

Software Freedom Law Center

Fall Conference at Columbia Law School

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October 28, 2016

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Session I : Blockchain

Software Freedom Law Center October 28, 2016

Digital Currency and Blockchain Technology

The Next Generation of Open Source Blockchains

Blockchain platform developed by banks to be open-source

Bitcoin and the Blockchain

Wrapping Your Head Around Private Blockchains

IRS Notice 2014-21, Virtual Currency Guidance

New York State Department of Financial Services Virtual Currencies Regulatory Framework THE DISRUPTER SERIES: DIGITAL CURRENCY AND BLOCKCHAIN TECHNOLOGY

HEARING

BEFORE THE

SUBCOMMITTEE ON COMMERCE, MANUFACTURING, AND TRADE

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTEENTH CONGRESS

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Gennaro (Jerry) Cuomo IBM Fellow Vice President, Blockchain Technologies House Energy and Commerce Subcommittee on Commerce, Manufacturing & Trade How to Capitalize on Blockchain March 16, 2016

Good Morning Chairman Upton, Ranking Member Pallone, Chairman Burgess, Ranking Member Schakowsky, and members of the subcommittee. My name is Jerry Cuomo and I am IBM's Vice President for Blockchain Technologies. Thank you very much for the opportunity to testify this morning. Technology and business leaders at IBM believe that blockchain is a revolutionary technology. It's a foundation for building a new generation of applications that establish trust and transparency while streamlining a wide variety of transactional processes. You are wise to include blockchain in your study of "disruptive" technologies because blockchain has the potential to vastly reduce the cost and complexity of getting things done—across industries, government agencies and social institutions.

I also want to tell you what blockchain is not, It's not Bitcoin, the cryptocurrency. While blockchain is the core technology that enables Bitcoin to operate, it can be used for entirely different purposes. Whereas Bitcoin is an anonymous network, blockchain can be used to set up trusted networks to handle interactions between known parties.

In this paper I'll explain what blockchain is, how it works, how it can best be built and used—for the benefit of business, the economy and society.

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Key points:

Blockchain creates trustworthy and efficient interactions. It's a distributed ledger shared via a peer-topeer network that maintains an ever-expanding list of data records. Each participant has an exact copy of the ledger's data, and additions to the chain are propagated throughout the network. Therefore, all participants in an interaction have an up-to-date ledger that reflects the most recent transactions or changes. (The "block" is the record and the "chain" is the collection of blocks that populate the ledger.) In this way, Blockchain reduces the need for establishing trust using traditional methods.

Blockchain technologies must be enhanced to meet the needs of businesses. The core technology must be adapted to further address security and privacy concerns—creating an enterprise-ready blockchain. In addition, computer systems and networks must be architected so they can scale up to handle an immense volume of transactions and industries and governments begin using the technology to handle their core organizational processes—and complete their tasks in seconds rather than minutes.

Blockchains must be open and interoperable. For blockchain to fulfill its full potential, it must be based on non-proprietary technology standards to assure the compatibility and interoperability of systems. Furthermore, the various blockchain versions should be built using open source software, with a combination of liberal licensing terms and strict governance, rather than proprietary software--which could be used to suppress competition. Only with openness will blockchain be widely adopted and will innovation flourish.

Blockchain will greatly benefit from government participation. It's critical from a national competiveness point of view for US companies and government agencies to lead the world in understanding the potential of blockchain and putting it to use. Because of the transparency made possible by blockchain, government agencies will be able to understand better what's going on within financial and commercial systems—and spot potential problems before they become critical. Blockchain

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will also enable more efficient interactions between government and businesses—regarding everything from taxes to land use.

Part 1: How Blockchain Can Be Used

Over the past two decades, the Internet, cloud computing and related technologies have revolutionized many aspects of business and society. These advances have made individuals and organizations more productive, and they have enriched many people's lives.

Yet the basic mechanics of how people and organizations forge agreements with one another and execute them have not been updated for the 21st century. In fact, with each passing generation we've added more middlemen, more processes, more bureaucratic checks and balances, and more layers of complexity to our formal interactions-especially financial transactions. We're pushing old procedures through new pipes.

This apparatus-the red tape of modern society-extracts a "tax" of many billions of dollars per year on the global economy and businesses.

What can be done? Businesses, governments and other institutions can use blockchains to build and govern business networks..

Blockchain-based systems could help radically improve whole industries, beginning with banking and insurance. But its impact could be much broader. It could make a difference whenever valuable assets are transferred from one party to another and whenever you need to know for certain that a piece of digital information — anything from electronic artwork to the terms of a business agreement — is unique and unchangeable by any party without the agreement of all parties.

I want to add a note of caution, however. Blockchain isn't the answer to every process- or transactionrelated problem. There will be situations where it will improve efficiencies and provide other benefits,

but there will be others where it's not a good fit. Furthermore, don't underestimate the technical and organizational challenges of building and adopting blockchain-based systems.

Here's where blockchain fits well—managing a business agreement between two or more companies. They can record the terms of that agreement on a blockchain, knowing it will execute and be enforced autonomously (e.g., "if you pay me in under 15 days, then I will give you a discount."). Nobody is in private control of the ledger and nobody can secretly change the terms of the agreement. It's like every guest at a B&B writing in the guest book with an indelible Sharpie. So, with blockchain, facts and agreements are recorded certifiably and indelibly, increasing trust, reducing risk, and thus reducing friction in business.

There's a broad range of potential business solutions. On one hand, enterprises will be able to re-imagine well known business processes and areas like supply chain, securities trading and logistics. At the same time, blockchain is poised to enable enterprises and whole industries to invent new digital business processes that include connected devices (Internet of Things) like cars, smartphones, appliances, solar energy panels, and drones. This capability could be critical, for instance, in enabling the insurance industry to design liability insurance policies to cover autonomous vehicles.

IBM is already begun deploying a blockchain-based system internally—for managing our commercial financing business.

The financial services industry is in the forefront of blockchain adoption. Almost every transaction in financial services involves multiple parties and many steps, largely because of the checks and balances that are required to assure that what has been promised has been done. Consider how the technology might be used in a critical financial services process, the settlement in securities trading. People in the industry are talking about a concept they call T+0, which means same day settlement. The hope is that they'll be able to use blockchain to strip out the inefficiencies and handoffs that are required to settle a

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trade so that settlement occurs on the same day as opposed to 2 or 3 days later as it is today, depending on the market.

Now, imagine supply chains where blockchain is put to work. An aircraft manufacturer, for example, might create a blockchain-based system for holistically managing all of its relationships with suppliers of parts and components. All of the suppliers will share the exact same information about a new aircraft model–every step in the process of planning, designing, assembling, delivering and maintaining it. At the same time, the manufacturer will use other blockchain-based systems for managing the financial relationships and transactions connected to each step. Thanks to blockchain, trust and accountability are built into supply chains. So are compliance with government regulations and internal rules and processes.

Blockchain fundamentally changes the game across three dimensions: time, cost, and risk. It reduces the time required to settle a multi-party contract from days to seconds, potentially. It reduces costs by stripping out intermediary organizations and processes. And, by enabling permissioned networks to share a transparent and non-changeable ledger, you reduce the risk of tampering, fraud and collusion.

Part 2: How Blockchain Works

Blockchain is both a software technology and a mechanism for groups working together.

At the heart of the blockchain network is a shared ledger, which describes assets, identifies their owners, lays out the steps in a process and records when each step is completed. Only at that point is the exchange of things of value consummated. The ledger has three important properties: replication, which synchronizes all of the copies of the ledger in the network; consensus, which assures that all ledgers are exact copies; and permissions, which ensure that members of a network can only see items in ledger that involve them.

When an entry is agreed to and committed to the blockchain's shared ledger, it cannot be changed. This is a critical feature, which differentiates blockchain's ledger from most database technologies--where entries can be updated and deleted. This makes blockchain resistant to tampering and provides clear audit trails for parties in transactions and government investigators to follow.

Another critical element of blockchain technology is the "smart contract." These are terms of agreement that are captured in software and stored and executed within the blockchain. The smart contracts automatically fulfill the obligations that members have agreed to. A blockchain is an ideal place to store and run such contracts because of its immutability and cryptographic security.

In our view, however, most blockchain implementations, and the tools surrounding them, aren't yet ready for many serious business uses. The concept and architecture are taking form, but some key capabilities and standards are missing or only now emerging. For instance, many enterprise applications require more extensive security capabilities than most of today's blockchain implementations offer. Within healthcare, more extensive privacy protections are needed.

So IBM and others in the industry are augmenting the core blockchain technologies with additional features. One goal is to ensure that institutions and individuals (whether participants or not) can only access information they're supposed to see. A key element is "entitled access," which is achieved by using modern cryptography so access to private data requires presentation of encryption keys/certificates held by authorized participants.

We're also taking steps to ensure that participants cannot commit fraud or collude in ways that jeopardize the integrity of the blockchain. Fraud and collusion resistance is achieved by ensuring that every transaction is validated by all the members of the blockchain networks, which might include regulatory and clearinghouse institutions.

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Lastly, we're enabling regulators, with permission, to check for regulatory compliance, and for law enforcement with proper judicial authority, to access details of transactions in the course of criminal investigations.

These additional features will be essential in healthcare scenarios, where the privacy of individuals is both a legal and moral imperative. Blockchain can prevent against accidental or malicious privacy breaches by requiring both encryption and multiple signatures to approve access to sensitive information. There might be a mechanism, for instance, that for a patient record to be seen, a doctor, a nurse and the patient must approve within the blockchain.

Part 3: Why it's Critical for Blockchains to be Open and Interoperable

It's essential for blockchain technology to be developed following the open source model so a critical mass of organizations will coalesce around it—and reap its full benefits. Because of open source rules, participants can trust that the technology will fulfill their needs and conform with industry standards—assuring interoperability between blockchain applications. Also, by sharing the foundational layer, the participants can focus their individual efforts on industry-specific applications, platforms, and hardware systems to support transactions.

An open source blockchain with liberal licensing terms and strict governance will enable the broadest adoption of blockchain by regulated industries. The liberal licensing terms will accelerate innovation, and the strict governance will hasten adoption and regulatory acceptance.

Given the nature of a blockchain network, industry users and regulators of blockchain are going to want visibility right down to the source code to verify its source, accuracy and security.

We believe that the best path forward for blockchain is for the tech industry, government, and the business community to consolidate their efforts around a single open source blockchain foundation

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that's developed and governed in an environment of transparency and cooperation. We also believe that organizations will be best served if they use industry-specific or function-specific extensions of that technology, which are created and governed following the same principles. An example of this might be a banking framework that deals with loans, lenders and borrowers.

There are several open source blockchain projects, but only the project managed and sanctioned by the Linux Foundation, called Linux Hyperledger, offers industry friendly terms and multi-company governance. That's why we're participating in the Linux Hyperledger project and urging others to do so as well.

The Linux Foundation announced the project last December. Founding members of the initiative represent a diverse group of stakeholders, including ABN AMRO, Accenture, ANZ Bank, BNY Mellon, Cisco, The Depository Trust & Clearing Corporation (DTCC), Deutsche Börse Group, Digital Asset Holdings, Fujitsu Limited, IBM, Intel, J.P. Morgan, R3, Red Hat, SWIFT, VMware and Wells Fargo. Already, several companies, including IBM, have contributed high-quality software code, technology, and intellectual property rights. The transparency, collaboration and shared governance of this project makes it attractive to participants—whether they're technology companies or enterprises who want to deploy the technology. The reaction to the announcement was overwhelming. More than 2300 organizations or individuals have asked to participate, the highest such tally in the Linux Foundation's history.

Part 4: Government's Stake in Blockchain

Blockchain is a true technology phenomenon. Less than a year ago, it was little known outside a small group of technologists. Now, it's making headlines everywhere and businesses and governments are scrambling to come to terms with it.

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The good news for government leaders is that Blockchain has the potential to transform governmental processes as fundamentally as is does those of the businesses—providing superior levels of transparency, accuracy and efficiency. It could help governments do everything from collect taxes and deliver social services benefits, to manage land registries and assure the integrity of government records.

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Take the US Social Security system, for instance. It involves the federal government, millions of employers, their payroll service providers, and more than 200 million beneficiaries and working individuals who are paying into the system. This is a model scenario for blockchain. There are many parties, many rules, many steps in the process of administering the system, and a critical need for very high levels of privacy protection and security from breaches.

Other potential uses of the technology are quite intriguing. What if the US government began issuing regulations and monitoring compliance via blockchain technology? And what if the government implemented the taxation system with blockchain. Individuals and businesses might never have to file an income tax return. Instead, a blockchain network noting their tax obligations and recording their financial transactions would continuously invoke the tax code, assess taxes and transfer money. No need to file a tax return.

The possibilities are endless, yet most governments around the world have not yet begun to come to terms with blockchain.

In my view, there's a clear role for government—cribbed liberally from a position paper issued recently by the UK government. It should:

Use blockchain technology. Government should act as an early adopter and start deploying the technology for projects like voting, recording land registries, managing immigration, and the like

Invest in research. Just as the National Institute of Standards and Technology works with industry to develop and apply technology, measurements, and standards, the government should investigate to make sure blockchain technology is robust, secure and scalable, while understanding the ethical and social implications of potential uses and the costs and benefits of adoption.

Create a regulation framework. The government needs to make sure that blockchains are being used in accordance with US laws while avoiding the stifling of innovation through excessive or rigid regulations.

Set standards to ensure security and privacy. The government needs to work with academia and industry to ensure that standards are set for the integrity, security and privacy of distributed ledgers and their contents. These standards need to be reflected in both regulatory and software code.

Conclusion

Blockchain is a classic emergent technology. It appears to have a broad set of uses and benefits, but it's so strikingly different from what people are used to that many business and government leaders alike are adopting a wait-and-see attitude. We applaud judicious caution, but, at the same time, we believe that organizations and institutions that don't quickly assess the potential of blockchain and begin experimenting with it risk falling behind as the world undergoes what we see as a tectonic shift. Therefore, we urge Congress and the Obama administration to study and discover the best uses of blockchain for the US government and the best regulatory approaches to maximizing its potential while protecting the interests of citizens. Blockchain may have begun its existence in the shadows of the crypto currency realm, but it now stands in the open—a powerful tool ready to serve business and society.

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Written Statement by:

MATTHEW ROSZAK Chairman, Chamber of Digital Commerce Co-Founder, Bloq, Inc.

Prepared for:

COMMITTEE ON ENERGY AND COMMERCE OF THE UNITED STATES HOUSE OF REPRESENTATIVES Subcommittee on Commerce, Manufacturing, and Trade "Disrupter Series: Digital Currency and Blockchain" March 16, 2016 | Washington, DC

bloq

INTRODUCTION

Good morning and thank you Chairman Burgess and the entire Subcommittee for the invitation to testify today about digital currencies and blockchain technology. I would also like to take this opportunity to commend your staff for the thoughtful engagement and preparation going into today's hearing.

My name is Matthew Roszak and I am very pleased to be here on behalf of the Chamber of Digital Commerce, where I serve as Chairman. The Chamber is the world's largest trade association representing the digital asset and blockchain industry. Our mission is to promote the acceptance and use of digital assets and blockchain-based technologies. Through education, advocacy, and working closely with policymakers, regulatory agencies and industry, our goal is to develop a pro-growth legal environment that fosters innovation, jobs and investment. Our membership is open to all those investing in and innovating with blockchain technology and is composed of the key blockchain companies, global technology firms, and financial institutions.

I'm from Chicago, Illinois, and have been working as a venture capitalist and technology entrepreneur for 20 years – and have invested over a \$1 billion of capital, and founded a dozen companies during my career. Over the last 3 years, I have invested in over 20 companies in the digital currency and blockchain industry through my investment firm, Tally Capital – and more recently, I co-founded a blockchain enterprise software company called Bloq with Jeff Garzik, a technology visionary and core developer of bitcoin. Bloq enables leading companies to scale their blockchain platforms with supported software and services.

In only a few short years, a technology that began as an alternative digital currency has captured the imaginations of thousands of innovators around the globe, and has created a generational opportunity for entrepreneurs and investors – that translates into *once in a lifetime* – think railroads, automobiles, telephony and the Internet – it has the potential to play on that scale, or even greater. This potential and sharing these perspectives is why I am here to testify today.

From the recent covers of the Economist¹ and Bloomberg², if it feels like you're reading about blockchain technology everywhere, well it's because you are – and there's a good reason for that.

Blockchain technology is one of the most important inventions in the history of finance – and the functions of many middlemen will soon get disrupted – and decentralized, peer-to-peer networks will move in, to reduce tons of friction and save billions in transaction costs, while unlocking incredible financial access and personal privacy to the world.

New products and services derived from blockchain technology have the potential to revolutionize entire categories of industry – including banking, government records, title and asset ownership, digitization of and encryption of medical records, digital identity, trading, clearing and settlement, secure voting systems, and many others.

¹ The Promise of the Blockchain, The Economist (Oct. 31, 2015)

http://www.economist.com/news/leaders/21677198-technology-behind-bitcoin-could-transform-how-economy-works-trust-machine

² Edward Robinson and Matthew Leising, Blythe Masters Tells Banks the Blockchain Changes Everything (Aug. 31, 2015) http://www.bloomberg.com/news/features/2015-09-01/blythe-masters-tells-banks-theblockchain-changes-everything

Digital currencies allow for money to be programmable. With bitcoin, the world's smartest and most creative software developers have an open platform on which to build products and services that will allow individuals, businesses, governments and even machines to do business with each other more efficiently and productively.

The blockchain is a newly created medium of and platform for money (or anything of value for that matter). Money has been redefined in the past -- from bricks of salt, to cowry shells, to wampum, to tally sticks – the utility of paper money will soon go away. Today, banking and finance are again in the process of being completely redefined. Digital currencies and blockchain technology create an entirely new operating system for money.

Not only is all of this a technological marvel, but it has also become the start of an impactful social movement for individuals, industries and governments.

WHAT IS BITCOIN AND WHAT IS THE BLOCKCHAIN?

When we talk about bitcoin, it is important to make a distinction between bitcoin the currency and the blockchain. While most of the discussions, hearings and debates (and the often sensational press coverage) among regulators, innovators, and public policymakers regarding bitcoin have focused on its use as a digital currency, some of the greatest potential for bitcoin does not lie in its use as a currency, it lies within the blockchain.

The blockchain is a peer-to-peer digital asset transfer system that is independent of any thirdparty intermediary, including financial institutions and governments. In short, it is open-source

software that is available to the public. Anyone and everyone may have access to it and innovate with it.

The first blockchain application was bitcoin the digital currency and is still what most people think of today when they think of bitcoin. What makes the bitcoin digital currency so unique is that it is based entirely on mathematics. In other words, no longer do consumers need to rely on a financial institution to settle transactions, the settlement process is integrated into the software network, via complex math verification features, making sending money instant, globally accessible, and extremely cost-effective.

Bitcoins can be bought from exchanges, ATMs or from other users. Bitcoin users are assigned a unique encrypted identity and can conduct transactions with other users that are recorded on a public ledger (i.e., blockchain) and are visible to computers on the network, but does not reveal any personal information about the parties to the transaction.

The blockchain holds a radically transparent, public ledger of all bitcoin transactions. It also verifies and authenticates these transactions. In addition, anyone may independently audit the transactions.

Bitcoin would not have happened without open source, and the transparency associated with it. Engineers and early enthusiasts could read the source code for themselves. Adopters did not have to trust Satoshi (bitcoin's creator) – just trusted the math, not the man. There are no hidden pieces of the puzzle with open source software. Open source creates more secure, trusted software through peer review, just like biology or chemistry or another science. Bitcoin and blockchain technology is trusted because it has been widely reviewed by cryptography experts as well as battle tested in the field for years.

Open networks spur permissionless innovation, which creates a vibrant, fast-paced technology community that promises a more secure, more transparent world.

THE INTERNET AND THE BLOCKCHAIN

We are still very early in the evolution of digital currencies and blockchain technology – akin to the dial-up phase of the early Internet

Blockchain technology possesses many of the same attributes as the Internet. It is an open and global infrastructure upon which many other technologies and applications can be built upon. The Internet is used to connect people and send information around the world instantly.

However, sending anything of value over the Internet is an issue developers have been working on for decades, as the process was very susceptible to hacks, attacks, double spending, criminals, and other issues.

The invention of the blockchain's decentralized, cryptographically secured, public ledger is a technological leap in computer science allowing anyone to send anything of value or to establish an immutable record over the Internet instantly, efficiently, securely, and without the need for a trusted third-party intermediary.

On the horizon we are going to combine the Internet of information with the Internet of money -- these two things compound each other – the Internet as we know it is great for collaboration

and communication, but deeply flawed when it comes to commerce and privacy – blockchain technology fixes that – which means loans without banks, contracts without lawyers, and stocks without brokers, executed and recorded across hundreds of servers at all corners of the earth. Some things are hard to explain, or understand, until you experience them. In 1994, *The Today Show* ran a small discussion of a new technology called "The Internet". It did not go well as Katie Couric thought that the "@" symbol stood for "about" – and they eventually had to ask a producer off-camera "what Internet is.³"

By the way, the 1994 Internet had 2,700 web pages, compared to today's Internet with over 1 billion web pages.

BITCOIN'S STATE OF THE UNION

Taking a famous quote from Charles Dickens' book, *A Tail of Two Cities*: "It was the best of times, it was the worst of times..." – this very much applies to bitcoin today.

Bitcoin has certainly had its share of negative PR – between SilkRoad and Mt. Gox – to price volatility, wallet hacks and ransomware – however the tide has turned dramatically over the last couple of years.

Investment in and innovation on the blockchain, since the publication of the original Bitcoin Whitepaper⁴ in 2008, has grown exponentially. Venture investment has eclipsed \$1 billion in

³ The Today Show. "Flashback! The Internet in 1995 | Archives" YouTube (Jun. 13, 2014) https://www.youtube.com/watch?v=95-yZ-31j9A

⁴ Satoshi Nakamoto. "Bitcoin: A Peer-to-Peer Electronic Cash System." (Nov. 2008) https://bitcoin.org/bitcoin.pdf

the past year⁵, some of the best and brightest from Silicon Valley to Wall Street to K Street are all racing into the industry, along with over 100,000 merchants now accepting digital currency for their goods and services.

Prominent financial institutions and technology companies including Bank of America, Citi, Deloitte, Foxconn, Goldman Sachs, IBM, Intel, PwC, Microsoft, NASDAQ, Samsung, UBS, and many more have dedicated significant resources to study, experiment, and innovate with blockchain technology.

Over 50 household name global banks have publically announced their respective blockchain initiatives, Wall Street is now marching to the beat of the blockchain drum. So are banks on the brink, or on the offensive? A report from Santander InnoVentures⁶ estimates that blockchain technology would yield over \$20 billion in annual costs savings for banks by 2022.

Historically, banks have had a love-hate relationship with technology going back to the early days of the Internet and even Y2K, mobile proliferation and then having their systems pressure tested during the 2008 financial crisis. Today, banks don't face competition by other banks, but by the developer sitting in Silicon Valley. The unbundling of financial services is playing out in front of our eyes – starting with companies like PayPal, to today's challengers like Lending Club, Square and Venmo – all of which will only be further magnified with the proliferation of blockchain enabled payment rails.

 ⁵ CoinDesk. Bitcoin Venture Capital Report. http://www.coindesk.com/bitcoin-venture-capital/
 ⁶ Mariano Belinky, Emmet Rennick and Andrew Veitch. "The Fintech 2.0 Paper: rebooting financial services." Santander InnoVentures http://santanderinnoventures.com/wp-content/uploads/2015/06/The-Fintech-2-0-Paper.pdf

DEBATE IS A FEATURE, NOT A BUG

Bitcoin is a car going down the road at 1,000 mph. Developers are not the drivers of this car, yet they are tasked with repairing and upgrading this car without turning it off, stopping it or rebooting it.

I'd like to discuss a challenge the Bitcoin community is currently facing – something tells me this Committee might be able to relate.

Making decisions in a decentralized system is not easy — the bitcoin ecosystem is currently facing some significant growing pains as the number of transactions has been growing exponentially — over 200,000 transaction per day. This is a clear measure of success and a testament to bitcoin's adoption and evolution. The current challenges reside in finding a path forward on how to increase the throughput of the system, and drive more transactions to support the growth of this platform.

Unlike a government or corporation, there are no "Members of Congress" in Bitcoin, nor a CEO or board of directors. That is all purposeful and part of the fundamental power and beauty of Bitcoin's math-based system. However when there is friction in the system on a particular topic, the gridlock can be overwhelming. It is a bit like trying to change the rules to "rocks-paperscissors."

Furthermore, the current challenges do not really reside in any specific technical component. Instead, the issues reside in the human factor of communication, and finding a way of building

consensus during the early days of this \$6.5 billion railway. The debates, fights and passions involved are in many ways a feature and not a bug of the network.

There's an opportunity on the horizon to create a more robust forum for discussion, debate and consensus building — with clearer ways to outline goals, priorities and risks involved in any particular scaling path moving forward. This discussion forum could act like a barometer for various stakeholders, which ultimately vote on which scaling path to run on their systems.

There are several well-known examples of sharing ideas and driving consensus, even with your greatest competitor or your worst enemy. Some of these platforms include W3C, ICANN, Wikipedia, Linux, and even the United Nations — a subset of the best practices utilized by these organizations could be leveraged and applied to Bitcoin.

Any healthy community will draw on the strength of its members. Bitcoin has done this to a degree which is, frankly, astounding. It is living proof that, when people are dedicated to a common cause, the best and brightest ideas will rise to the top. Extremely talented and brilliant people have solved some of Bitcoin's toughest problems. These "statesmen" usually work for free, as volunteers, purely out of a love of the technology.

Through their efforts, the systems' features, security and resilience have all improved dramatically. Problems are identified and solved. Bitcoin learns, and heals; it reacts to stresses and it evolves.

But, as it grows, it faces governance challenges which it is currently struggling to overcome. These challenges, I would imagine, are similar to those faced by the US Congress on a daily basis. This industry needs a *call to action* to resolve its differences and find a path forward.

CONCLUSION

Digital currency and blockchain technology is an important emerging area that has the potential to transform the financial services industry, and beyond. An October 2015 Congressional Research Service (CRS) report⁷ cites three potential benefits of bitcoin: 1) Lower transaction costs for electronic economic exchanges; 2) Increased privacy; and 3) No erosion of purchasing power by inflation. These benefits continue to increase as the number of bitcoin users and businesses entering the digital currency market grows. These factors will call for greater oversight of the industry not just by federal agencies but by Congress as well. Additionally, states are now starting to weigh in through legislation and regulation. Congress could play an important role by establishing uniform standards that could preempt conflicting state laws and provide greater clarity to the industry and its stakeholders.

Given the amount of financial and intellectual capital being poured into this ecosystem, I see great promise in blockchain technology – and that development will require cooperation among industry, technologists and regulators – an open dialogue with policymakers is a critical ingredient to this industry's long term success.

⁷ "Bitcoin: Questions, Answers, and Analysis of Legal Issues." Congressional Research Service (October 13, 2015) https://www.fas.org/sgp/crs/misc/R43339.pdf

However government does not move at the speed of innovation and there needs to be a balanced approach applied as to not impair investment flows, job creation and innovation. There are currently over 1,000 startups betting their lives on blockchain-enabled technologies. Applying light touch regulation – similar to the UK, Singapore and Canada – with a "wait and see attitude" (much like the early Internet) will create jobs for Americans and help keep innovation in the United States.

In conclusion, I believe digital currencies and blockchain technology have the potential to benefit society with privacy, security and freedom of conveyance of data — which in my mind, ranks up there with life, liberty and the pursuit of happiness.

Thank you, and I look forward taking questions and discussing these topics further with you.

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Home > The Next Generation of Open Source Blockchains

The Next Generation of Open Source Blockchains [1]

Never before has any open source project generated as much attention on the international stage as Bitcoin.

But Bitcoin, a cryptocurrency platform void of allegiance to any nation or financial institution, is just the first of an expanding and more sophisticated class of open source blockchains expected to revolutionize the exchange of all digital assets -- money, real estate, music and intellectual property -- in future commerce.

The <u>Bitcoin Foundation</u> [2] continues to develop its peer-to-peer payment network under an MIT license. The value of Bitcoins has fluctuated up and down, and while some naysayers have already pronounced its death, backers saw an upswing after Brexit.

However Bitcoin pays off, inherent in its survival is growing acceptance of blockchain platforms and their open source roots -- and the notion that no financial company, merchant or government should control the technology platforms or the transactions.

"The only way a blockchain can work is to have open APIs and open source approach," said Judith Hurwitz, owner of Hurwitz & Associates, pointing to investments by IBM and SAP in blockchains, also often referred to as Distributed Ledger Technology.

Loyyal Corp, of New York, is developing a rewards platform on multiple blockchain platforms.

"I personally see the blockchain industry as a free market of commoditized trust ...commoditized for the first time ever in human history [and] a blockchain is the interface for the customization of that commoditized trust for each consumer's needs," said Loyyal CEO Greg Simon. "What matters is the users trust the code enough to use the platform and the transparency of open source reduces the cost of trusting the platform."

The second generation of open source blockchain projects - Ethereum [3], Hyperledger Project [4], MultiChain [5], Eris [6], and Ripple [7] -- illustrate how platforms are evolving in different directions to support distributed transactions and contracts of all types.

"Bitcoin is an application of a distributed ledger like PowerPoint is to Windows. Hyperledger is a distributed ledger, like raw Windows, and a much broader range of contracts is possible," said Sam Ramji, CEO of Cloud Foundry, who also points out that openness is core since the platform is designed for digital trust and settlement.

"There is a need for a commons to support civil utilities like Linux, Apache, Hadoop and Cloud Foundry -- we're in a moment where every company depends on software as much as they depend on electricity or cash," Ramji added. "A distributed ledger for everyone on the planet is just such a project."

And the explosion of these open source projects -- from Ethereum to Hyperledger to Ripple, illustrates the rapid pace of adoption and experimentation.

"We expect blockchain technology to well and truly break out of its FinTech niche in 2016," wrote Duncan Johnston-Witt, CEO of Cloudsoft and a member of the Hyperledger Project.

Last month, for example, ATB Financial announced its collaboration with SAP and Ripple has already paid off with the launch of an international blockchain payment system from Canada to Germany.

What is a blockchain?

The blockchain consists of a series of interconnected storage blocks, distributed across servers throughout the globe, each with time-stamped batches of transactions that are highly secure.

"A blockchain is a distributed, decentralized database that is specialized in storing transactions [and] it is architectured to be secure even if one or more of the nodes running are compromised," said Gilles Gravier, Director and Senior Advisor of Global Open Source Practice, Wipro Limited. "Transactions processed and stored are immutable. They can't be rolled back or modified after the fact. Blockchains can be shared publicly (permissionless) or shared among a limited, selected, group of entities (permissioned)."

There are many platform forks derived from Bitcoin, including, most notably, Ethereum, which delivered its first platform in July of 2015.

Ethereum, dubbed Bitcoin 2.0 and founded by an original developer of Bitcoin, is a public blockchain offering smart contract features that contains a virtual machine executing peer-to-peer contracts using a cryptocurrency known as Ether. Formally established in Zug, Switzerland in June 2014, the Ethereum Foundation has support from Microsoft, Deloitte and Touche, IBM, and JPMorgan Chase.

Ethereum software-as-a-service is now certified to run on Microsoft's Azure cloud platform, for instance.

"Ethereum is a decentralized platform that runs smart contracts: applications that run exactly as programmed without any possibility of downtime, censorship, fraud, or third party interference," according to the project web site, noting that the platform can be used to crowd fund to sell products or auction off items. "These applications run on a custom built blockchain, an enormously powerful shared global infrastructure that can move value around and represent the ownership of property ... all without a middleman or counterparty risk."

Blockchain project differences

One core differentiation from one platform to another is whether they are permission-less, like Bitcoin and Ethereum, in which anyone can join or create blocks, or permissioned platforms such as Hyperledger, MultiChain, and Eris. MultiChain is backwards compatible with Bitcoin but is a private blockchain platform, said Gideon Greenspan, CEO and founder of Coin Sciences, developer of MultiChain, which is in alpha testing.

The Hyperledger Project, announced by The Linux Foundation last December and backed by IBM, Intel, Cisco, JPMorgan, Wells Fargo, the London Stock Exchange, Red Hat, and Swift, is at work on its 1.0 release of Fabric.

The Fabric codebase, based on IBM's <u>Open Blockchain</u> [8], was "built specifically to focus on permissioned chains - chains where the nodes are not anonymous to each other but are known and permitted by mutual consent," explained Brian Behlendorf, executive director of the Hyperledger Project and founder of the Apache Software Foundation.

"This means there is no anonymous participation in the chain. However, it allows for a much simpler form of consensus ... and it also means that you can set a much higher transaction volume than that defined by Bitcoin or Ethereum."

Eris and HydraChain [9] are forks of Ethereum yet have been retooled as permissioned blockchains. Unlike cryptocurrencies, permission blockchains are often demanded by enterprises and financial institutions that require consensus of participating parties.

Another distinction, notes Luxoft Technology Strategist Vasiliy Suvorov, is how transaction data is submitted and validated on a ledger.

Suvorov, whose company, like Ethereum, is based in Zug (known as Crypto-Valley), said token-based blockchains, such as Bitcoin, and Smart Contract-based blockchains such as Ethereum, <u>Tendermint</u> [10], and Eris, appeal to different classes of users but no doubt the second generation platforms are gaining more traction.

"As of late, many are considering switching to Ethereum. Scalability issues with Bitcoin and lack of support for more complex logic drive popularity of Ethereum and the price of Ether higher," Suvorov claimed, noting that many enterprises are developing prototypes on Ethereum. "Hyperledger and Microsoft Bletchley [an architecture and set of tools proposed by Microsoft that will allow different DLT to run on its Azure cloud] will be a great alternative and will gain popularity when ready.

Blockchain adoption on the rise

The R3 Project, for instance, connects more than 40 banks to distributed ledgers of Ethereum, Chain.com, Eris Industries, Intel, and IBM running on Microsoft Azure. In January, R3 CEV launched its distributed ledger experiment with Barclays, BMO Financial Group, Credit Suisse, Commonwealth Bank of Australia, HSBC, Natixis, Royal Bank of Scotland, TD Bank, UBS, UniCredit and Wells Fargo. As part of that, the banks were connected on an R3-managed private peer-to-peer distributed ledger, based on the Ethereum technology and hosted on a virtual private network in Microsoft Azure.

The Moscow Stock Exchange is moving forward on Hyperledger. In a public statement last month, Sergei Poliakoff, CIO of Moscow Exchange, which recently became a member of Hyperledger, said "we believe in the future impact of distributed ledger technologies for the whole financial industry. Our team has been exploring possible applications of Blockchain in trading, clearing and settlement."

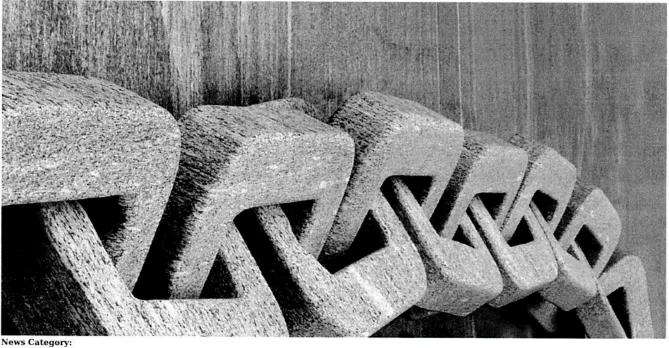
Most of the industry's players are very optimistic about the market prospects for public and private blockchains but it's clear that it will take a little time to evolve, at least outside of the financial services industry.

The CEO of MultiChain maintains his private blockchain -- and many other private blockchains under development -- will appeal to many industry sectors outside of finance including insurance, healthcare, distribution, manufacturing and IT -- in time.

"It will take many years to become mainstream , or at least to reach its full market potential because right now the products are very new and not yet mature," said Greenspan.

"It's not too outlandish to think that in five years time, every Fortune 500 company and perhaps even the top 1000 will have deployed a blockchain somewhere," said Hyperledger's Behlendorf.

Tags: enterprise [11] blockchain [12] bitcoin [13] distributed ledger [14] Hyperledger Project [15] MultiChain [16] ethereum [17] Image:



Enterprise [18]

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Exclusive: Blockchain platform developed by banks to be open-source



UBS employees work in the UBS "fintech lab" at Canary Wharf in London, Britain, October 19, 2016. REUTERS/Hannah McKay

By Jemima Kelly | LONDON

A blockchain platform developed by a group that includes more than 70 of the world's biggest financial institutions is making its code publicly available, in what could become the industry standard for the nascent technology.

The Corda platform has been developed by a consortium brought together by New-York-based financial technology company R3. It represents the biggest shared effort among banks, insurers, fund managers and other players to work on using blockchain technology in the financial markets.

Blockchain, which originated in the digital currency bitcoin, works as a web-based transactionprocessing and settlement system. It creates a "golden record" of any given set of data that is automatically replicated for all parties in a secure network, eliminating any need for third-party verification.

Banks reckon the technology could save them money by making their operations faster, more efficient and more transparent. They are racing to build products using the technology that will generate new revenue, with dozens of patent applications filed for blockchain-based products by Wall Street's top lenders.

R3 says it hopes its platform will become the industry standard, although its intention is indeed for firms to build products on top of it.

"We want other banks and other parties to innovate with products that sit on top of the platform, but we don't want everyone to create their own platform ... because we'll end up with lots of islands that can't talk to each other," R3's chief engineer, James Carlyle, told Reuters.

"If we have one platform with lots of products on top, then we get something that's more like the internet, where we still get innovation but we can still communicate with each other."

Corda's code will be contributed on Nov. 30 to the Hyperledger project - a cross-industry project led by

the non-profit Linux Foundation to advance blockchain technology by coming up with common standards.

Corda - which uses the same technology as bitcoin but restricts access to transaction data and can handle more complex transactions - was developed specifically for the financial world, such as for the processing of securities and derivatives and for payments.

"Blindly investing millions of dollars in small, disparate technology projects is not appropriate for banks at a time when budgets are stretched," said R3's chief executive, David Rutter.

"The risk of backing the wrong horse could far outweigh the potential gains. Given that the power of this technology lies in its network effect, the consortium model is the ideal method to get it off the drawing board and into the wholesale financial markets."

ThomsonReuters is a member of R3's consortium.

(Reporting by Jemima Kelly, editing by Larry King)

Bitcoin and the Blockchain

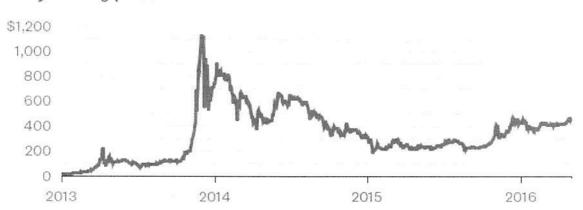
By Olga Kharif | Updated Aug 3, 2016 4:52 PM UTC

When bitcoin broke into public consciousness in 2013, it couldn't have been sexier: a digital currency being used for everything from drug deals to cupcakes. Three years later, there's a new wave of excitement about an aspect of bitcoin that is a bit less sexy: public online ledgers. The blockchain – the technology used for verifying and recording transactions that's at the heart of bitcoin – is now seen as having the potential to reshape the global financial system and possibly other industries.

The Situation

More than 40 banks including Barclays and JPMorgan Chase are part of the R3 consortium, which is working on ways to use the blockchain for money transfers, record keeping and other back-end functions. Nasdaq Inc. is already using the blockchain – with help from startup Chain.com – for trading securities in private companies. In a pilot project, the exchange is also using the

technology to allow people who have established "digital residency" in Estonia to cast absentee shareholder votes in publicly traded companies there without a proxy. In January, the Australian Stock Exchange signed a contract with blockchain startup Digital Asset Holdings to speed up its clearing and settlement services in the cash equities market. But while blockchain is winning converts, digital currencies have had their ups and downs. In April, Russia said it's planning to punish users of cryptocurrencies. The price of ether, a newer virtual currency, plunged after hackers hit a crowdsourced venture capital fund that relied on it. The bitcoin community has become increasingly split over software and governance issues, leading a number of former proponents to walk away. The price of bitcoin rose through the first half of 2016 in anticipation of a reduction in supply written into the currency's software. But the theft of \$65 million worth of bitcoin from a Hong Kong-based exchange and a subsequent drop in the currency's value was a reminder of its many uncertainties.



Bitcoin Goes Up and Down

Daily closing price

SOURCE: BLOOMBERG

The Background

Virtual currencies aren't new – online fantasy games have long used them – but the development of a secure digital currency without a central issuer rightly turned heads. The person or people who created the bitcoin system under the pseudonym Satoshi Nakamoto solved a problem central to any currency – how to control its issuance, i.e., prevent counterfeiting – and did it without relying on a government's authority. The software also solved one specific hurdle for digital money – how to stop users from spending the same unit of currency twice. The breakthrough idea was the blockchain, a publicly visible, anonymous online ledger that records every single bitcoin transaction. It's maintained by a network of bitcoin "miners" whose computers perform the calculations that validate each transaction, preventing double-spending. The miners earn a reward of newly issued bitcoin. The pace of creation is limited, and no more than 21 million bitcoins will ever be issued.

The Argument

Since bitcoin first boomed, there's been no shortage of critics to call its rise a bubble and to argue that the currency has no intrinsic value. But entrepreneurs in the field say that focusing on the price of bitcoin is missing the point – its value is as proof of concept for a new kind of payment system not reliant on third parties like governments, big banks or credit-card companies. Promising applications of the blockchain system include moving money abroad, signing contracts, clearing complex financial transactions and as a medium for micro-payments in emerging countries. Others say blockchain advocates are hyping what amounts to no more than a new kind of database. Will bitcoin itself be left behind in the blockchain rush? Even some of the currency's canniest boosters always said there was no guarantee that it would ever break into the monetary mainstream. As the bitcoin community has grown more divided, some have grown more pessimistic. Mike Hearn, a former member of the core team that updates the bitcoin software, said in 2013 that the "most plausible outcome" was that bitcoin would become a niche currency. In January 2016, he called it an experiment that had failed.

The Reference Shelf

- A Bloomberg Businessweek article looking at how interest in blockchain is surpassing that in bitcoin.
- Bloomberg Television has a video primer as part of its "The 12 Days of Bitcoin" series
- Bloomberg Markets traced the interest of Silicon Valley investors in bitcoin.
- CoinDesk has a Bitcoin price index; Bitcoincharts.com has a range of data.
- Two explainers, one aimed at kindergarteners and the other a you-toocan-mine-bitcoin project, plus an exploration of the double-spending problem.
- The New Yorker looks at Dark Wallet, a project meant to speed the spread of bitcoin, from the law student who invented the printable gun.

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Wrapping Your Head Around Private Blockchains

<u>Christine Hall</u> Thu, 2016-09-08 16:42

Anyone trying to understand the business potential of blockchains, which are being advertised as the up-andcoming next "greatest thing," might want to take a look at how the technology is already being used. At the most recent LinuxCon, Donna Dillenberger with IBM's Watson Research Center explained how Big Blue is already implementing the Linux Foundation's <u>Hyperledger project</u>.

"We have four thousand suppliers and partners all over the world that are sending us parts to build computers," she explained. "That causes us to have 25,000 disputes every year."

The nature of the disputes would be headaches familiar to any business office. Vendors might say they sent IBM an invoice, which the company has no record of receiving, or that a part was shipped with the company finding no record that it arrived. At IBM, the average dispute amounts to about \$31,000 and each dispute takes 44 days to resolve.

The company's solution was to ask all of its vendors to use its private blockchain. This means that when vendors send an invoice they also put a record of the invoice on the blockchain. IBM then posts a blockchain record when the invoice is received. Likewise, a record is put on the blockchain to indicate that a product has been shipped, and IBM posts a notice when the item arrives.

With this system in place, vendors no longer have to spend time on the phone with a call center to track down an unpaid invoice, but can check the blockchain to see not only whether it was received, but also whether it's been approved and if a payment is on the way.

"It's cut down the amount of time that it takes to resolve a dispute," Dillenberger said.

Also at LinuxCon, Hyperledger's executive director, Brian Behlendorf, offered a hypothetical scenario that might have helped lessen the impact of the last recession.

"In 2008, when the home mortgage and real estate market disaster unfolded," he said, "the biggest reason for the panic selling was the fact that you had companies selling tranches of risk in mortgages, which meant that somebody's mortgage might be owned by a hundred different banks if their mortgage had been sliced and diced by many of the operations. The problem was, as things started to fall apart no one could find the paperwork, and when no one can find the paperwork on your house, you can't sell it, or if you can, you have to sell it for pennies on the dollar. This became a real nuts and bolts real asset emergency and part of that was because there wasn't a way to quickly look this up, there wasn't a record of these transactions that independently could be gone through.

"I'm not saying blockchain would've solved that," he added, "because there could have been bad applications or incomplete applications. But many people say this is the kind of technology that could try to help keep the next

major disaster like that from being about a paperwork disaster."

The Hyperledger project's blockchain is a "private" blockchain that differs from "public" blockchains, such as the one that was developed for Bitcoin around 2008, in three major ways that are essential for business use. Not only can each posted item be encrypted, permissions can be put in place to determine who can view the item. In addition, each item can be digitally signed to identify who posted it.

Businesses are jumping on the bandwagon for this technology, which can be seen by the number of sponsors who've signed on for the Linux Foundation's efforts. "Initially when it launched there were about 20 sponsors who said let's come together to get this kicked off," Behlendorf said. "There are now 80 different sponsoring members, everyone from companies like Airbus, who is looking at using blockchain technologies to implement a transparency layer for their supply chain, to a small Chinese startup company called The Orange Magic Cube."

The project is also getting developmental help from companies that don't typically collaborate on open source projects. "A company like J.P. Morgan bank has certainly ingested a lot of open source before, and they've worked with companies like Red Hat and others to push any changes they might have needed back upstream," Behlendorf explained. "But this is the first time that a company like that, a bank, is saying that this is a core technology for us and we have our own devs helping push the platform forward. We don't just want to be a consumer way outside here."

The Linux Foundation's Hyperledger project's application is currently pre-beta and is licensed under Apache License, Version 2.0.

Source URL: http://windowsitpro.com/industry/wrapping-your-head-around-private-blockchains

Notice 2014-21

SECTION 1. PURPOSE

This notice describes how existing general tax principles apply to transactions using virtual currency. The notice provides this guidance in the form of answers to frequently asked questions.

SECTION 2. BACKGROUND

The Internal Revenue Service (IRS) is aware that "virtual currency" may be used to pay for goods or services, or held for investment. Virtual currency is a digital representation of value that functions as a medium of exchange, a unit of account, and/or a store of value. In some environments, it operates like "real" currency -- i.e., the coin and paper money of the United States or of any other country that is designated as legal tender, circulates, and is customarily used and accepted as a medium of exchange in the country of issuance -- but it does not have legal tender status in any jurisdiction.

Virtual currency that has an equivalent value in real currency, or that acts as a substitute for real currency, is referred to as "convertible" virtual currency. Bitcoin is one example of a convertible virtual currency. Bitcoin can be digitally traded between users and can be purchased for, or exchanged into, U.S. dollars, Euros, and other real or virtual currencies. For a more comprehensive description of convertible virtual currencies to date, see Financial Crimes Enforcement Network (FinCEN) *Guidance on the Application of FinCEN's Regulations to Persons Administering, Exchanging, or Using Virtual Currencies* (FIN-2013-G001, March 18, 2013).

SECTION 3. SCOPE

In general, the sale or exchange of convertible virtual currency, or the use of convertible virtual currency to pay for goods or services in a real-world economy transaction, has tax consequences that may result in a tax liability. This notice addresses only the U.S. federal tax consequences of transactions in, or transactions that use, convertible virtual currency, and the term "virtual currency" as used in Section 4 refers only to convertible virtual currency. No inference should be drawn with respect to virtual currencies not described in this notice.

The Treasury Department and the IRS recognize that there may be other questions regarding the tax consequences of virtual currency not addressed in this notice that warrant consideration. Therefore, the Treasury Department and the IRS request comments from the public regarding other types or aspects of virtual currency transactions that should be addressed in future guidance.

Comments should be addressed to:

Internal Revenue Service Attn: CC:PA:LPD:PR (Notice 2014-21) Room 5203 P.O. Box 7604 Ben Franklin Station Washington, D.C. 20044

or hand delivered Monday through Friday between the hours of 8 A.M. and 4 P.M. to:

Courier's Desk Internal Revenue Service Attn: CC:PA:LPD:PR (Notice 2014-21) 1111 Constitution Avenue, N.W. Washington, D.C. 20224

Alternatively, taxpayers may submit comments electronically via e-mail to the following address: <u>Notice.Comments@irscounsel.treas.gov</u>. Taxpayers should include "Notice 2014-21" in the subject line. All comments submitted by the public will be available for public inspection and copying in their entirety.

For purposes of the FAQs in this notice, the taxpayer's functional currency is assumed to be the U.S. dollar, the taxpayer is assumed to use the cash receipts and disbursements method of accounting and the taxpayer is assumed not to be under common control with any other party to a transaction.

SECTION 4. FREQUENTLY ASKED QUESTIONS

Q-1: How is virtual currency treated for federal tax purposes?

A-1: For federal tax purposes, virtual currency is treated as property. General tax principles applicable to property transactions apply to transactions using virtual currency.

Q-2: Is virtual currency treated as currency for purposes of determining whether a transaction results in foreign currency gain or loss under U.S. federal tax laws?

A-2: No. Under currently applicable law, virtual currency is not treated as currency that could generate foreign currency gain or loss for U.S. federal tax purposes.

Q-3: Must a taxpayer who receives virtual currency as payment for goods or services include in computing gross income the fair market value of the virtual currency?

A-3: Yes. A taxpayer who receives virtual currency as payment for goods or services must, in computing gross income, include the fair market value of the virtual currency,

measured in U.S. dollars, as of the date that the virtual currency was received. See Publication 525, *Taxable and Nontaxable Income*, for more information on miscellaneous income from exchanges involving property or services.

Q-4: What is the basis of virtual currency received as payment for goods or services in Q&A-3?

A-4: The basis of virtual currency that a taxpayer receives as payment for goods or services in Q&A-3 is the fair market value of the virtual currency in U.S. dollars as of the date of receipt. See Publication 551, *Basis of Assets,* for more information on the computation of basis when property is received for goods or services.

Q-5: How is the fair market value of virtual currency determined?

A-5: For U.S. tax purposes, transactions using virtual currency must be reported in U.S. dollars. Therefore, taxpayers will be required to determine the fair market value of virtual currency in U.S. dollars as of the date of payment or receipt. If a virtual currency is listed on an exchange and the exchange rate is established by market supply and demand, the fair market value of the virtual currency is determined by converting the virtual currency into U.S. dollars (or into another real currency which in turn can be converted into U.S. dollars) at the exchange rate, in a reasonable manner that is consistently applied.

Q-6: Does a taxpayer have gain or loss upon an exchange of virtual currency for other property?

A-6: Yes. If the fair market value of property received in exchange for virtual currency exceeds the taxpayer's adjusted basis of the virtual currency, the taxpayer has taxable gain. The taxpayer has a loss if the fair market value of the property received is less than the adjusted basis of the virtual currency. See Publication 544, *Sales and Other Dispositions of Assets*, for information about the tax treatment of sales and exchanges, such as whether a loss is deductible.

Q-7: What type of gain or loss does a taxpayer realize on the sale or exchange of virtual currency?

A-7: The character of the gain or loss generally depends on whether the virtual currency is a capital asset in the hands of the taxpayer. A taxpayer generally realizes capital gain or loss on the sale or exchange of virtual currency that is a capital asset in the hands of the taxpayer. For example, stocks, bonds, and other investment property are generally capital assets. A taxpayer generally realizes ordinary gain or loss on the sale or exchange of virtual currency that is not a capital asset in the hands of the taxpayer. Inventory and other property held mainly for sale to customers in a trade or

business are examples of property that is not a capital asset. See Publication 544 for more information about capital assets and the character of gain or loss.

Q-8: Does a taxpayer who "mines" virtual currency (for example, uses computer resources to validate Bitcoin transactions and maintain the public Bitcoin transaction ledger) realize gross income upon receipt of the virtual currency resulting from those activities?

A-8: Yes, when a taxpayer successfully "mines" virtual currency, the fair market value of the virtual currency as of the date of receipt is includible in gross income. See Publication 525, *Taxable and Nontaxable Income*, for more information on taxable income.

Q-9: Is an individual who "mines" virtual currency as a trade or business subject to self-employment tax on the income derived from those activities?

A-9: If a taxpayer's "mining" of virtual currency constitutes a trade or business, and the "mining" activity is not undertaken by the taxpayer as an employee, the net earnings from self-employment (generally, gross income derived from carrying on a trade or business less allowable deductions) resulting from those activities constitute self-employment income and are subject to the self-employment tax. See Chapter 10 of Publication 334, *Tax Guide for Small Business*, for more information on self-employment tax and Publication 535, *Business Expenses*, for more information on determining whether expenses are from a business activity carried on to make a profit.

Q-10: Does virtual currency received by an independent contractor for performing services constitute self-employment income?

A-10: Yes. Generally, self-employment income includes all gross income derived by an individual from any trade or business carried on by the individual as other than an employee. Consequently, the fair market value of virtual currency received for services performed as an independent contractor, measured in U.S. dollars as of the date of receipt, constitutes self-employment income and is subject to the self-employment tax. See FS-2007-18, April 2007, *Business or Hobby? Answer Has Implications for Deductions,* for information on determining whether an activity is a business or a hobby.

Q-11: Does virtual currency paid by an employer as remuneration for services constitute wages for employment tax purposes?

A-11: Yes. Generally, the medium in which remuneration for services is paid is immaterial to the determination of whether the remuneration constitutes wages for employment tax purposes. Consequently, the fair market value of virtual currency paid as wages is subject to federal income tax withholding, Federal Insurance Contributions

Act (FICA) tax, and Federal Unemployment Tax Act (FUTA) tax and must be reported on Form W-2, *Wage and Tax Statement*. See Publication 15 (Circular E), *Employer's Tax Guide*, for information on the withholding, depositing, reporting, and paying of employment taxes.

Q-12: Is a payment made using virtual currency subject to information reporting?

A-12: A payment made using virtual currency is subject to information reporting to the same extent as any other payment made in property. For example, a person who in the course of a trade or business makes a payment of fixed and determinable income using virtual currency with a value of \$600 or more to a U.S. non-exempt recipient in a taxable year is required to report the payment to the IRS and to the payee. Examples of payments of fixed and determinable income include rent, salaries, wages, premiums, annuities, and compensation.

Q-13: Is a person who in the course of a trade or business makes a payment using virtual currency worth \$600 or more to an independent contractor for performing services required to file an information return with the IRS?

A-13: Generally, a person who in the course of a trade or business makes a payment of \$600 or more in a taxable year to an independent contractor for the performance of services is required to report that payment to the IRS and to the payee on Form 1099-MISC, *Miscellaneous Income*. Payments of virtual currency required to be reported on Form 1099-MISC should be reported using the fair market value of the virtual currency in U.S. dollars as of the date of payment. The payment recipient may have income even if the recipient does not receive a Form 1099-MISC. See the Instructions to Form 1099-MISC and the General Instructions for Certain Information Returns for more information. For payments to non-U.S. persons, see Publication 515, *Withholding of Tax on Nonresident Aliens and Foreign Entities*.

Q-14: Are payments made using virtual currency subject to backup withholding?

A-14: Payments made using virtual currency are subject to backup withholding to the same extent as other payments made in property. Therefore, payors making reportable payments using virtual currency must solicit a taxpayer identification number (TIN) from the payee. The payor must backup withhold from the payment if a TIN is not obtained prior to payment or if the payor receives notification from the IRS that backup withholding is required. See Publication 1281, *Backup Withholding for Missing and Incorrect Name/TINs,* for more information.

Q-15: Are there IRS information reporting requirements for a person who settles payments made in virtual currency on behalf of merchants that accept virtual currency from their customers?

A-15: Yes, if certain requirements are met. In general, a third party that contracts with a substantial number of unrelated merchants to settle payments between the merchants and their customers is a third party settlement organization (TPSO). A TPSO is required to report payments made to a merchant on a Form 1099-K, *Payment Card and Third Party Network Transactions*, if, for the calendar year, both (1) the number of transactions settled for the merchant exceeds 200, and (2) the gross amount of payments made to the merchant exceeds \$20,000. When completing Boxes 1, 3, and 5a-1 on the Form 1099-K, transactions where the TPSO settles payments made with virtual currency are aggregated with transactions where the TPSO settles payments made with real currency to determine the total amounts to be reported in those boxes. When determining whether the transactions are reportable, the value of the virtual currency is the fair market value of the virtual currency in U.S. dollars on the date of payment.

See The Third Party Information Reporting Center, <u>http://www.irs.gov/Tax-</u> <u>Professionals/Third-Party-Reporting-Information-Center</u>, for more information on reporting transactions on Form 1099-K.

Q-16: Will taxpayers be subject to penalties for having treated a virtual currency transaction in a manner that is inconsistent with this notice prior to March 25, 2014?

A-16: Taxpayers may be subject to penalties for failure to comply with tax laws. For example, underpayments attributable to virtual currency transactions may be subject to penalties, such as accuracy-related penalties under section 6662. In addition, failure to timely or correctly report virtual currency transactions when required to do so may be subject to information reporting penalties under section 6721 and 6722. However, penalty relief may be available to taxpayers and persons required to file an information return who are able to establish that the underpayment or failure to properly file information returns is due to reasonable cause.

SECTION 5. DRAFTING INFORMATION

The principal author of this notice is Keith A. Aqui of the Office of Associate Chief Counsel (Income Tax & Accounting). For further information about income tax issues addressed in this notice, please contact Mr. Aqui at (202) 317-4718; for further information about employment tax issues addressed in this notice, please contact Mr. Neil D. Shepherd at (202) 317- 4774; for further information about information reporting issues addressed in this notice, please contact Ms. Adrienne E. Griffin at (202) 317-6845; and for further information regarding foreign currency issues addressed in this notice, please contact Mr. Raymond J. Stahl at (202) 317- 6938. These are not toll-free calls.

NEW YORK STATE

DEPARTMENT OF FINANCIAL SERVICES

NEW YORK CODES, RULES AND REGULATIONS

TITLE 23. DEPARTMENT OF FINANCIAL SERVICES CHAPTER I. REGULATIONS OF THE SUPERINTENDENT OF FINANCIAL SERVICES PART 200. VIRTUAL CURRENCIES

(ALL MATERIAL IS NEW)

Statutory Authority: Financial Services Law Sections 102, 104, 201, 206, 301, 302, 309, and 408

- Section 200.1 Introduction
- Section 200.2 Definitions
- Section 200.3 License
- Section 200.4 Application
- Section 200.5 Application fees
- Section 200.6 Action by superintendent
- Section 200.7 Compliance
- Section 200.8 Capital requirements
- Section 200.9 Custody and protection of customer assets
- Section 200.10 Material change to business
- Section 200.11 Change of control; mergers and acquisitions

- Section 200.12 Books and records
- Section 200.13 Examinations
- Section 200.14 Reports and financial disclosures
- Section 200.15 Anti-money laundering program
- Section 200.16 Cyber security program
- Section 200.17 Business continuity and disaster recovery
- Section 200.18 Advertising and marketing
- Section 200.19 Consumer protection
- Section 200.20 Complaints
- Section 200.21 Transitional period
- Section 200.22 Severability

Section 200.1 Introduction

This Part contains regulations relating to the conduct of business involving Virtual Currency, as defined herein, in accordance with the superintendent's powers pursuant to the above-stated authority.

Section 200.2 Definitions

For purposes of this Part only, the following definitions shall apply:

(a) *Affiliate* means any Person that directly or indirectly controls, is controlled by, or is under common control with, another Person;

(b) *Cyber Security Event* means any act or attempt, successful or unsuccessful, to gain unauthorized access
 to, disrupt, or misuse a Licensee's electronic systems or information stored on such systems;

(c) *Department* means the New York State Department of Financial Services;

(d) *Exchange Service* means the conversion or exchange of Fiat Currency or other value into Virtual

Currency, the conversion or exchange of Virtual Currency into Fiat Currency or other value, or the conversion or exchange of one form of Virtual Currency into another form of Virtual Currency;

(e) *Fiat Currency* means government-issued currency that is designated as legal tender in its country of issuance through government decree, regulation, or law;

(f) *Licensee* means any Person duly licensed by the superintendent pursuant to this Part;

(g) *New York* means the State of New York;

(h) *New York Resident* means any Person that resides, is located, has a place of business, or is conducting business in New York;

(i) *Person* means an individual, partnership, corporation, association, joint stock association, trust, or other entity, however organized;

(j) *Prepaid Card* means an electronic payment device that: (i) is usable at a single merchant or an affiliated group of merchants that share the same name, mark, or logo, or is usable at multiple, unaffiliated merchants or service providers; (ii) is issued in and for a specified amount of Fiat Currency; (iii) can be reloaded in and for only Fiat Currency, if at all; (iv) is issued and/or reloaded on a prepaid basis for the future purchase or delivery

of goods or services; (v) is honored upon presentation; and (vi) can be redeemed in and for only Fiat Currency, if at all;

(k) *Principal Officer* means an executive officer of an entity, including, but not limited to, the chief executive, financial, operating, and compliance officers, president, general counsel, managing partner, general partner, controlling partner, and trustee, as applicable;

 Principal Stockholder means any Person that directly or indirectly owns, controls, or holds with power to vote ten percent or more of any class of outstanding capital stock or other equity interest of an entity or possesses the power to direct or cause the direction of the management or policies of the entity;

(m) *Principal Beneficiary* means any Person entitled to ten percent or more of the benefits of a trust;

(n) *Qualified Custodian* means a bank, trust company, national bank, savings bank, savings and loan association, federal savings association, credit union, or federal credit union in the State of New York, subject to the prior approval of the superintendent. To the extent applicable, terms used in this definition shall have the meaning ascribed by the Banking Law;

(o) *Transmission* means the transfer, by or through a third party, of Virtual Currency from a Person to a Person, including the transfer from the account or storage repository of a Person to the account or storage repository of a Person;

(p) *Virtual Currency* means any type of digital unit that is used as a medium of exchange or a form of digitally stored value. Virtual Currency shall be broadly construed to include digital units of exchange that (i) have a centralized repository or administrator; (ii) are decentralized and have no centralized repository or administrator; or (iii) may be created or obtained by computing or manufacturing effort. Virtual Currency shall not be construed to include any of the following:

(1) digital units that (i) are used solely within online gaming platforms, (ii) have no market or application outside of those gaming platforms, (iii) cannot be converted into, or redeemed for, Fiat Currency or

Virtual Currency, and (iv) may or may not be redeemable for real-world goods, services, discounts, or purchases.

(2) digital units that can be redeemed for goods, services, discounts, or purchases as part of a customer affinity or rewards program with the issuer and/or other designated merchants or can be redeemed for digital units in another customer affinity or rewards program, but cannot be converted into, or redeemed for, Fiat Currency or Virtual Currency; or

(3) digital units used as part of Prepaid Cards;

(q) *Virtual Currency Business Activity* means the conduct of any one of the following types of activities involving New York or a New York Resident:

(1) receiving Virtual Currency for Transmission or Transmitting Virtual Currency, except where the transaction is undertaken for non-financial purposes and does not involve the transfer of more than a nominal amount of Virtual Currency;

(2) storing, holding, or maintaining custody or control of Virtual Currency on behalf of others;

(3) buying and selling Virtual Currency as a customer business;

(4) performing Exchange Services as a customer business; or

(5) controlling, administering, or issuing a Virtual Currency.

The development and dissemination of software in and of itself does not constitute Virtual Currency Business Activity.

Section 200.3 License

(a) License required. No Person shall, without a license obtained from the superintendent as provided in this Part, engage in any Virtual Currency Business Activity. Licensees are not authorized to exercise fiduciary powers, as defined under Section 100 of the Banking Law.

(b) Unlicensed agents prohibited. Each Licensee is prohibited from conducting any Virtual CurrencyBusiness Activity through an agent or agency arrangement when the agent is not a Licensee.

(c) Exemption from licensing requirements. The following Persons are exempt from the licensing requirements otherwise applicable under this Part:

 Persons that are chartered under the New York Banking Law and are approved by the superintendent to engage in Virtual Currency Business Activity; and

(2) merchants and consumers that utilize Virtual Currency solely for the purchase or sale of goods or services or for investment purposes.

Section 200.4 Application

(a) Application for a license required under this Part shall be in writing, under oath, and in a form prescribed by the superintendent, and shall contain the following:

(1) the exact name of the applicant, including any doing business as name, the form of organization, the date of organization, and the jurisdiction where organized or incorporated;

(2) a list of all of the applicant's Affiliates and an organization chart illustrating the relationship among the applicant and such Affiliates;

(3) a list of, and detailed biographical information for, each individual applicant and each director, Principal Officer, Principal Stockholder, and Principal Beneficiary of the applicant, as applicable, including such individual's name, physical and mailing addresses, and information and documentation regarding such individual's personal history, experience, and qualification, which shall be accompanied by a form of authority, executed by such individual, to release information to the Department;

(4) a background report prepared by an independent investigatory agency acceptable to the superintendent for each individual applicant, and each Principal Officer, Principal Stockholder, and Principal Beneficiary of the applicant, as applicable;

(5) for each individual applicant; for each Principal Officer, Principal Stockholder, and Principal Beneficiary of the applicant, as applicable; and for all individuals to be employed by the applicant who have access to any customer funds, whether denominated in Fiat Currency or Virtual Currency: (i) a set of completed fingerprints, or a receipt indicating the vendor (which vendor must be acceptable to the superintendent) at which, and the date when, the fingerprints were taken, for submission to the State Division of Criminal Justice Services and the Federal Bureau of Investigation; (ii) if applicable, such processing fees as prescribed by the superintendent; and (iii) two portrait-style photographs of the individuals measuring not more than two inches by two inches;

(6) an organization chart of the applicant and its management structure, including its Principal Officers or senior management, indicating lines of authority and the allocation of duties among its Principal Officers or senior management;

(7) a current financial statement for the applicant and each Principal Officer, Principal Stockholder, and Principal Beneficiary of the applicant, as applicable, and a projected balance sheet and income statement for the following year of the applicant's operation;

(8) a description of the proposed, current, and historical business of the applicant, including detail on the products and services provided and to be provided, all associated website addresses, the jurisdictions in which the applicant is engaged in business, the principal place of business, the primary market of operation, the projected customer base, any specific marketing targets, and the physical address of any operation in New York;

(9) details of all banking arrangements;

(10) all written policies and procedures required by, or related to, the requirements of this Part;

(11) an affidavit describing any pending or threatened administrative, civil, or criminal action, litigation, or proceeding before any governmental agency, court, or arbitration tribunal against the applicant or any of its directors, Principal Officers, Principal Stockholders, and Principal Beneficiaries, as applicable, including the names of the parties, the nature of the proceeding, and the current status of the proceeding;

(12) verification from the New York State Department of Taxation and Finance that the applicant is compliant with all New York State tax obligations in a form acceptable to the superintendent;

(13) if applicable, a copy of any insurance policies maintained for the benefit of the applicant, its directors or officers, or its customers;

(14) an explanation of the methodology used to calculate the value of Virtual Currency in Fiat Currency; and

(15) such other additional information as the superintendent may require.

(b) As part of such application, the applicant shall demonstrate that it will be compliant with all of the requirements of this Part upon licensing.

(c) Notwithstanding Subsection (b) of this Section, the superintendent may in his or her sole discretion and consistent with the purposes and intent of the Financial Services Law and this Part approve an application by granting a conditional license.

(1) A conditional license may be issued to an applicant that does not satisfy all of the regulatory requirements upon licensing.

(2) A Licensee that holds a conditional license may be subject to heightened review, whether in regard to the scope and frequency of examination or otherwise.

(3) Unless the superintendent removes the conditional status of or renews a conditional license, said license shall expire two years after its date of issuance.

i) The superintendent may in his or her sole discretion and consistent with the purposes and intent of the Financial Services Law and this Part:

(A) renew a conditional license for an additional length of time; or

(B) remove the conditional status from a conditional license.

(4) A conditional license may be suspended or revoked pursuant to Section 200.6 of this Part.

(5) A conditional license may impose any reasonable condition or conditions, as determined by the superintendent in his or her sole discretion.

(6) The superintendent may remove any condition or conditions from a conditional license that has been issued.

(7) In determining whether to issue a conditional license, renew or remove the conditional status of a conditional license, or impose or remove any specific conditions on a conditional license, the superintendent may consider any relevant factor or factors. Relevant factors may include but are not limited to:

i) the nature and scope of the applicant's or Licensee's business;

ii) the anticipated volume of business to be transacted by the applicant or Licensee;

iii) the nature and scope of the risks that the applicant's or Licensee's business presents to consumers, Virtual Currency markets, financial markets, and the general public;

iv) the measures which the applicant or Licensee has taken to limit or mitigate the risks its business presents;

v) whether the applicant or Licensee is registered with FinCEN;

vi) whether the applicant or Licensee is licensed, registered, or otherwise authorized by any

governmental or self-regulatory authority to engage in financial services or other business activities;

vii) the applicant's or Licensee's financial services or other business experience; and

viii) the Licensee's history as a holder of a conditional license issued by the superintendent.

(d) The superintendent may permit that any application for a license under this Part, or any other submission required by this Part, be made or executed by electronic means.

Section 200.5 Application fees

As part of an application for licensing under this Part, each applicant must submit an initial application fee, in the amount of five thousand dollars, to cover the cost of processing the application, reviewing application materials, and investigating the financial condition and responsibility, financial and business experience, and character and general fitness of the applicant. If the application is denied or withdrawn, such fee shall not be refunded. Each Licensee may be required to pay fees to the Department to process additional applications related to the license.

Section 200.6 Action by superintendent

(a) Generally. Upon the filing of an application for licensing under this Part, payment of the required fee, and demonstration by the applicant of its ability to comply with the provisions of this Part upon licensing, the superintendent shall investigate the financial condition and responsibility, financial and business experience, and character and general fitness of the applicant. If the superintendent finds these qualities are such as to warrant the belief that the applicant's business will be conducted honestly, fairly, equitably, carefully, and efficiently within the purposes and intent of this Part, and in a manner commanding the confidence and trust of the community, the superintendent shall advise the applicant in writing of his or her approval of the application, and shall issue to the applicant a license to conduct Virtual Currency Business Activity, subject to the provisions of this Part and such other conditions as the superintendent shall deem appropriate; or the superintendent may deny the application.

(b) Approval or denial of application. The superintendent shall approve or deny every application for a license hereunder within 90 days from the filing of an application deemed by the superintendent to be complete. Such period of 90 days may be extended at the discretion of the superintendent for such additional reasonable period of time as may be required to enable compliance with this Part. A license issued pursuant to this Part shall remain in full force and effect until it is surrendered by the Licensee, is revoked or suspended, or expires as provided in this Part.

(c) Suspension or revocation of license. The superintendent may suspend or revoke a license issued under this Part on any ground on which the superintendent might refuse to issue an original license, for a violation of any provision of this Part, for good cause shown, or for failure of the Licensee to pay a judgment, recovered in any court, within or without this State, by a claimant or creditor in an action arising out of, or relating to, the Licensee's Virtual Currency Business Activity, within thirty days after the judgment becomes final or within thirty days after expiration or termination of a stay of execution thereon; provided, however, that if execution on

the judgment is stayed, by court order or operation of law or otherwise, then proceedings to suspend or revoke the license (for failure of the Licensee to pay such judgment) may not be commenced by the superintendent during the time of such stay, and for thirty days thereafter. "Good cause" shall exist when a Licensee has defaulted or is likely to default in performing its obligations or financial engagements or engages in unlawful, dishonest, wrongful, or inequitable conduct or practices that may cause harm to the public.

(d) Hearing. No license issued under this Part shall be revoked or suspended except after a hearing thereon. The superintendent shall give a Licensee no less than ten days' written notice of the time and place of such hearing by registered or certified mail addressed to the principal place of business of such Licensee. Any order of the superintendent suspending or revoking such license shall state the grounds upon which it is based and be sent by registered or certified mail to the Licensee at its principal place of business as shown in the records of the Department.

(e) Preliminary injunction. The superintendent may, when deemed by the superintendent to be in the public interest, seek a preliminary injunction to restrain a Licensee from continuing to perform acts that violate any provision of this Part, the Financial Services Law, Banking Law, or Insurance Law.

(f) Preservation of powers. Nothing in this Part shall be construed as limiting any power granted to the superintendent under any other provision of the Financial Services Law, Banking Law, or Insurance Law, including any power to investigate possible violations of law, rule, or regulation or to impose penalties or take any other action against any Person for violation of such laws, rules, or regulations.

Section 200.7 Compliance

(a) Generally. Each Licensee is required to comply with all applicable federal and state laws, rules, and regulations.

(b) Compliance officer. Each Licensee shall designate a qualified individual or individuals responsible for coordinating and monitoring compliance with this Part and all other applicable federal and state laws, rules, and regulations.

(c) Compliance policy. Each Licensee shall maintain and enforce written compliance policies, including policies with respect to anti-fraud, anti-money laundering, cyber security, privacy and information security, and any other policy required under this Part, which must be reviewed and approved by the Licensee's board of directors or an equivalent governing body.

Section 200.8 Capital requirements

(a) Each Licensee shall maintain at all times such capital in an amount and form as the superintendent determines is sufficient to ensure the financial integrity of the Licensee and its ongoing operations based on an assessment of the specific risks applicable to each Licensee. In determining the minimum amount of capital that must be maintained by a Licensee, the superintendent may consider a variety of factors, including but not limited to:

(1) the composition of the Licensee's total assets, including the position, size, liquidity, risk exposure, and price volatility of each type of asset;

(2) the composition of the Licensee's total liabilities, including the size and repayment timing of each type of liability;

(3) the actual and expected volume of the Licensee's Virtual Currency Business Activity;

(4) whether the Licensee is already licensed or regulated by the superintendent under the Financial Services Law, Banking Law, or Insurance Law, or otherwise subject to such laws as a provider of a financial product or service, and whether the Licensee is in good standing in such capacity;

(5) the amount of leverage employed by the Licensee;

(6) the liquidity position of the Licensee;

(7) the financial protection that the Licensee provides for its customers through its trust account or bond;

(8) the types of entities to be serviced by the Licensee; and

(9) the types of products or services to be offered by the Licensee.

(b) Each Licensee shall hold capital required to be maintained in accordance with this Section in the form of cash, virtual currency, or high-quality, highly liquid, investment-grade assets, in such proportions as are acceptable to the superintendent.

Section 200.9 Custody and protection of customer assets

(a) Each Licensee shall maintain a surety bond or trust account in United States dollars for the benefit of its customers in such form and amount as is acceptable to the superintendent for the protection of the Licensee's customers. To the extent a Licensee maintains a trust account in accordance with this section, such trust account must be maintained with a Qualified Custodian.

(b) To the extent a Licensee stores, holds, or maintains custody or control of Virtual Currency on behalf of another Person, such Licensee shall hold Virtual Currency of the same type and amount as that which is owed or obligated to such other Person.

(c) Each Licensee is prohibited from selling, transferring, assigning, lending, hypothecating, pledging, or otherwise using or encumbering assets, including Virtual Currency, stored, held, or maintained by, or under the custody or control of, such Licensee on behalf of another Person except for the sale, transfer, or assignment of such assets at the direction of such other Person.

Section 200.10 Material change to business

(a) Each Licensee must obtain the superintendent's prior written approval for any plan or proposal to introduce or offer a materially new product, service, or activity, or to make a material change to an existing product, service, or activity, involving New York or New York Residents.

(b) A "materially new product, service, or activity" or a "material change" may occur where:

 the proposed new product, service, or activity, or the proposed change may raise a legal or regulatory issue about the permissibility of the product, service, or activity;

(2) the proposed new product, service, or activity, or the proposed change may raise safety and soundness or operational concerns; or

(3) a change is proposed to an existing product, service, or activity that may cause such product, service, or activity to be materially different from that previously listed on the application for licensing by the superintendent.

(c) The Licensee shall submit a written plan describing the proposed materially new product, service, or activity, or the proposed material change, including a detailed description of the business operations, compliance policies, and the impact on the overall business of the Licensee, as well as such other information as requested by the superintendent.

(d) If a Licensee has any questions about the materiality of any proposed new product, service, or activity, or of any proposed change, the Licensee may seek clarification from the Department prior to introducing or offering that new product, service, or activity or making that change.

Section 200.11 Change of control; mergers and acquisitions

(a) Change of Control. No action shall be taken, except with the prior written approval of the superintendent, that may result in a change of control of a Licensee.

(1) Prior to any change of control, the Person seeking to acquire control of a Licensee shall submit a written application to the superintendent in a form and substance acceptable to the superintendent, including but not limited to detailed information about the applicant and all directors, Principal Officers, Principal Stockholders, and Principal Beneficiaries of the applicant, as applicable.

(2) For purposes of this Section, the term "control" means the possession, directly or indirectly, of the power to direct or cause the direction of the management and policies of a Licensee whether through the ownership of stock of such Licensee, the stock of any Person that possesses such power, or otherwise. Control shall be presumed to exist if a Person, directly or indirectly, owns, controls, or holds with power to vote ten percent or more of the voting stock of a Licensee or of any Person that owns, controls, or holds with power to vote ten percent or more of the voting stock of such Licensee. No Person shall be deemed to control another Person solely by reason of his being an officer or director of such other Person.

(3) The superintendent may determine upon application that any Person does not or will not upon the taking of some proposed action control another Person. Such determination shall be made within 30 days or such further period as the superintendent may prescribe. The filing of an application pursuant to this Subsection in good faith by any Person shall relieve the applicant from any obligation or liability imposed by this Section with respect to the subject of the application until the superintendent has acted upon the application. The superintendent may revoke or modify his or her determination, after notice and opportunity to be heard, whenever in his or her judgment revocation or modification is consistent with this Part. The superintendent may consider the following factors in making such a determination:

i) whether such Person's purchase of common stock is made solely for investment purposes and not to acquire control over the Licensee;

ii) whether such Person could direct, or cause the direction of, the management or policies of theLicensee;

iii) whether such Person could propose directors in opposition to nominees proposed by the management or board of directors of the Licensee;

iv) whether such Person could seek or accept representation on the board of directors of the Licensee;

v) whether such Person could solicit or participate in soliciting proxy votes with respect to any matter presented to the shareholders of the Licensee; or

vi) any other factor that indicates such Person would or would not exercise control of the Licensee.
 (4) The superintendent shall approve or deny every application for a change of control of a Licensee
 hereunder within 120 days from the filing of an application deemed by the superintendent to be complete. Such
 period of 120 days may be extended by the superintendent, for good cause shown, for such additional
 reasonable period of time as may be required to enable compliance with the requirements and conditions of this

Part.

(5) In determining whether to approve a proposed change of control, the superintendent shall, among other factors, take into consideration the public interest and the needs and convenience of the public.
(b) Mergers and Acquisitions. No action shall be taken, except with the prior written approval of the superintendent, that may result in a merger or acquisition of all or a substantial part of the assets of a Licensee.

(1) Prior to any such merger or acquisition, an application containing a written plan of merger or acquisition shall be submitted to the superintendent by the entities that are to merge or by the acquiring entity, as applicable. Such plan shall be in form and substance satisfactory to the superintendent, and shall specify

each entity to be merged, the surviving entity, or the entity acquiring all or substantially all of the assets of the Licensee, as applicable, and shall describe the terms and conditions of the merger or acquisition and the mode of carrying it into effect.

(2) The superintendent shall approve or deny a proposed merger or a proposed acquisition of all or a substantial part of the assets of a Licensee within 120 days after the filing of an application that contains a written plan of merger or acquisition and is deemed by the superintendent to be complete. Such period of 120 days may be extended by the superintendent, for good cause shown, for such additional reasonable period of time as may be required to enable compliance with the requirements and conditions of this Part.

(3) In determining whether to so approve a proposed merger or acquisition, the superintendent shall, among other factors, take into consideration the public interest and the needs and convenience of the public.

Section 200.12 Books and records

(a) Each Licensee shall, in connection with its Virtual Currency Business Activity, make, keep, and preserve all of its books and records in their original form or native file format for a period of at least seven years from the date of their creation and in a condition that will allow the superintendent to determine whether the Licensee is complying with all applicable laws, rules, and regulations. The books and records maintained by each Licensee shall, without limitation, include:

(1) for each transaction, the amount, date, and precise time of the transaction, any payment instructions, the total amount of fees and charges received and paid to, by, or on behalf of the Licensee, and the names, account numbers, and physical addresses of (i) the party or parties to the transaction that are customers or accountholders of the Licensee; and (ii) to the extent practicable, any other parties to the transaction;

(2) a general ledger containing all asset, liability, ownership equity, income, and expense accounts;

(3) bank statements and bank reconciliation records;

(4) any statements or valuations sent or provided to customers and counterparties;

(5) records or minutes of meetings of the board of directors or an equivalent governing body;

(6) records demonstrating compliance with applicable state and federal anti-money laundering laws, rules, and regulations, including customer identification and verification documents, records linking customers to their respective accounts and balances, and a record of all compliance breaches;

(7) communications and documentation related to investigations of customer complaints and transaction error resolution or concerning facts giving rise to possible violations of laws, rules, or regulations;

(8) all other records required to be maintained in accordance with this Part; and

(9) all other records as the superintendent may require.

(b) Each Licensee shall provide the Department, upon request, immediate access to all facilities, books, records, documents, or other information maintained by the Licensee or its Affiliates, wherever located.

(c) Records of non-completed, outstanding, or inactive Virtual Currency accounts or transactions shall be maintained for at least five years after the time when any such Virtual Currency has been deemed, under the Abandoned Property Law, to be abandoned property.

Section 200.13 Examinations

(a) Each Licensee shall permit and assist the superintendent to examine the Licensee whenever in the superintendent's judgment such examination is necessary or advisable, but not less than once every two calendar years, including, without limitation, to determine:

(1) the financial condition of the Licensee;

(2) the safety and soundness of the conduct of its business;

(3) the policies of its management;

(4) whether the Licensee has complied with the requirements of laws, rules, and regulations; and

(5) such other matters as the superintendent may determine, including, but not limited to, any activities of the Licensee outside the State of New York if in the opinion of the superintendent such activities may affect the Licensee's Virtual Currency Business Activity.

(b) Each Licensee shall permit and assist the superintendent at any time to examine all of the Licensee's books, records, accounts, documents, and other information.

(c) Each Licensee shall permit and assist the superintendent to make such special investigations as the superintendent shall deem necessary to determine whether a Licensee has violated any provision of the applicable laws, rules, or regulations and to the extent necessary shall permit and assist the superintendent to examine all relevant facilities, books, records, accounts, documents, and other information.

(d) For the purpose of determining the financial condition of the Licensee, its safety and soundness practices, or whether it has complied with the requirements of laws, rules, and regulations, the Licensee shall permit and assist the superintendent, when in the superintendent's judgment it is necessary or advisable, to examine an Affiliate of the Licensee.

Section 200.14 Reports and financial disclosures

(a) Each Licensee shall submit to the superintendent quarterly financial statements within 45 days following the close of the Licensee's fiscal quarter in the form, and containing such information, as the superintendent shall prescribe, including without limitation, the following information:

 a statement of the financial condition of the Licensee, including a balance sheet, income statement, statement of comprehensive income, statement of change in ownership equity, cash flow statement, and statement of net liquid assets;

(2) a statement demonstrating compliance with any financial requirements established under this Part;

- (3) financial projections and strategic business plans;
- (4) a list of all off-balance sheet items;
- (5) a chart of accounts, including a description of each account; and
- (6) a report of permissible investments by the Licensee as permitted under this Part.

(b) Each Licensee shall submit audited annual financial statements, together with an opinion and an attestation by an independent certified public accountant regarding the effectiveness of the Licensee's internal control structure. All such annual financial statements shall include:

(1) a statement of management's responsibilities for preparing the Licensee's annual financial statements, establishing and maintaining adequate internal controls and procedures for financial reporting, and complying with all applicable laws, rules, and regulations;

(2) an assessment by management of the Licensee's compliance with such applicable laws, rules, and regulations during the fiscal year covered by the financial statements; and

(3) certification of the financial statements by an officer or director of the Licensee attesting to the truth and correctness of those statements.

(c) Each Licensee shall notify the superintendent in writing of any criminal action or insolvency proceeding against the Licensee or any of its directors, Principal Stockholders, Principal Officers, and Principal Beneficiaries, as applicable, immediately after the commencement of any such action or proceeding.

(d) Each Licensee shall notify the superintendent in writing of any proposed change to the methodology used to calculate the value of Virtual Currency in Fiat Currency that was submitted to the Department in accordance with Section 200.4 or this Subsection.

(e) Each Licensee shall submit a report to the superintendent immediately upon the discovery of any violation or breach of law, rule, or regulation related to the conduct of activity licensed under this Part.

(f) Each Licensee shall make additional special reports to the superintendent, at such times and in such form, as the superintendent may request.

Section 200.15 Anti-money laundering program

 (a) All values in United States dollars referenced in this Section must be calculated using the methodology to determine the value of Virtual Currency in Fiat Currency that was provided to the Department under this Part.

(b) Each Licensee shall conduct an initial risk assessment that will consider legal, compliance, financial, and reputational risks associated with the Licensee's activities, services, customers, counterparties, and geographic location and shall establish, maintain, and enforce an anti-money laundering program based thereon. The Licensee shall conduct additional assessments on an annual basis, or more frequently as risks change, and shall modify its anti-money laundering program as appropriate to reflect any such changes.

(c) The anti-money laundering program shall, at a minimum:

 provide for a system of internal controls, policies, and procedures designed to ensure ongoing compliance with all applicable anti-money laundering laws, rules, and regulations;

(2) provide for independent testing for compliance with, and the effectiveness of, the anti-money laundering program to be conducted by qualified internal personnel of the Licensee, who are not responsible for the design, installation, maintenance, or operation of the anti-money laundering program, or the policies and procedures that guide its operation, or a qualified external party, at least annually, the findings of which shall be summarized in a written report submitted to the superintendent;

(3) designate a qualified individual or individuals in compliance responsible for coordinating and monitoring day-to-day compliance with the anti-money laundering program; and

(4) provide ongoing training for appropriate personnel to ensure they have a fulsome understanding of anti-money laundering requirements and to enable them to identify transactions required to be reported and maintain records required to be kept in accordance with this Part.

(d) The anti-money laundering program shall include a written anti-money laundering policy reviewed and approved by the Licensee's board of directors or equivalent governing body.

(e) Each Licensee, as part of its anti-money laundering program, shall maintain records and make reports in the manner set forth below.

(1) Records of Virtual Currency transactions. Each Licensee shall maintain the following information for all Virtual Currency transactions involving the payment, receipt, exchange, conversion, purchase, sale, transfer, or transmission of Virtual Currency:

i) the identity and physical addresses of the party or parties to the transaction that are customers or accountholders of the Licensee and, to the extent practicable, any other parties to the transaction;

ii) the amount or value of the transaction, including in what denomination purchased, sold, or transferred;

iii) the method of payment;

iv) the date or dates on which the transaction was initiated and completed; and

v) a description of the transaction.

(2) Reports on transactions. When a Licensee is involved in a Virtual Currency to Virtual Currency transaction or series of Virtual Currency to Virtual Currency transactions that are not subject to currency transaction reporting requirements under federal law, including transactions for the payment, receipt, exchange, conversion, purchase, sale, transfer, or transmission of Virtual Currency, in an aggregate amount exceeding the United States dollar value of \$10,000 in one day, by one Person, the Licensee shall notify the Department, in a manner prescribed by the superintendent, within 24 hours.

(3) Monitoring for suspicious activity. Each Licensee shall monitor for transactions that might signify money laundering, tax evasion, or other illegal or criminal activity.

(i) Each Licensee shall file Suspicious Activity Reports ("SARs") in accordance with applicable federal laws, rules, and regulations.

(ii) Each Licensee that is not subject to suspicious activity reporting requirements under federal law shall file with the superintendent, in a form prescribed by the superintendent, reports of transactions that indicate a possible violation of law or regulation within 30 days from the detection of the facts that constitute a need for filing. Continuing suspicious activity shall be reviewed on an ongoing basis and a suspicious activity report shall be filed within 120 days of the last filing describing continuing activity.

(f) No Licensee shall structure transactions, or assist in the structuring of transactions, to evade reporting requirements under this Part.

(g) No Licensee shall engage in, facilitate, or knowingly allow the transfer or transmission of Virtual Currency when such action will obfuscate or conceal the identity of an individual customer or counterparty. Nothing in this Section, however, shall be construed to require a Licensee to make available to the general public the fact or nature of the movement of Virtual Currency by individual customers or counterparties.

(h) Each Licensee shall also maintain, as part of its anti-money laundering program, a customer identification program.

(1) Identification and verification of account holders. When opening an account for, or establishing a service relationship with, a customer, each Licensee must, at a minimum, verify the customer's identity, to the extent reasonable and practicable, maintain records of the information used to verify such identity, including name, physical address, and other identifying information, and check customers against the Specially Designated Nationals ("SDNs") list maintained by the Office of Foreign Asset Control ("OFAC"), a part of the U.S. Treasury Department. Enhanced due diligence may be required based on additional factors, such as for high risk customers, high-volume accounts, or accounts on which a suspicious activity report has been filed.

(2) Enhanced due diligence for accounts involving foreign entities. Licensees that maintain accounts for non-U.S. Persons and non-U.S. Licensees must establish enhanced due diligence policies, procedures, and controls to detect money laundering, including assessing the risk presented by such accounts based on the nature of the foreign business, the type and purpose of the activity, and the anti-money laundering and supervisory regime of the foreign jurisdiction.

(3) Prohibition on accounts with foreign shell entities. Licensees are prohibited from maintaining relationships of any type in connection with their Virtual Currency Business Activity with entities that do not have a physical presence in any country.

(4) Identification required for large transactions. Each Licensee must require verification of the identity of any accountholder initiating a transaction with a value greater than \$3,000.

(i) Each Licensee shall demonstrate that it has risk-based policies, procedures, and practices to ensure, to the maximum extent practicable, compliance with applicable regulations issued by OFAC.

(j) Each Licensee shall have in place appropriate policies and procedures to block or reject specific or impermissible transactions that violate federal or state laws, rules, or regulations.

(k) The individual or individuals designated by the Licensee, pursuant to Paragraph 200.15(c)(3), shall be responsible for day-to-day operations of the anti-money laundering program and shall, at a minimum:

(1) Monitor changes in anti-money laundering laws, including updated OFAC and SDN lists, and update the program accordingly;

(2) Maintain all records required to be maintained under this Section;

(3) Review all filings required under this Section before submission;

(4) Escalate matters to the board of directors, senior management, or appropriate governing body and seek outside counsel, as appropriate;

(5) Provide periodic reporting, at least annually, to the board of directors, senior management, or appropriate governing body; and

(6) Ensure compliance with relevant training requirements.

Section 200.16 Cyber security program

(a) Generally. Each Licensee shall establish and maintain an effective cyber security program to ensure the availability and functionality of the Licensee's electronic systems and to protect those systems and any sensitive data stored on those systems from unauthorized access, use, or tampering. The cyber security program shall be designed to perform the following five core cyber security functions:

(1) identify internal and external cyber risks by, at a minimum, identifying the information stored on the Licensee's systems, the sensitivity of such information, and how and by whom such information may be accessed;

(2) protect the Licensee's electronic systems, and the information stored on those systems, from unauthorized access, use, or other malicious acts through the use of defensive infrastructure and the implementation of policies and procedures;

(3) detect systems intrusions, data breaches, unauthorized access to systems or information, malware, and other Cyber Security Events;

(4) respond to detected Cyber Security Events to mitigate any negative effects; and

(5) recover from Cyber Security Events and restore normal operations and services.

(b) Policy. Each Licensee shall implement a written cyber security policy setting forth the Licensee's policies and procedures for the protection of its electronic systems and customer and counterparty data stored on those systems, which shall be reviewed and approved by the Licensee's board of directors or equivalent governing body at least annually. The cyber security policy must address the following areas:

(1) information security;

(2) data governance and classification;

(3) access controls;

(4) business continuity and disaster recovery planning and resources;

- (5) capacity and performance planning;
- (6) systems operations and availability concerns;

(7) systems and network security;

- (8) systems and application development and quality assurance;
- (9) physical security and environmental controls;
- (10) customer data privacy;
- (11) vendor and third-party service provider management;
- (12) monitoring and implementing changes to core protocols not directly controlled by the Licensee, as applicable; and
 - (13) incident response.

(c) Chief Information Security Officer. Each Licensee shall designate a qualified employee to serve as the Licensee's Chief Information Security Officer ("CISO") responsible for overseeing and implementing the Licensee's cyber security program and enforcing its cyber security policy.

(d) Reporting. Each Licensee shall submit to the Department a report, prepared by the CISO and presented to the Licensee's board of directors or equivalent governing body, at least annually, assessing the availability, functionality, and integrity of the Licensee's electronic systems, identifying relevant cyber risks to the Licensee, assessing the Licensee's cyber security program, and proposing steps for the redress of any inadequacies identified therein.

(e) Audit. Each Licensee's cyber security program shall, at a minimum, include audit functions as set forth below.

(1) Penetration testing. Each Licensee shall conduct penetration testing of its electronic systems, at least annually, and vulnerability assessment of those systems, at least quarterly.

(2) Audit trail. Each Licensee shall maintain audit trail systems that:

(i) track and maintain data that allows for the complete and accurate reconstruction of all financial transactions and accounting;

(ii) protect the integrity of data stored and maintained as part of the audit trail from alteration or tampering;

(iii) protect the integrity of hardware from alteration or tampering, including by limiting electronic and physical access permissions to hardware and maintaining logs of physical access to hardware that allows for event reconstruction;

(iv) log system events including, at minimum, access and alterations made to the audit trail systems by the systems or by an authorized user, and all system administrator functions performed on the systems; and

(v) maintain records produced as part of the audit trail in accordance with the recordkeeping requirements set forth in this Part.

(f) Application Security. Each Licensee's cyber security program shall, at minimum, include written procedures, guidelines, and standards reasonably designed to ensure the security of all applications utilized by the Licensee. All such procedures, guidelines, and standards shall be reviewed, assessed, and updated by the Licensee's CISO at least annually.

(g) Personnel and Intelligence. Each Licensee shall:

(1) employ cyber security personnel adequate to manage the Licensee's cyber security risks and to perform the core cyber security functions specified in Paragraph 200.16(a)(1)-(5);

(2) provide and require cyber security personnel to attend regular cyber security update and training sessions; and

(3) require key cyber security personnel to take steps to stay abreast of changing cyber security threats and countermeasures.

Section 200.17 Business continuity and disaster recovery

(a) Each Licensee shall establish and maintain a written business continuity and disaster recovery
 ("BCDR") plan reasonably designed to ensure the availability and functionality of the Licensee's services in the event of an emergency or other disruption to the Licensee's normal business activities. The BCDR plan, at minimum, shall:

(1) identify documents, data, facilities, infrastructure, personnel, and competencies essential to the continued operations of the Licensee's business;

(2) identify the supervisory personnel responsible for implementing each aspect of the BCDR plan;

(3) include a plan to communicate with essential Persons in the event of an emergency or other disruption to the operations of the Licensee, including employees, counterparties, regulatory authorities, data and communication providers, disaster recovery specialists, and any other Persons essential to the recovery of documentation and data and the resumption of operations;

(4) include procedures for the maintenance of back-up facilities, systems, and infrastructure as well as alternative staffing and other resources to enable the timely recovery of data and documentation and to resume operations as soon as reasonably possible following a disruption to normal business activities;

(5) include procedures for the back-up or copying, with sufficient frequency, of documents and data essential to the operations of the Licensee and storing of the information off site; and

(6) identify third parties that are necessary to the continued operations of the Licensee's business.

(b) Each Licensee shall distribute a copy of the BCDR plan, and any revisions thereto, to all relevant employees and shall maintain copies of the BCDR plan at one or more accessible off-site locations.

(c) Each Licensee shall provide relevant training to all employees responsible for implementing the BCDR plan regarding their roles and responsibilities.

(d) Each Licensee shall promptly notify the superintendent of any emergency or other disruption to its operations that may affect its ability to fulfill regulatory obligations or that may have a significant adverse effect on the Licensee, its counterparties, or the market.

(e) The BCDR plan shall be tested at least annually by qualified, independent internal personnel or a qualified third party, and revised accordingly.

Section 200.18 Advertising and marketing

(a) Each Licensee engaged in Virtual Currency Business Activity shall not advertise its products, services, or activities in New York or to New York Residents without including the name of the Licensee and the legend that such Licensee is "Licensed to engage in Virtual Currency Business Activity by the New York State Department of Financial Services."

(b) Each Licensee shall maintain, for examination by the superintendent, all advertising and marketing materials for a period of at least seven years from the date of their creation, including but not limited to print media, internet media (including websites), radio and television advertising, road show materials, presentations, and brochures. Each Licensee shall maintain hard copy, website captures of material changes to internet advertising and marketing, and audio and video scripts of its advertising and marketing materials, as applicable.

(c) In all advertising and marketing materials, each Licensee shall comply with all disclosure requirements under federal and state laws, rules, and regulations.

(d) In all advertising and marketing materials, each Licensee and any person or entity acting on its behalf, shall not, directly or by implication, make any false, misleading, or deceptive representations or omissions.

Section 200.19 Consumer protection

(a) Disclosure of material risks. As part of establishing a relationship with a customer, and prior to entering into an initial transaction for, on behalf of, or with such customer, each Licensee shall disclose in clear, conspicuous, and legible writing in the English language and in any other predominant language spoken by the customers of the Licensee, all material risks associated with its products, services, and activities and Virtual Currency generally, including at a minimum, the following:

 Virtual Currency is not legal tender, is not backed by the government, and accounts and value balances are not subject to Federal Deposit Insurance Corporation or Securities Investor Protection Corporation protections;

(2) legislative and regulatory changes or actions at the state, federal, or international level may adversely affect the use, transfer, exchange, and value of Virtual Currency;

(3) transactions in Virtual Currency may be irreversible, and, accordingly, losses due to fraudulent or accidental transactions may not be recoverable;

(4) some Virtual Currency transactions shall be deemed to be made when recorded on a public ledger, which is not necessarily the date or time that the customer initiates the transaction;

(5) the value of Virtual Currency may be derived from the continued willingness of market participants to exchange Fiat Currency for Virtual Currency, which may result in the potential for permanent and total loss of value of a particular Virtual Currency should the market for that Virtual Currency disappear;

(6) there is no assurance that a Person who accepts a Virtual Currency as payment today will continue to do so in the future;

(7) the volatility and unpredictability of the price of Virtual Currency relative to Fiat Currency may result in significant loss over a short period of time;

(8) the nature of Virtual Currency may lead to an increased risk of fraud or cyber attack;

(9) the nature of Virtual Currency means that any technological difficulties experienced by the Licensee may prevent the access or use of a customer's Virtual Currency; and

(10) any bond or trust account maintained by the Licensee for the benefit of its customers may not be sufficient to cover all losses incurred by customers.

(b) Disclosure of general terms and conditions. When opening an account for a new customer, and prior to entering into an initial transaction for, on behalf of, or with such customer, each Licensee shall disclose in clear, conspicuous, and legible writing in the English language and in any other predominant language spoken by the customers of the Licensee, all relevant terms and conditions associated with its products, services, and activities and Virtual Currency generally, including at a minimum, the following, as applicable:

(1) the customer's liability for unauthorized Virtual Currency transactions;

(2) the customer's right to stop payment of a preauthorized Virtual Currency transfer and the procedure to initiate such a stop-payment order;

(3) under what circumstances the Licensee will, absent a court or government order, disclose information concerning the customer's account to third parties;

(4) the customer's right to receive periodic account statements and valuations from the Licensee;

(5) the customer's right to receive a receipt, trade ticket, or other evidence of a transaction;

(6) the customer's right to prior notice of a change in the Licensee's rules or policies; and

(7) such other disclosures as are customarily given in connection with the opening of customer accounts.

(c) Disclosures of the terms of transactions. Prior to each transaction in Virtual Currency, for, on behalf of, or with a customer, each Licensee shall furnish to each such customer a written disclosure in clear, conspicuous, and legible writing in the English language and in any other predominant language spoken by the customers of the Licensee, containing the terms and conditions of the transaction, which shall include, at a minimum, to the extent applicable:

(1) the amount of the transaction;

(2) any fees, expenses, and charges borne by the customer, including applicable exchange rates;

(3) the type and nature of the Virtual Currency transaction;

(4) a warning that once executed the transaction may not be undone, if applicable; and

(5) such other disclosures as are customarily given in connection with a transaction of this nature.

(d) Acknowledgement of disclosures. Each Licensee shall ensure that all disclosures required in this Section are acknowledged as received by customers.

(e) Receipts. Upon completion of any transaction, each Licensee shall provide to a customer a receipt containing the following information:

 the name and contact information of the Licensee, including a telephone number established by the Licensee to answer questions and register complaints;

(2) the type, value, date, and precise time of the transaction;

- (3) the fee charged;
- (4) the exchange rate, if applicable;
- (5) a statement of the liability of the Licensee for non-delivery or delayed delivery;

(6) a statement of the refund policy of the Licensee; and

(7) any additional information the superintendent may require.

(f) Each Licensee shall make available to the Department, upon request, the form of the receipts it is required to provide to customers in accordance with Subsection 200.19(e).

(g) Prevention of fraud. Licensees are prohibited from engaging in fraudulent activity. Additionally, each Licensee shall take reasonable steps to detect and prevent fraud, including by establishing and maintaining a written anti-fraud policy. The anti-fraud policy shall, at a minimum, include:

(1) the identification and assessment of fraud-related risk areas;

- (2) procedures and controls to protect against identified risks;
- (3) allocation of responsibility for monitoring risks; and
- (4) procedures for the periodic evaluation and revision of the anti-fraud procedures, controls, and

monitoring mechanisms.

Section 200.20 Complaints

(a) Each Licensee shall establish and maintain written policies and procedures to fairly and timely resolve complaints.

(b) Each Licensee must provide, in a clear and conspicuous manner, on its website or websites, in all physical locations, and in any other location as the superintendent may prescribe, the following disclosures:

(1) the Licensee's mailing address, email address, and telephone number for the receipt of complaints;

(2) a statement that the complainant may also bring his or her complaint to the attention of the

Department;

(3) the Department's mailing address, website, and telephone number; and

(4) such other information as the superintendent may require.

(c) Each Licensee shall report to the superintendent any change in the Licensee's complaint policies or procedures within seven days.

Section 200.21 Transitional Period

A Person already engaged in Virtual Currency Business Activity must apply for a license in accordance with this Part within 45 days of the effective date of this regulation. In doing so, such applicant shall be deemed in compliance with the licensure requirements of this Part until it has been notified by the superintendent that its application has been denied, in which case it shall immediately cease operating in this state and doing business with New York State Residents. Any Person engaged in Virtual Currency Business Activity that fails to submit an application for a license within 45 days of the effective date of this regulation shall be deemed to be conducting unlicensed Virtual Currency Business Activity.

Section 200.22 Severability

If any provision of this Part or the application thereof to any Person or circumstance is adjudged invalid by a court of competent jurisdiction, such judgment shall not affect or impair the validity of the other provisions of this Part or the application thereof to other Persons or circumstances.

Session II : Automotive FOSS

Software Freedom Law Center October 28, 2016

Driven to Tears - GPLv3 and the Automotive Industry

Volkswagen's Diesel Fraud Makes Critic of Secret Code a Prophet

Eben Moglen, When Software Is in Everything: Future Liability Nightmares Free Software Helps Avoid (2010)

Mark Janis, A Tale of the Apocryphal Axe: Repair, Reconstruction, & the Implied License in Intellectual Property Law, 58 Maryland L. Rev. 423

Driven to Tears – GPLv3 and the Automotive Industry

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Abstract

The automotive industry is moving toward the use of Free and Open Source software (FOSS) in vehicles. GPLv3 is currently presenting a roadblock to greater adoption. Specifically the Installation Information requirement in GPLv3 Section 6 (sometimes called the "Anti-Tivoization" clause) is causing some car makers to fear GPLv3. These car-makers want to lock down all software installed on their cars against user modifications, but fear that using GPLv3 software will prevent them from doing so. Although there may be good reasons to lock down some software on cars, car-makers should not fear GPLv3. One solution the industry may wish to consider to allay concerns about the Installation Information requirement in GPLv3 is to adopt and advocate for use of an "Additional Permission" that excepts users from having to comply with that requirement.

Keywords GPLv3; Installation Information; Anti-Tivoization; automotive;

Car makers and GPLv3: Current Concerns

In the last five years, the automotive industry has begun widely using Free Software.¹ Primarily used for handling media and providing services – such as navigation – FOSS has nonetheless made inroads into an industry that has historically relied on closed-source proprietary software. This cautious movement to Free and Open Source Software ("FOSS") has followed a predictable trajectory not unlike other industries which have discovered

GNU/Linux and other FOSS software.² The embrace of FOSS software in the automotive industry, in particular software licensed under the GNU General Public License ("GPL"), has lead to a certain amount of cost savings and improved quality. However, this embrace has not included GPLv3 – and specifically the Anti-Tivoization clause in that license – and the rejection of GPLv3 has been vehement enough to result in "blacklisting".³ This blacklisting is considered necessary by those who advocate for it in order to prevent users from modifying the software on their vehicle, which is generally prevented by the locking of software onto hardware using cryptographic keys.

Locking the software to the hardware – by signing the original software image with a cryptographic key so that only an image provided by the supplier will boot or install – is a common practice in embedded devices.⁴ This process of signing software images – so only images with the right key will boot or install – effectively prevents a user from modifying the software on the device since they have no access to the key needed to allow their modified version to boot or install. This practice was considered by the author of the GPL – Richard Stallman – to violate the spirit of the GPL, and resulted in the addition of the "Installation Information" obligation in GPLv3.⁵

ar makers want the ability to Tivoize the software on their vehicles to ensure that the user does not modify the software on the vehicle's head unit. The major reason claimed by car makers for locking the software on their vehicles is safety.

ECU Remapping and Software Locking

The claim that complying with GPLv3 to allow a user to modify the software in a vehicle based on safety concerns is disingenuous. Drivers have, for many years, replaced parts of their car, such as tires, brakes or sometimes even software.⁶ In addition, drivers frequently use off-brand or non-original parts, often because they're considerably cheaper but just as safe and functional. There is even a large after-market for remapping Engine ontrol Units ("E Us").² E Us are microprocessors which control fuel mixture, turbo charging, transmission, and other drive train features of the car, almost all of which in some way affect safety and performance. This after-market sells services like E U remapping to increase performance or to improve fuel economy.⁸ While the E U remapping business is something of a grey market - since it is not fully supported by car makers and can increase the cost of your insurance and void a car's warranty² - nonetheless car makers are tacitly supporting this market. ar makers support E U remapping by making companies that provide that service part of their motor sports stable of advisers, by using data from the E U re-mappers to understand performance changes resulting from remapping, and generally looking the other way if customers decide to install re-mapped E Us.¹⁰ Even car dealers may have a hard time spotting a non-original E U and would therefore likely not refuse warranty service on an E U re-mapped vehicle.11

Remapping an E U can be dangerous. hanging the fuel mixture may not cause safety issues, but if you were to significantly increase the power of a car without commensurate changes in handling characteristics you might increase the risk of an accident. Safety issues certainly need to be considered when remapping an E U. For these reasons, one would expect a similar reaction from the car manufacturers to E U remapping as the current position on modifications to head unit software; namely, that it is forbidden for safety reasons and technological measures like cryptographic keys would be used to prevent it. That this is not widely the case raises the suspicion that there may be other reasons – other that safety – motivating some car manufacturers to prevent user-modifiable software in the head unit of their cars.

Software: A New Revenue Driver for Car

Manufacturers?

Speculating on those reasons is not hard to do. ar makers are becoming software producers and they are using this new capacity to market modern cars to appeal to contemporary drivers. Software is an opportunity not just to increase safety and performance but to engage the driver and passengers in a way that builds a relationship. Each update is an opportunity to strengthen that relationship, each point where the driver or passenger engages the software is an opportunity for the car makers to build that relationship further, and that relationship can represent an opportunity for significant revenues. These revenues would not necessarily be significant if they are just gathered through sales via a bespoke app store; the revenues from such a bespoke app store may be too low – and the costs of alteration of the relationship between the car vendor and the driver or passenger could be too high – to justify allowing modified software or applications.

What car makers likely want is a way to market new vehicles to younger drivers and to provide seamless and easy to use services to their middle-age customers, as well as to integrate modern notions of mobility and connectivity into their vehicles to appeal to a broad range of customers. Software is a key part of that marketing strategy. In fact, advertising tomorrow's technology manages to sell cars today. This is why we see so much press on the Apple and Google entrance into the In-Vehicle Infotainment ("IVI") market; the anticipation of these companies being connected with systems in a vehicle sells cars now even though it likely won't be widely seen in cars for years.

Preventing a user from changing the software in their car is likely driven by the desire to keep the in-car experience branded. The consequences of diluting that brand, either by blocking branded content, or by causing branded content to work in ways different than the brand owner desires, could result in loss of revenue through diminished brand loyalty, lost accessory sales, and even lost advertising – a business some car companies have stated they'll go into. There is likely a rich trove of data waiting to mined in the vehicle that car makers and others are eager to get a hold of, so as to target advertising. Keeping control over the In-Vehicle Infotainment system, the system that provides media, navigation, and connectivity and runs on the "head unit," is desirable. There is likely an incentive for car makers to try to mitigate the effects any license – like GPLv3 – which facilitates a user's modification of software on the head unit in a way that could impede data collection or advertisement targeting.

Safety: Is It An Issue?

There is, however, some merit to the view that the car makers are not dressing up a commercial need under the guise of a safety-critical concern. Those who stand in the second rank on legal issues – right after the automotive legal team – state that with regard to the GPLv3, the difficulty is with only the Anti-Tivoization clause, and the reason for disfavoring that license is safety. That proposition is worth taking at face value if only to test some of the assumptions made.

Modern cars have around 100 million lines of code running on them, $\frac{12}{2}$ with 70% of that code being in the head unit. omplexity is a non-trivial issue in automotive software design. In addition to being complex, cars can be dangerous. The World Health Organization says that:

[R]oad traffic injuries are the eighth leading cause of death, and as such are an important global public health problem. They are the number one cause of death among those aged 15-29 years. There were approximately 1.24 million road traffic deaths in the world in 2010, 77% of which were among males. Middle-income countries had the highest burden and the highest road traffic death rates. $\frac{13}{2}$

In the United States deaths in motor vehicles are a serious problem. While the

U.S. has reduced deaths by drunk driving over the last few decades via public health advertising, ignition locks, and sobriety checkpoints, deaths are still very high in comparison to other countries. Regulation has a role to play in reducing automobile deaths, and that regulation will directly affect car makers – both how they construct cars and how they are liable for malfunctions.

Regulation in the auto industry is not typically a consideration for many FOSS developers. The GPL and other open source licenses typically disclaim any liability, so when using FOSS, automotive companies may not have the expectation that their suppliers will assume liability for harms resulting from their software. Either the car manufacturers will need to become comfortable that they must assume any liability for the FOSS that they use, or they will have to educate and change the culture of the FOSS software development houses that they hope to work with so as to reduce the potential for the car manufacturers having to take on substantial liability for the use of FOSS.

If an automotive company has to go to court, it often requires its software suppliers, via a contractual indemnity, to shoulder some or all of the legal burden resulting from that software. This would not occur when one uses software that disclaims any liability. In addition, because a global car company is selling into (or having its products operate in) myriad jurisdictions with myriad different rules for liability for products, ensuring safety of those products so as to reduce the manufacturer's liability costs can be complex and costly. Automotive software has a role to play in the liability equation, both in the way in which it may affect the driver and the vehicle. Whether it is measuring the cognitive workload on the driver, or assisted driving through monitoring the car ahead, software will be able to greatly assist drivers to drive more safely. Not preventing a user from tampering with software that controls those features, be it driver workload assessment or an ignition lock, could have grievous results and possibly significant legal ramifications. As an example, software that permitted the user to disable a court-mandated ignition lock, which unlocks the ignition only if the driver has a detected blood alcohol content below the legal limit or none at all, could be argued to be contrary to public good, if not in violation of the initial order requiring the ignition lock. There are at least some circumstances where it is arguably quite reasonable for car companies to not want some of the software in the car to be modified.

Addressing Anti-Tivoization in Automotive Software

GPLv3 includes a provision that allows a copyright holder to use that license but to include "Additional Permissions" granting additional rights to the licensee::

> "Additional permissions" are terms that supplement the terms of this License by making exceptions from one or more of its conditions. Additional permissions that are applicable to the entire Program shall be treated as though they were included in this License, to the extent that they are valid under applicable law....

> You may place additional permissions on material, added by you to a covered work, for which you have or can give appropriate copyright permission.¹⁴

This provision of GPLv3 also allows downstream licensees to remove these additional permissions, if they so desire;

When you convey a copy of a covered work, you may at your option remove any additional permissions from that copy, or from any part of it. (Additional permissions may be written to require their own removal in certain cases when you modify the work.)¹⁵

This provision of GPLv3 provides a mechanism by which a copyright holder who prefers GPLv3 for their code, but is concerned about the effect of the Installation Information requirement on its downstream customers or end users, to grant an additional permission that does not obligate a licensee to follow the Installation Information requirement. At least one project has adopted such an additional permission, which could serve as a template:

> The copyright holders grant you an additional permission under Section 7 of the GNU General Public License, version 3, exempting you from the requirement in Section 6 of the GNU General Public License, version 3, to accompany orresponding Source with Installation Information for the Program or any work based on the Program. You are still required to comply with all other Section 6 requirements to provide orresponding Source.¹⁶

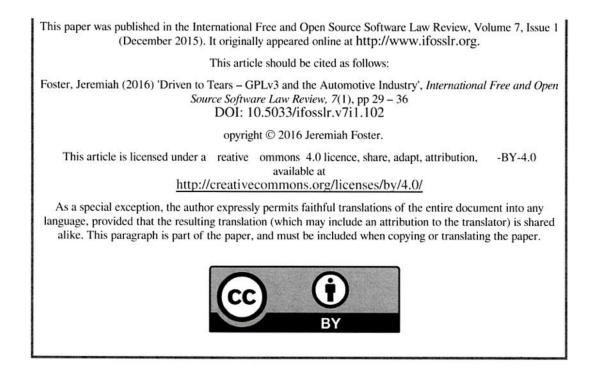
An additional permission under Section 7 of GPLv3 which exempts the licensee from the Installation Information requirement of that license, might allow for GPLv3 software to be used in automobiles while still locking down the software on the head unit to prevent the end user from changing and reinstalling the software.¹⁷

Conclusion

GPLv3 compliance in automotive applications may hinge on mitigating the effects of GPLv3 Section 6 and the requirement for sharing of installation information. For many automobile makers, and perhaps the regulatory authorities which set standards for automobiles, the Anti-Tivoization clause of GPLv3 may be considered a deal breaker for reasons of safety. Use of an Additional Permission that exempts the licensee with complying with the Installation Information requirement may be a way to allow for use of GPLv3 in automotive applications while addressing these safety concerns. Other methods, of course, may also exist; the Free Software Foundation (FSF) believes legislation can help.18 Free Software has the potential not just to play an important role in yet another industry, it has the potential to save lives, quite literally. Once licensing and compliance is understood I think a very strong case can be made that the transparency enabled by FOSS makes safety-critical devices easier to produce, of higher quality, and more effective. This is why there may be the need, at least at this time, to provide a mechanism by which GPLv3 can be used in the automotive industry while addressing their current concerns that the Anti-Tivoization clause may cause safety concerns.¹⁹

About the author

Jeremiah C. Foster is an American living in Sweden, works for Pelagicore AB, and prefers Free Software to Open Source.



E.g.,	http://	projects.genivi.org/what

- E.g., http://www.comparebusinessproducts.com/fyi/50-places-linux-runningyou-might-not-expect
- See "LFCS: GPLv3 and automobiles" https://lwn.net/Articles/548212/ See "It's not just TiVo locking down their hardware" https://www.fsf.org/blogs /licensing/gplv3-lockdown
- See 'Transcript of Richard Stallman on GPLv3 in Brussels, Belgium; 1st of April 2007" http://fsfe.org/campaigns/gplv3/brussels-

rms-transcript#tivoisation

See "WTF! It Should Not Be Illegal to Hack Your Own ar's omputer" http://www.wired.com/2015/01/let-us-hack-our-cars/

See "What is Remapping, and is it Worthwhile?"

http://www.moneysupermarket.com/car-insurance/blog/what-is-remappingand-is-it-worthwhile/

Ibid.

Ibid.

See "Ford Racing really wants you to mod EcoBoost engines" http://www.roadandtrack.com/car-culture/buying-maintenance/news/a24602 /ford-racing-really-wants-you-to-mod-ecoboost-engines/

Ibid.

See " odebases: Millions of Lines of ode"

http://www.informationisbeautiful.net/visualizations/million-lines-of-code/ and "Genivi: BMW ase Study" http://www.genivi.org/sites/default/files /BMW_ ase_Study_Download_040914.pdf

http://www.who.int/gho/road_safety/mortality/number_text/en/

GNU General Public License version 3.0, Section 7, http://www.gnu.org /licenses/gpl-3.0.en.html

Ibid.

E.g., the anola Project. See Edward T. Lima, "Additional Permissions to the GPLv3," https://garage.maemo.org/forum/forum.php?forum_id=3771

Although Additional Permissions are explicitly allowed in the text of GPLv3, and have been used by projects to exempt licensees from the Installation Information obligation, see, ibid., the use of such an Additional Permission carries risks. First, making use of such a mechanism could require that all

code (or at least all code for which it is not desired to provide Installation Information) in the software stack include this Additional Permission - a potentially difficult or impossible task if the stack is complex or requires code from a variety of different projects. There might also be the difficult issue of license incompatibility with code licensed under GPLv3 without such an Additional Permission. If the developer base for the components in the software stack are believers either in the value of the Installation Information requirement, or dislike any effort to alter the "purity" of GPLv3 with Additional Permissions, it may not be possible to make use of this proposal. In addition, any Additional Permission that exists in GPLv3 code may, per Section 7 of GPLv3, be removed by downstream licensees. This could also complicate the creation of a software stack not requiring compliance with the Installation Information requirement. Thus, although this article suggests that an Additional Permission exempting the licensees from complying with the Installation Information requirement might help address some concerns within the automobile industry with GPLv3, the logistics of using and maintaining the Additional Permission might present more complications than the value of the Additional Permission in the first place.

See "Volkswagen's Diesel Fraud Makes ritic of Secret ode a Prophet." <u>http://www.nytimes.com/2015/09/23/nyregion/volkswagens-diesel-fraud-</u> makes-critic-of-secret-code-a-prophet.html? r=0

 $\frac{\text{makes-critic-of-secret-code-a-prophet.html? r=0}{\text{Many thanks to the members of the Free Software Foundation Europe's safety-critical special interest mailing list and countless others who've helped me with this article.}$

The New Hork Times http://nyti.ms/1QXUKWN

N.Y. / REGION

Volkswagen's Diesel Fraud Makes Critic of Secret Code a Prophet

About New York

By JIM DWYER SEPT. 22, 2015

A Columbia University law professor stood in a hotel lobby one morning and noticed a sign apologizing for an elevator that was out of order. It had dropped unexpectedly three stories a few days earlier. The professor, Eben Moglen, tried to imagine what the world would be like if elevators were not built so that people could inspect them.

Mr. Moglen was on his way to give a talk about the dangers of secret code, known as proprietary software, that controls more and more devices every day.

"Proprietary software is an unsafe building material," Mr. Moglen had said. "You can't inspect it."

That was five years ago. On Tuesday, Volkswagen admitted it had rigged the proprietary software on 11 million of its diesel cars around the world so that they would pass emissions tests when they were actually spreading smog.

The breadth of the Volkswagen scandal should not obscure the broader question of how vulnerable we are to software code that is out of sight and beyond oversight.

Here is how the Volkswagen scheme worked, according to the federal Environmental Protection Agency: The cars' software turned on the pollution-control equipment only during inspections. No human intervention needed. The software could silently deduce that an inspection was taking place based on the position of the steering wheel (cars hooked up to emissions meters don't make turns), the speed of the vehicle, how long the engine had been running and barometric pressure. The driver and the inspector were none the wiser.

When the test was done and the car was on the road, the pollution controls shut off automatically, apparently giving the car more pep, better fuel mileage or both, but letting it spew up to 35 times the legal limit of nitrogen oxide.

This cheating was not discovered by the E.P.A., which sets emissions standards but tests only 10 to 15 percent of new cars annually, relying instead on "self certification" by auto manufacturers. The scam came to light when engineers at West Virginia University road-tested Volkswagen cars that had passed emission inspections. The cars, the engineers discovered, actually pumped out more pollutants when they were in the real world. Far from trying to make trouble for Volkswagen, the engineers had been hired by the International Council on Clean Transportation, a clean-air advocacy group that hoped to use Volkswagens to show European regulators how efficiently diesel cars could meet the strict emissions limits set by the United States.

After months of denials, Volkswagen admitted it had programmed cheating into the software.

Mr. Moglen, a lawyer, technologist and historian who founded the Software Freedom Law Center, has argued for decades that software ought to be transparent. That would best serve the public interest, he said in his 2010 speech.

"Software is in everything," he said, citing airplanes, medical devices and cars, much of it proprietary and thus invisible. "We shouldn't use it for purposes that could conceivably cause harm, like running personal computers, let alone should we use it for things like anti-lock brakes or throttle control in automobiles."

On Tuesday, Mr. Moglen recalled the elevator in his hotel.

"Intelligent public policy, as we all have learned since the early 20th century, is to require elevators to be inspectable, and to require manufacturers of elevators to build them so they can be inspected," he said. "If Volkswagen knew that every customer who buys a vehicle would have a right to read the source code of all the software in the vehicle, they would never even consider the cheat, because the certainty of getting caught would terrify them."

That is not how carmakers or even the E.P.A. see things. The code in automobiles is tightly protected under the Digital Millennium Copyright Act. Last year, several groups sought to have the code made available for "good-faith testing, identifying, disclosing and fixing of malfunctions, security flaws or vulnerabilities," as Alex Davies reported last week in Wired.

A group of automobile manufacturers said that opening the code to scrutiny could create "serious threats to safety and security." And two months ago, the E.P.A. said it, too, opposed such a move because people might try to reprogram their cars to beat emission rules.

The penalties that Volkswagen faces have not yet been toted. On Monday, a federal judge sentenced the former head of a peanut company to 28 years in prison for knowingly shipping peanuts with salmonella, causing or contributing to nine deaths.

Poisoned peanut butter and poisoned air are different injuries to public welfare, but both ought to be caught long before they can kill people.

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Also of interest: Software Freedom Conservancy Moglen Ravicher LLC

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When Software is in Everything: Future Liability Nightmares Free Software Helps Avoid

A Speech given by <u>Eben Moglen</u> at a meeting of the The <u>Scottish</u> <u>Society for Computers and Law</u> (SSCL) annual meeting on June 30, 2010

Event records

[Iain Mitchell]

We are very very privileged indeed to have Professor Eben Moglen speaking to us this evening. Last time he spoke in Edinburgh for our annual lecture a couple of years ago it was to mark the launch of the GPLv3. We haven't gotten anything quite so headlinegrabbing this evening. But we have something that I think is going to be very much an issue in the years to come, because the days when computers were merely just things that sat on your desktop have long since disappeared. The true nature of a computer is that a computer is in everything. Software is in everything. And when software is in everything, what are the future nightmares and liabilities and how can they be avoided? There is the theme of Eben's talk this evening.

I don't think I need to say very much about Professor Moglen, who is very well-known throughout the world. But for those of you who may be unfamiliar with him, he had in his earlier career the distinction of clerking for Justice Marshall of United States Supreme Court. And he has taught at Columbia Law School and holds visiting appointments at Harvard University, Tel Aviv University and the University of Virginia. He is the founder of the Software Freedom Law Center. He has achieved the Electronic Frontier Foundation's pioneer award for efforts on behalf of freedom in the electronic society. He is admitted to practice in the state of New York and before the United States Supreme Court. Would you please join with me in welcoming Professor Moglen.

[Clapping]

[Eben Moglen]

Thank you, Iain, thank you so much. It's an honour and a very great pleasure to be here again among friends.

When I was here last year as Iain mentioned, I was coming to the end of a very long and complicated process of negotiating one particular matter of licensing free software. I spoke here partly out of desperation and partly out of hope.

I was desperate to begin thinking about something else after 16 months of the GPL all the time, and I was hopeful that we had done the job in a way which, although nobody was more conscious than I of the difficulties, the bumps and the primitiveness of our collaboration, might signal something good about the future.

I speak here today, I suppose, out of hope and desperation, which feels very different to me. I am concerned because one of the things I have been thinking about recently is the difficulties that we face when software is in everything, based on a little bit of the experience I have going around the world looking at all the places where software is.

And I speak out of hope because I do think it is possible that if we understand what is happening a little bit quicker than we usually do about large scale social change, we will avoid a lot of nastyness that is otherwise going to be pretty serious for us.

So the place I want to start, is with the definition of a problem. The problem that I would like to define, I did try to put in the title, but "everything" is of course a remarkably indistinct word. So let me begin where I think the moment tells us to begin by pointing out that software is in cars. Software is in medical devices. Software is in all other forms of vehicular transport and software is now and increasingly will be more and more fully represented in buildings themselves that are the fundamental constituents of the built environment where we dwell, work and take care of one another.

These aspects of softwares being in everything then, though they are merely reflective of everything (I don't mean that is the exclusive list of everything,) let us just, because I don't mean to talk all evening, talk about them as though they were enough of everything to make the point.

Let us begin then with the few, what shall I say, speculations. Not facts, which would take too long and require too much like proof. And all of us here will understand that when matters of large liabilities are at stake, proof is not a thing you can do lightly.

One of the things that we know this year in 2010, and I am going to stick to matters about now, is that sometimes cars mysteriously speed up and crash into things.

That is not a disputed statement. Why they mysteriously speed up and crash into things raises all the usual kinds of difficulties of causation and proof you would expect when liability is a serious social matter. But let us just say that we know that cars mysteriously speed up and crash into things and it is reasonable to wonder about software in relation to the cause of those accidents. And wondering about whether there is software behind some of those accidents raises some important questions.

There is software in the things that power peoples' hearts, and it fails sometimes. That too is a fact. There is a lot more to be said and once again proof is an important subject and I don't mean to do more than speculate. The rules about what software you can put in medical devices and how you test are not rules which would be regarded as sufficient to create safety in other industries whose liability profile is substantially lower than medical devices.

My organization, the Software Freedom Law Center, will next month be publishing a report

on this particular subject and so I am going to limit myself to speculations here in knowledge that some facts will become publicly available shortly that will be illuminating.

Software flies airplanes. And sometimes software fails, perhaps, creating accidents. Once again, that is the most that one could say without entering into complicated discussion. But I think it would be useful to indicate the nature of the subject there a little more precisely. So let us give it an airline and a flight number: Air France, 447, which went down in the Atlantic Ocean on the First of June, 2009, killing 228 people. Today, 13 months after that accident, the flight data recorders have not been discovered. The problem has been posted by one crash investigator as locating an object the size of a shoebox, in an area the size of Paris, three thousands meters below the surface of the ocean, in terrain as rugged as the Alpes.

There is every reason to believe that those flight data recorders which have not been discovered in the last 13 months will never be discovered. And the only direct information available about the cause of the loss of Air France 447 will be the automated telemetry received from the plane in the last hour of its flight in thunder storm activity over the central south Atlantic.

The telemetry shows that the aircraft experienced the loss of trust in one of its inertial navigation guidance systems. It is hypothesized that may have occurred due to icing of a tube on outside the face of the plane which registers air pressure changes for inertial guidance input. We know that one of the two redundant inertial guidance systems had failed in the opinion of the software that determines whether or not to trust the system and that the standby air data system and the other inertial guidance inputs were disagreeing. Thus there was a disagreement between the two available sources of information and one had been ruled unreliable and not to be consulted, and in that condition the next thing registered was vertical falling of the passenger cabin which led to, we infer, powered flight into ground. In other words, the only thing we are ever likely to know about Air France 447 is that there was a multiple condition software failure in process on the airplane, after which it was lost.

So what I am talking about then, is the inevitable occurrence of what we would regard as significant liability issues surrounding software failure as amongst the significant causal possibilities throughout society.

That is the definition of the problem.

The parties affected by the problem, in addition to the human beings killed, injured or otherwise subjected to losses for which liability may rest with someone else, are manufacturers and regulators around the world who face serious issues about operation at the edge of their ability to foresee.

Manufacturers face obviously the problem of constructing devices which meet both regulatory demands and market conditions in which we may treat the avoidance of avoidable liabilities as among their regulatory demands.

But they experience some secondary difficulties from time to time, with relation to the software they embed in the products that they make whose failure may cause harm. One of the difficulties that they experience is that they acquire software from third parties with indemnities, or liability exclusions, which are extremely limited for them as purchasers. And more serious problem is sometimes they do not acquire software legitimately.

One of the difficulties one can speculate would be faced by an automobile manufacturer who learned that some of its fundamental control software is causing harm. One of the difficulties one might speculate, I at least would on the basis of my experience, is that the

manufacturer might not be in a position to disclose about its software all of the matters one would expect them to know, like how they got it, because there is a lot of software in the world doing jobs that we might think of as quite legally important with respect to the possible incurring of liability by the manufacturer which was acquired through means that we would characterize as informal, if we were being exculpatory.

And if you are in a situation where you have software which you reasonably believe is malfunctioning, and which you may even be able to fix, but which had already caused very substantial harm, in your opinion, the last thing you would want to have to do is come forward and confess a sin in its acquisition because that would lead to problems that you cannot control very easily. And therefore it is much simply to fall upon the difficulty of proving the software had anything to do with it.

Now in the case of automobiles it is particularly easy, and in the case of aircraft crashes it is particularly hard. To suggest what the manufacturers mostly want to be able to suggest in a situation like that which is that the person operating the product probably caused the harm.

The aircraft passenger is among the most passively vulnerable forms of modern human experience, as we are made to remember every single time we go to the airport and somebody prods us as though we were criminals. Our vulnerability, at least if you travel as much as I do, is always reinforced to you by the behavior authority deals out to you in international air transport. But once you are belted in, if computers on the airplane begin to disagree about what information should be presented to the expert human beings, who are supposed to make the judgment, who have the fate of the aircraft, the passengers and the crew in their hands, would be something you can do nothing whatever about. And if the computers disagree, and the pilots don't get to make expert judgment and the airplane falls out of the sky, which could conceivably have happened once already, at least, then obviously it would be very difficult for the manufacturer of the airplane to say that the passenger was in any way at fault and he would limit himself to say that the airline did not do with the airplane as it should. He would also fix anything that is wrong with the software. Which is why, oddly enough, the aircraft is not our biggest problem and I did not put it in the headline.

The automobile on the other hand is a very dangerous machine whose tendency to cause harm can always be blamed on the driver. And I would simply limit myself to pointing out to you that Toyota has had for many years both expert witnesses and as consultants a number of social physiologists with distinguished appointments at American Universities on the payroll in order to testify in lawsuits that people often press the accelerator pedal under the mistaken impression that they are pressing the brake, particularly under conditions of stress.

This is one of those beautiful counter-intuitive results of social psychology. Teaching you something about human beings which you are able then to marvel at because it is a property of human beings which is apparently universal but which has never happened to you in your own life. Where I wager with great certainty that you have never actually pressed the accelerator pedal accelerating down the highway and crashed into something under the impression that you were holding your foot on the brake.

This is what you do when software malfunctions, sometimes, I would suggest. And lawyers make money doing it and things that lawyers make money doing are unlikely to stop happening unless forced.

Regulators then have two problems. First they must have jurisdiction to regulate and second they must have competence. Jurisdiction to regulate is not merely a formal question. It is a practical one. Japanese administrative agencies have authority in the

jurisdictional sense to regulate automobile safety. But it is famously the case that automobile safety in Japan is a self-regulatory matter as Internet privacy is in the United States, a subject I am not going to talk about today, but which would justify another visit to Edinburgh if you ever incline to invite me back.

Regulated jurisdiction in other words over software in particular would mean regulators deciding to go into businesses they have largely left, each and in their own way, to be adjusted by other people. If one could say only the best of regulatory conduct in this area, one would say that it had resulted in a lot of self-regulation. That is the good news. One of the other problems about regulation then, (I won't get to the whole of the bad news all at once, because I wish to emphasize hope over desperation at least to some extent,) is the extraordinary difficulty that regulators have in maintaining competence to cover this portion of their jurisdiction, practically.

The National Highway Traffic Safety Administration in the United States, our chief automobile safety regulator, an agency which is comparatively active, extremely thorough, and from a technical point a view very well informed but which often loses battles over recalls due to the politics of regulation in the United States, NHTSA, an organization which rarely has the difficulty of getting its facts right, was compelled to admit in the course of discussion about Toyota's automobiles in the United States this Spring, that it had no engineers capable of providing independent testing of Toyota's relevant software in its relevant models of automobile. No capable engineers, because this is an area so far outside the practical jurisdiction of even a quite conscientious regulator.

And so NHTSA has borrowed 50 software engineers from NASA in order to thicken its ability to conduct a meaningful investigation in this incidence, which says nothing about how a continuing presence in this area would be managed if facts happened to justify the desire to look into the software in cars more thoroughly then has been done in the past. Similarly I am not going to restrict myself to beating up on North American regulators in this talk and I am not going to restrict myself by any means to beating up on regulators but, similarly, to offer another U.S. example the Food and Drug Administration in the United States which modulo again its difficulties in the politics of regulation, is also a highly factually competent agency with a comparatively deep technical understanding of its subject. That FDA long ago outsourced to private commercial parties the job of testing the safety of medical devices, under a devolution of government into the private sector activities that I could call by some name that would be familiar to you but which might sound deprecatory.

At any rate, what has happened is, that those organizations that contract to test the safety of medical devices and as we shall report in the next month, the protocols concerning how they test software for those purposes which are contractual in nature and which are therefore documented, the protocols they use would not be sufficient for testing software in a matter far less important than a pacemaker or an insulin pump.

Once again the fundamental difficulty will turn out to be that testing software is a complex activity. And simple testing of software, asserting that it manages under conditions of single cause of failure situations, is inadequate, even if the software cannot in its malfunction cause imminent death as some of the software can, and perhaps, has.

So once again what we shall discover is regulatory authorities face significant constraints on their cognitive capacity, and on their ability to conduct the kind of testing even if it is only sporadic spot testing which we assume assures the safety and quality of materials used in society where harm imminently results from failure.

In the hotel in which I was staying here, a lovely establishment, but which I shall not name for reasons that will be apparent in a moment, there was an accident last week in which an elevator cable parted and an elevator containing guests in the hotel plummeted from the second story into the basement. When you check in at the hotel you merely see a sign that says "We are sorry that this elevator is not working. And we are apologetic about any inconvenience it may cause." I know that the accident occurred because a gentleman I met in the course of my journey from New York to Edinburgh earlier this week was the employer of the two people who were in the car. And in casual conversation waiting for a delayed airplane the matter came out. I have not, I admit, looked into the question of elevator safety regulation in the municipality. But in every city in the world where buildings are tall (and they have been tall here in proportion to the environment for longer than they have in most parts of the world) elevators safety is a regulated matter, and there are periodic inspections and people who are independent engineers, working at least in theory for the common good, are supposed to conduct such tasks as would allow them to predict statistically that there is a very low likelihood of a fatal accident until the next regular inspection.

With most of the software that causes harm if it fails in the world, there is no regular inspection. There is no requirement to make the materials inspectable. And there is great doubts about the capacity of regulators' and the technicians they can reasonably expect to employ within budgetary constraints, to conduct the kind of investigation to assure safety which is characteristic of the simple physical stuff out of which the dangerous parts of our world are built.

That is the full explication of why we are going to have liability nightmares. I recognize that there may be people in the room for whom the phrase "liability nightmare" sounds like a good thing. And this is part of why I speak out of desperation. Because oddly enough there are a lot of smart people on the other side of what I'm about to say.

Some of those people have business interests in being allowed to determine the quantum of this risk all by themselves and to lay it off as silently as possible. Because of course there are pathologies of private governance just as there are pathologies of public governance.

Oddly enough, under late capitalism when financial industries are strong, businesses' incentives to study and prevent the risks of catastrophic loss can be remarkably low. The reason those incentives can be so low is that the avoidance of catastrophic but low-probability risks with real costs in the present looks like expenses you can cut.

And if you are leveraging your business, avoidance of catastrophic risks of low probability with substantial present costs in either time or money will cause failures to go underprevented routinely as a result of the gravity of the balance sheet.

Allow me to mention in this context Lord Brown, whose creation of the don't-call-it-British-Petroleum Company as we know it now for a short while more, resulted from the leveraged acquisition of large numbers of oil companies building an immensity which then had to save money everywhere it could in order to manage the expenses against which it had to balance the costs of the immense leverage that had created it.

That BP became well understood throughout the world as a safety miser, and its record in every major jurisdiction where it functioned showed that its incentives had become to under-insure against low-frequency catastrophic risk because the avoidance of present expense was irrevocably determined by the gravity of the balance sheet. We had a refinery explosion in the United States; we had significant pipeline injury resulting from inadequate management in the United States; and now, I say no more.

So I am desperate because there are forces at work in all the places where justice must be made—that is, among the public regulators within the private businesses and even at the bar—there are forces that do not want to hear what I am going to say, which is that we

can't live this way.

This must not happen. This is another form of ecological harm resulting from our inability to understand the technological nature of our transformation of society shrewdly and rapidly enough to avoid serious human harms.

I said recently, I will admit, that Mr. Zuckerberg had done more harm to the human race than anybody else his age. And that's an unfortunate fact about where we live now, but I need to point out to you that there are a lot of people in the world a lot older than Mr. [Zuckerberg]. Now we got a problem we must fix and the bad news, as I have pointed out, is that we are not socially aligned even to recognize it, let alone fix it.

The hopeful part of my talk is unfortunately rather short but it's rather intense, because the good news is, freedom foresaw the problem, and we could fix it if we were let. You see, the fundamental difficulty is a difficulty which arises from the inadequacy of regimes of inspection. Manufacturers have incentives for non-transparency, including non-transparent ways of creating the code they put in things. Regulators have an incentive for transparency, but they cannot manage the expensive cognitive machinery necessary to understand and to repair the liabilities created by software.

And legal rules, though of course productive of an exacting and thorough sort of justice, as we all know, are at their very best effective in certain forms of post-harm redistribution, against which I have nothing bad to say, except that they don't prevent the nightmare. All they do is, after long litigation, move money around between insurers, which is not really a sufficient response.

We do possess the answers necessary to implement a different way of thinking about things in the free world. First of all, we produce transparently. Second, we avail ourselves of what has come to be known in the free world as Linus's Law, named after Linus Torvalds, that in the presence of enough eyeballs, all bugs are shallow.

This is not a necessarily correct technical statement, but it is, in this context, an important social proposition. The correct way to maximize the available inspection of software that can fail is to use civil society's full width to conduct inspection. I don't need to explain to you what can be accomplished in this world by a single motivated hacker.

I don't need to explain to you why it is that if you tell everybody on Earth, "the software that could fail, killing your mother the next time she takes an airplane, is on the Web, you might want to have a look at it," there is a remarkably high number of very talented and thoughtful people around the world who will do exactly that.

So what I'm going to say, oddly enough, reduces to a couple of rather simple principles, which could avoid a great deal of liability nightmare around the world. On the downside, some lawyers would get less rich doing those liability nightmares, and I acknowledge, in an audience such as this, the legitimacy of that consideration.

But the upside is more substantial. We would actually avoid a lot of deaths.

Proprietary software is an unsafe building material. You can't inspect it. You can't assess its complex failure modes easily, by simply poking at the finished article. And most important of all, if you were aware of a problem that was of a safety-enhancing kind, that you could fix, you couldn't fix it.

If you were aware of a catastrophic failure mode, you couldn't do anything about it, except ask the manufacturer to fix it, who of course sells almost all the software that it sells, if it sells to consumers, under a shrink-wrap with a Hadley against Baxandall-ization of the whole thing. Which basically says, if the software fails catastrophically and obliterates your town, we'll give you your money back.

So proprietary software is an unsafe building material. We shouldn't use it for purposes that could conceivably cause harm, like running personal computers. Let alone should we use it for things like anti-lock brakes, or throttle control in automobiles. We wouldn't allow people to build black-box elevators, you know. They've got to be inspectable, and they have to be repairable by the people in whose buildings they are.

That's a sensible rule, arrived at over a long period of experience with what can happen when things fall, which you would expect us to carry unchanged into our experience of the digital environment, but which is not. The basic principle of the difficulty that we face is we can't see enough and we can't modify it fast enough to avoid merely assessing in an extraordinarily complex way that the legal system, too, will be no good at, what went wrong after it fails. What we actually need is the ability to harness civil society to prevent failure. This is a problem, in other words, which can be prevented more easily than it can be coped with after the fact.

The obscurity of my principle, the fact that it hasn't been widely endorsed around the world, well, I will leave the question why everybody hasn't seen it already to be discussed by others.

Because, after all, I really am, however desperately, an optimist. I actually think what we ought to do is just recognize the truth of this and fix it. I can't imagine that there's anybody who wouldn't want to—unless they had existing incentives already not to want to.

And, so what we have is a democracy problem, because that's how we deal with things like this. In other words, we need regulation, but the regulation that we need is regulation that prevents harm, a not-difficult proposition, usually, to offer to a legislator.

We need to use inspectable and testable building materials in constructing the artifacts that run our lives.

Well, that's not a terribly difficult proposition to put before a legislature. Every legislature in the twentieth century accepted that to a great extent, from the municipalities around us, to the national governments, and beyond. The European Commission prohibits, flatly, the use of user-modifiable software in medical devices. The European Commission's view is that the presence of modifiable software in medical devices causes risk. I perfectly understand this point of view, but it's precisely backward.

On the whole, over the entirety of the problem, the availability of software you can read, understand, and repair, which can be vetted thoroughly, which can be fully disclosed to civil society, which can be assured to work, though in which who installs modifications in which devices can be rigidly controlled by many forms of law, including criminal law, makes sense.

The determination that every medical device will be a black box, fully testable only by its manufacturer, does not make sense. The existing compromises, including the European Commission's view, are, unfortunately, not working.

In the United States, at least in theory, regulation makes more room for the possibility of free software in medical devices, but practice is, of course, very much the other way.

I will state, as grounded speculation resulting from my experience, that there is at least one major manufacture in Europe who is out of compliance with GPL, concerning GPL'ed software embedded in the medical devices they sell here, because they believe that it is less risky to disobey the GPL and risk copyright infringement lawsuits than to risk the wrath of the European Commission for using that GPL'ed software in medical devices.

If you were a large manufacturer of medical devices in Europe and that's the choice your regulatory masters put you to, that would be a bad thing, I say, happening to believe that violating the GPL is a bad idea for practical as well as moral reasons.

But what we really benefit from is the recognition that the more brains we harness to the process of making this extraordinarily complex and failure-prone technological environment around us safe, the better we will do.

Failures in software that cause security problems are not the biggest difficulty. They're over-emphasized, by several orders of magnitude. But they're not trivial, and I would be remiss if I didn't say something about them, which is that they offer an excellent demonstration of why it's better to have more eyeballs on the code.

I appreciate that there is strong controversy around the world of whether proprietary operating systems or free operating systems are more secure. But you appreciate that that controversy is like the controversy over whether people sometimes press the accelerator when they meant to press the brake and keep it there long enough to drive down the highway and crash into things, because you have more Windows computers in your life, in all likelihood, than I have in mine, and so you know.

What we really recognize ourselves is also recognized by the regulators, and, to some extent, is recognized by the manufacturers, though they adopt our software primarily because it's cheap for them. They also know it works, and "works" includes "doesn't send their devices up in smoke" and other such things, which are, after all, not good for you, and which they wish to avoid. If they didn't believe they were avoiding those risks, which are catastrophic to them, if not to the human beings around them, they wouldn't use our stuff.

Even the lawyers know this would be a good idea because, I've told you and, although I'm happy to answer hostile questions if anybody has any, the truth is, this is common sense, really. And, despite predictions on the subject by non-lawyers, lawyers listen to common sense.

So we're going to have to do it. We're going to have to do it. It's going to take some trouble to get it done, because there are going to be a lot of people on the other side, for reasons we've just investigated. And each one of the catastrophes that ought to be the last straw, there's going to be argument about. There's going to be discussion about causation and proof, and it's going to be immensely complicated.

And, some of the people in this room will be adding smoke, because that's their job and they do it well. So, it's not going to work the way it ought to work, namely, "look, we've got to do something about that." Unless people are willing to synthesize the data for themselves, and put it together, and add common sense to it, and make a democratic demand, it won't occur.

And a lot of other things will occur that we will feel bad about, that we should have avoided, that I just told you we could raise our odds of avoiding very drastically, and all we'd have to do is be for freedom, which is surely the most desperate kind of hope anybody could have offered under these circumstances. Thank you very much.

[Iain Mitchell]

Eben has very kindly agreed to answer questions, so I was wondering if we have somebody who might like to kick off the discussion.

[Audience member]

I have several questions. Thank you so much. You raise so many interesting points. I am Paula from the Open Knowledge Foundation in Scotland and, so a lot of questions. Is there a mailing list where we can ask them all, by the way.

[Eben Moglen]

So, there is a place called moglen@columbia.edu, and I'll put a website up or add it to my blog, or do something. If it's a useful conversation we'll keep it around.

[Audience member]

There are several things, but I'm going to ask you just one.

We are learning how to use the "put a lot of eyeballs on the code." I think, although there are issues, we can start. Would you recommend that we have many eyeballs on the license? My approach to open source licensing is that at the moment I see that there are limited lawyers who are experts and although the lawyers who are experts have been [inaudible]. So my approach would be why don't we open the licensing process to a group of people, even with different opinions, to try to make these license more reliable. This is something that I don't see happening now and I would like to have your opinion on your experience.

[Eben Moglen]

So, as F. Scott Fitzgerald says, so we beat on like boats against the current, borne back ceaselessly into the past. Well, that's why GPL3 was done the way it was done, because I wanted to put together a process like that in which we could somehow model the social consequences of mixing in a deliberative process everybody who, regardless of the size of organization, or the geographic dispersion, or the nature of the technical or legal specialization of the parties, and we spent 16 months putting a license together in that way, and the last time I was here, the talk I gave, which is rattling around the net somewhere, was about what I thought we might have learned on the basis on that early experiment with the process of making better licenses that way.

The Mozilla Foundation is currently engaged in a process of revising the Mozilla Public License, which pretty much adopts that general approach to the making of free software licenses, and given that MPL and the Free Software Foundation copyleft licenses are the most complex licenses that are used in the free world for most purposes, I think we've pretty much tried in a conscientious way to fulfill your request. I don't know what would happen if you tried to get together a lot of people around the world to reconsider the MIT X11 license, or BSD. My guess is that people would say, yes, well, they are simple things, and they work, why fix them, they ain't broken. And they don't have to be very adaptable to circumstances because they basically defer to downstream users' decision-making.

I think Creative Commons is correct that the process of manufacturing software licenses doesn't need to occur in the Creative Commons process. There are answers that are important where Diane Peters, the general counsel of Creative Commons and I work closely at the moment. Diane sits on the board of the Software Freedom Law Center, and we are, I hope, valued colleagues. She is

What we have been talking about recently is the world in which we live in, in which media objects are converging so that both software and non-executable media bitstreams—video, audio, texts, and graphics—are living inside a single object from the user's point of view and we need to think about how multiple licenses exist and work together inside that barrel, one is for the code, and one is for the graphics, the text, the media of every kind.

There will be some adjustments around the edges and I have every reason to think that those, too, will occur in Wiki-like ways. We all are benefiting enormously from enhanced Web collaborations. I feel sure that license-making is going to go in that direction.

[Audience member]

I was just wondering, as well as having the software publicly available, do you think it would be useful if software had test suites that were publicly available?

[Eben Moglen]

Well, if you look at how most free world software works, that's how it works. "make configure," "./configure," "make test," "make install," right? We do that. We've always done that, not just the free world, right?

[Audience member]

But should there be a regulator are defining that there should be certain tests in the test suite...

[Eben Moglen]

Why worry about whether regulators define it? In the free world we define it. Developers define tests because they want to test their software. Testing is part of the process of making.

[Audience member]

The whole idea of a regulator is to ensure that it doesn't go wrong.

[Eben Moglen]

Let's suppose that regulators try to be maximally parsimonious. Let's suppose they operated either in libertarian political environments or under the rigid routine of having to explain to a political appointee everything they do, or in any of the other ways, have limited budgets, let's suppose that for any of the reasons that regulators want to be parsimonious, they want to be parsimonious. The minimum set of regulations necessary is, you must make all parts available to inspection, and you must permit anybody to fix a safety problem at any time.

[Audience member]

There would be contentions.

[Iain Mitchell]

Coming from a European legal perspective, the difficulty, of course, you've got, is, that regulation can never be a silver bullet. Think of the mass of regulation that surrounded the banking industry, and think of where that got us. I think that the point is, that Eben's point is very well made, that regulation might be necessary on some stratum, but essentially you've got to rely upon commercial and market pressures, you've got to rely on public opinion, you've got to rely upon persuading politicians. Don't think that regulation is the silver bullet that will cure everything.

[Eben Moglen]

One of the elements of this that's contentions is that what you have to rely upon is society,

sometimes known as socialism, which is why it's so contentious.

What the businesses have learned is that they could socialize research and development in software to the free world. We did it for them with enormous efficiency, both in order to demonstrate a theoretical proposition, namely that freedom is good, and a practical proposition, namely that we could make neat stuff if people would let us. And as a consequence, we altered the way the software industry around the world works because we proved to them that socialization of research and development was highly profitable.

Now even Lawrence Ellison, a man who never had a research division—because what good is a research division in a company that makes and sells software?—now even Lawrence Ellison participates in socialism heavily, because he bought a relationship with the free world of enormous value and he paid seven billion dollars for it, which to him is real money, even. You could raise a sailboat for that.

Now, the consequence of relying on society is that the regulator gets a free ride the same way that the capitalist does. In the same way that the manufacturer who sells at a profit has socialized his R&D to great efficiency gain, so the regulator socializes the process of testing and fixing. The reason that it gets done is people want it done, it's got an itch, it gets scratched, and because we're talking about software, when one guy fixes it everybody gets the benefit. We take advantage of the very same multiplicative effect in zero-marginal-cost economics that the manufacturers took advantage of. We use it for a different purpose, namely to achieve social good.

Well, that's not an unprecedented activity. That's what we did in the first place; that's what we're about. We use the socializ-ability of software knowledge in the zero-marginal-cost economy to produce social gains with very little apparent social input, because we harness the creativity and ingenuity of people and we free that to do the work. All I'm pointing to is that with tiny regulatory interactions you can harness that same process to make the environment safer, and you will get immense safety from it. But, it will be contentious, yes, my goodness it will.

[Audience member]

No, I'm saying that...

[Eben Moglen]

No, it would, you're right, it will.

[Audience member]

No, what I'm saying is, let me paint out if you say to somebody, you say, "it's not safe, let me fix it." How do I know that you're going to make it more safe, and on top of that, I cannot sue you or anybody else for [inaudible]...

[Eben Moglen]

Then don't use the fix. That's easy!

[Audience member]

But what I'm saying is I question the competence of anyone who comes up to me and says ""hey, I'm gonna make it more safe."

[Eben Moglen]

That's odd, because that's how we do it now. We say to people "I can make it safer, I can make it more secure, I can make it use less energy, I can make it work better," and we're right. And if we're wrong, people don't use the fix. That's what we've already done. I understand your suspicion, I appreciate the point, I come to you on that subject with proof in hand. A quarter of a century of work.

[Audience member]

In your model, what is going to exist with quality assessment [inaudible]...

[Eben Moglen]

Well, you can do it any way you want, can't you, because everybody participates equally in that process in the free world. Regulators would surely want to participate. I would rather imagine they would participate in a variety of ways, including by putting some of the people who successfully fix things on the technical advisory committees that are so important to the functioning of the regulatory entities.

There's nothing to prevent us from issuing trumps to the regulators if we want to. There's nothing, for example, that prevents us from coupling the system of 'everybody's got a right to inspect and everybody's got a right to nominate patches' with the idea that a regulatory entity produces authoritative versions of things which are safety-critical. If the German government wants to decide what the German automotive operating system consists of, which they might, given my experience, that wouldn't be a problem for me.

The point is that the software's free availability and everybody's opportunity to read it, think about it, deal with it, poke it, test it, modify it, and compose patches for it, crucially advantages that national regulator. And I point to the national operating systems built on free software that occasionally are discussed by national governments, as the Russian government is discussing one now.

I don't necessarily think at any given moment that that's a good idea - I have views in particular contexts about it - but there would be nothing to prevent a society from doing it and I wouldn't think it was a bad response, unless some practical detail suggested it was poorly implemented. The goal here isn't to establish all that regulators might do, the goal here is to establish a minimum that every society ought to do because it's a predicate to doing it right - whatever 'doing it right' turns out to mean.

[Audience member]

Let's take a simple example we're all familiar with, domestic heating boiler, which is controlled by British standards and European Union standards, and if you design a new pump, they have to approve it before you put it on the market.

Now let's imagine you've got a bit of software in our pump and it's gone free, as you've just described. Surely the only way that's going to work in terms of the consumer is that there will then have to be a system for checking that the fixes are safe. And you'll simply be putting the civically-enthusiastic fixer under the same burden as a manufacturer of pumps. And therefore people will not want to go and check our boilers because when they find a fix they won't feel confident about the regulatory system.

[Eben Moglen]

No, not necessarily. I appreciate that that's a possible difficulty, and if it arises it needs to be solved in one of several ways. Generally speaking, standardization doesn't involve making it impossible for free software authors to work—we work heavily in standardized

areas, in fact I should say we work heavily in heavily standardized areas. We work best, it is true, in heavily standardized areas where the standards are open, that is where everybody has an equal right to implement and therefore we took the area that we standardized the most in, namely the web, and we created at WC3 an extraordinarily important open standards manufacturing policy, which is now a model for open standards discussion in, among other things, government regulatory entities around the world. The Software Freedom Law Center was providing - is currently proving - some advice to the government of India on that subject, but the relationship between standardization and free development is not somehow one of incompatibility that would make it wrong to say that standards-making is a good way of doing, among other things, safety regulation, and the free world would be somehow disadvantaged by it.

The major difficulty with using standards regulation as safety regulation is that standards are by-and-large purchasable outcomes of pay-to-play organizations. That's how standards are made around the world by-and-large, and the result is that if you expect standards-making in software to be effective at producing safety, there will be difficulty, that's all that I would say.

The OOXML standard mess is a reasonable example of how tame standard making can cause industry pathologies. If you spend \$150 million around the world in bribes, as Microsoft did, you can make anything a standard. I'm not sure that's what you want out of the thing you want to make your safety regulations from, but I would agree that standardization is a deeply important component of how things ought to be made safe.

The problem with thinking of software failure as cured by standardization, which is the last comment I want to make, is that standards are very general things in the world of software. With respect to your boiler, it's true that a standard can define how valves work in a way which is important to safety criticality, but software standards don't define what will happen under multiple-failure conditions and things like that. They define how things work under normal circumstances, they define how protocols work when they are properly implemented - they don't define what happens when tubes freeze over and arbitration software has to decide which navigational system is to be relied upon. That's not the sort of stuff standards do. If we tried to use standards to do it, we'd have to revise how we make standards.

[Audience member]

It's evident at the moment that most manufacturers do not release the source for embedded software currently. Is your impression that their current reason for doing this is because they think it's good, some other people might take it, or because it's bad and some other people might find this out?

[Eben Moglen]

Mostly it is the former. It's not merely that it's good and somebody else might take it, it's that every standardization reduces a downstream service monopoly that they can control. For example, with respect to the diagnostic codes emitted by complex automotive systems and how to understand them, every manufacturer in the United States - and as far as I know, in the world economy - tries to control downstream access to the ability to access and interpret their codes. This despite the fact that the American Society of Automotive Engineers is supposed to standardize everything of importance about automobiles, and every couple of years, a guy calls me up and wants me to help him challenge the inactivity of the American Society of Automotive Engineers in requiring standardization of the diagnostic code scam in the automotive industry as they currently standardize the pitch and diameter of every screw and bolt in every automobile.

But standards structures don't work well for that purpose in the area of software and they allow manufactures to derive various downstream anti-competitive advantages from the maintenance of their own proprietary software stacks. Whether there is any social good to balance that resulting from any increase in profitability to the manufacturer should at least be an explorable question. In my society regulatory interventions are supposed to occur on a cost-benefit basis, and I would abide the outcome of the cost-benefit investigation of that just as you were suggesting. My guess is that manufacturers derive substantially less value whatever it is from the harm caused.

[Audience member]

I'm just curious to think about where software ends, because we've kind of got the situation now that perhaps 20 years ago hardware was relatively simple but we have open software sitting on the most incredibly complicated hardware device, I can see that the sort of chip designs themselves are basically software now—we can classify it as software—but I'm just trying to think how far we can expand such a scheme. The chemistry of chip fabrication could be cause for a problem.

[Eben Moglen]

Well oddly enough, chip manufacturers worry a great deal about that already. We don't experience a lot of hardware failure in the world, in that context. Hardware—computing hardware, digital use processing hardware—tends to fail catastrophically if it fails at all because manufacturers are very good at dealing with the things that would cause the kinds of failures—the multiple-condition peculiarities. We know that gamma-rays can distort unshielded hardware, and even so we worry about it very little because we add an extra bit that doesn't cost us anything in the memory and we fix single bit errors when they happen.

So we take even physical limitations in hardware and we deal with it. Hardware engineering is orders of magnitude more sophisticated than software engineering. I've said this before—I'll be quick about it now. When I went to work at the IBM Santa Teresa laboratory, in July of 1979, it was one of the largest clusters of hardware in the world, we had 330 professional programmers producing software used by IBM databases, programming languages, and all sorts of other stuff, we had acres, hectares of 3330 and 3350 disk drives. I have the spec sheet of the laboratory hardware from the day I joined, a little piece of employee bumf, 330 people 20 7168's, the total capacity of that laboratory was 29 gigabytes and we thought that was big.

Okay? 32 gigabytes on a thing the size of your thumbnail that costs \$129 or a terabyte hard drive that costs \$79, right? Hardware builders have built machines that dwarf what we expected could be achieved when I was young, they reduced them to less than the size of your hand, they put them on a table top for \$200. Software is arguably worse—surely not substantially better. The great mystery of our world, unless you understand the harm done by the proprietization of software, is why software engineering is so primitive compared to hardware engineering.

So I can't stand here and tell you that you're at risk from catastrophic hardware failure, that we can't test and don't diagnose, and that manufacturers don't find. That would be untrue. Every once in a while, as you know, guys put out chips with some significant unexpected problem in them—Intel has had to fall on its sword twice in the personal computer era because there was some error in a floating-point box that didn't do its job right. In one revision of one chip. But this is not a difficulty like software because software has been engineered differently, and although we in the free world would like to say we haven't done it, and mostly we haven't done it, the truth is software engineering had been held back for two generations by over-proprietization and we've just begun to fix the problem. But this would fix the problem in a bigger way.

Thank you all.

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A Tale of the Apocryphal Axe: Repair, Reconstruction, and the Implied License in Intellectual Property Law

Mark D. Janis

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A TALE OF THE APOCRYPHAL AXE: REPAIR, RECONSTRUCTION, AND THE IMPLIED LICENSE IN INTELLECTUAL PROPERTY LAW

MARK D. JANIS*

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[T]he apocryphal axe					

[is that] of which [its] owner brags: "This is my great-grandfather's original axe, although the handle has been replaced five times, and the head twice."¹

This Article discusses the mischief that ensues when courts must solve the riddle of the apocryphal axe in order to determine patent infringement. The stakes are enormous. Consider the owners of axe patents, who are pleased to sell axes, but would be even happier if they could control the multi-million-dollar replacement-parts market in axe handles and heads.² This control is elusive, however, because a supplier of unpatented handles or heads infringes the axe patent only if a customer uses a replacement handle or head to make a *new* axe.³

3. The customer would incur liability for direct infringement as a result of the unauthorized making. 35 U.S.C. § 271(a) (1994 & Supp. 1996). The supplier might be liable under an indirect infringement theory, either for intentionally inducing the customer to infringe, *id.* § 271(b), or for knowingly contributing to the customer's infringement by supplying a replacement part that is especially designed for use in a patented device and that is neither a staple article nor suitable for any substantial non-infringing use, *id.* § 271(c). In order for the supplier to be indirectly liable on either theory, however, the customer must indeed directly infringe the patent. See Serrano v. Telular Corp., 111 F.3d 1578, 1583 (Fed. Cir. 1997) (finding that "[t]here can be no contributory infringement without direct infringement").

^{1.} FMC Corp. v. Up-Right, Inc., 816 F. Supp. 1455, 1464 n.15 (N.D. Cal. 1993), aff'd, 21 F.3d 1073 (Fed. Cir. 1994).

^{2.} In a number of industries, the sale of replacement parts for a patented invention may account for the bulk of the revenue derived from the invention. See, e.g., Kendall Co. v. Progressive Med. Tech., Inc., 85 F.3d 1570, 1576 (Fed. Cir. 1996) (noting the patent holder's argument that "much of the profit arises from sale of the replaceable sleeves rather than from sale of the original device").

So what does it take to "make" a new axe? An axe handle breaks; a customer fits a new handle to the old head. What has occurred? Is this an extinguishment of the original, followed by incarnation of a new axe? This would be an illegal "reconstruction." Or is this the same old axe, dressed in a new suit? This, by contrast, would be a permissible "repair." Although this question seems better suited to some sort of mystic of machine tools than to a jurist, liability for patent infringement, with its serious financial consequences, turns on it.

The intellectual history of patent law's repair-reconstruction dichotomy is, if not exactly rich, at least varied, and unquestionably idiosyncratic. The repair-reconstruction dichotomy has baffled and annoyed courts for decades,⁴ often driving courts to employ "loose language."⁵ It moved Justice Black to song,⁶ and it impelled Justice Brown to render what is presumably (one hopes) the United States Supreme Court's only considered judgment on the inherently perishable nature of toilet paper.⁷ This dichotomy originated in an extraordinary case concerning one of the most frequently litigated patents in the history of the U.S. patent system; Daniel Webster and William H. Seward, two towering figures of nineteenth century American politics, were co-counsel in this case at the very moment when their political rivalry portended the disintegration of the Union.⁸

4. See infra Part I.B.

6. See infra note 103 and accompanying text.

7. See Morgan Envelope Co. v. Albany Perforated Wrapping Paper Co., 152 U.S. 425, 436 (1894) (discussing a patent for a package of toilet paper).

8. See Wilson v. Simpson, 50 U.S. (9 How.) 109 (1850); infra Part I.B.1.

For a scholarly analysis of the contributory infringement theory, see A. Samuel Oddi, Contributory Infringement/Patent Misuse: Metaphysics and Metamorphosis, 44 U. PITT. L. REV. 73, 76 (1982) (characterizing the doctrine simply as "the patent law application of the tort doctrine of imposing joint and several liability on tortfeasors acting in concert" and tracing its origin in American law to Wallace v. Holmes, 29 F. Cas. 74 (C.C.D. Conn. 1871) (No. 17,100)).

^{5.} F.F. Slocomb & Co. v. A.C. Layman Mach. Co., 227 F. 94, 97 (D. Del. 1915) (noting that such language has been used in addressing "the question whether the furnishing of particular parts of patented mechanism will amount to reconstruction and consequently an invasion of the exclusive rights of the patentee"), *aff'd*, 230 F. 1021 (3d Cir. 1916); *see* Mallinckrodt, Inc. v. Medipart, Inc., 976 F.2d 700, 709 (Fed. Cir. 1992) ("Although the rule is straightforward its implementation is less so, for it is not always clear where the boundary lies: how much 'repair' is fair before the device is deemed reconstructed."); Standard Havens Prods., Inc. v. Gencor Indus., Inc., 953 F.2d 1360, 1376 (Fed. Cir. 1991) (noting that "[t]he difference between a repair and a reconstruction is a difficult question that must be resolved case by case"); Hess-Bright Mfg. Co. v. Bearings Co. of Philadelphia, 271 F. 350, 352 (E.D. Pa. 1921) ("The dividing line between repairs and a making over cannot be verbally located.").

Courts long ago abandoned all efforts to cabin the repair- reconstruction dichotomy within a rigid framework of rules.⁹ Instead, they rest their decisions on "the exercise of sound common sense and an intelligent judgment."¹⁰ This lack of a clear framework is not helpful to patent owners attempting to recoup research and development expenditures,¹¹ replacement parts suppliers endeavoring to carry on a legitimate business, or to customers, whose axe handles regularly break. It also is probably not satisfactory to judges, who routinely must confront the repair-reconstruction problem in patent cases. Indeed, the issue has recently been the subject of two key appellate decisions, both of which generated certiorari petitions.¹²

As a matter of sheer practicality and doctrinal stability, then, the repair-reconstruction problem needs closer scrutiny. Additionally, the dichotomy is of considerable theoretical and practical significance as one aspect of a larger problem in defining the extent to which the authorized sale of goods exhausts intellectual property rights in the subsequent use and resale of those goods.¹³ Exhaustion of rights is an issue of considerable theoretical importance¹⁴ with which jurists of the world's leading courts, including the United States Supreme Court,¹⁵

10. Goodyear Shoe, 112 F. at 150.

11. See FMC, 21 F.3d at 1078 (noting the patent owner's request for a clearer legal standard by which to distinguish infringement-through-reconstruction from permissible repair).

12. Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 123 F.3d 1445 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1304 (1998); Aktiebolag v. E.J. Co., 121 F.3d 669 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1337 (1998).

13. In general terms, exhaustion of intellectual property rights refers to the loss of intellectual property rights with regard to particular products, occurring when those products are the subject of an authorized sale. *See infra* Part I.A (providing an introduction to the concept of exhaustion and exploring additional definitions).

14. See generally Darren E. Donnelly, Parallel Trade and International Harmonization of the Exhaustion of Rights Doctrine, 13 SANTA CLARA COMPUTER & HIGH TECH. L.J. 445 (1997) (discussing the international dimension of the exhaustion of rights problem); David C.L. Perkins & Marleen Van Kerckhove, Licensing Intellectual Property Rights in the EU: The Community Exhaustion Doctrine, 490 PRAC. LAW INST. 419 (1997) (examining the way in which the exhaustion principle is applied in the European Union).

15. See Quality King Distribs., Inc. v. L'Anza Research Int'l, Inc., 118 S. Ct. 1125, 1130-34 (1998) (holding that, under the first sale doctrine, authorized sale of copyrighted work outside the United States exhausts copyright protection within the United States, thus providing a defense against a claim of unauthorized importation).

^{9.} See, e.g., FMC Corp. v. Up-Right, Inc., 21 F.3d 1073, 1079 (Fed. Cir. 1994) ("It is impracticable, as well as unwise, to attempt to lay down any rule on this subject, owing to the number and infinite variety of patented inventions." (internal quotation marks omitted) (quoting Goodyear Shoe Mach. Co. v. Jackson, 112 F. 146, 150 (1st Cir. 1901))); Electric Auto-Lite Co. v. P. & D. Mfg. Co., 109 F.2d 566, 567 (2d Cir. 1940) (per curiam) (asserting that "in the nature of things there can be no rule as to where repair ends and reconstruction begins").

the European Court of Justice,¹⁶ and the Supreme Court of Japan,¹⁷ have recently grappled.

This Article seeks to scrutinize the repair-reconstruction dichotomy,¹⁸ with particular attention to the following question: Should the exhaustion doctrine, the historic basis from which the "right" of permissible repair springs, continue to serve as its organizing principle? This Article argues that it should not. The exhaustion doctrine has driven courts to frame the repair-reconstruction distinction as an exercise in distinguishing permissible "using" from impermissible new "making." Although the analyses vary widely, the general approach falls under the concept of spentness: If the patented device has become "spent," then further replacement activities designed to restore the device to usefulness constitute illegal reconstruction.¹⁹

The rhetoric of "spentness," however, invites numerous calamities; the riddle of the apocryphal axe is emblematic of them. Analyses of spentness tend to be overly focused on the peculiarities of particular devices and the technical aspects of the replacement activities em-

17. BBS Kraftfahrzeug Technik AG v. Kabushiki Kaisha Racimex Japan (Sup. Ct. 1, 1997), available at Jinzo Fujino, Parallel Imports of Patented Goods: The Supreme Court Talks About its Legality (visited Jan. 29, 1999) <http://www.okuyama.com/c3v0lok.htm> (holding that authorized sales of patented aluminum wheels in Germany exhausts patent rights in Japan, thus allowing a purchaser in Germany to export products into Japan and sell them in Japan in competition with the patent owner). This internet site provides a translation of the decision and commentary. For a discussion of lower court decisions in the BBS case, see Nanao Naoko et al., Decisions on Parallel Imports of Patented Goods, 36 IDEA 567, 572 (1996) (concluding that the High Court in BBS found that "parallel imports of patented goods are permitted if patent rights to the imported goods exist both in the country where they are sold for the first time and in the country into which they are imported").

18. Other commentators have taken up the topic, but only infrequently. See, e.g., Mark A. Farley, Infringement Questions Stemming from the Repair or Reconstruction of Patented Combinations, 68 J. PAT. & TRADEMARK OFF. Soc'Y 149 (1986); Ronald B. Hildreth, Contributory Infringement, 44 J. PAT. OFF. Soc'Y 512 (1962); Edmund J. Sease, Patent Law: Repair-Reconstruction—A Review, Analysis, and Proposal, 20 DRAKE L. REV. 85 (1970). No comprehensive recent treatment of the issue exists to my knowledge.

19. Two senses of spentness can be discerned from the cases. The first, described in the accompanying text, might be termed "overall spentness." Yet the cases also refer to the spentness of individual components of the combination. Used in this fashion, spentness cuts in the other direction. Subsequent replacement of a spent component might well constitute permissible repair. See *infra* Part I.B.2 for a fuller discussion.

^{16.} Joined Cases C267 & 268/95, Merck & Co. v. Primecrown Ltd., [1997] 1 C.M.L.R. 83 (1996) (holding that the first sale of patented product within the EU, even in a country where no patent protection for the product is available, exhausts patent rights throughout the EU). For recent commentary, see Paul Torremans & Irini Stamatoudi, Merck is Back to Stay: The Court of Justice's Judgment in Merck v. Primecrown, 9 EUR. INTELL. PROP. Rev. 545, 545 (1997) (discussing cases involving patent exhaustion by virtue of marketing a product within a member state of the European community that does not grant a patent for the product at issue).

ployed.²⁰ Such analyses are particularly troubling because they mask, and sometimes even ignore altogether, the reasonable expectations of the patentee and purchaser, respectively.

This Article argues that courts should turn away from an exhaustion of rights model for analyzing the repair-reconstruction dichotomy, and instead embrace an implied license model. A purchaser of patented goods may be said to take an implied license to use and resell the goods, but not to remake them. Framed this way, the repairreconstruction inquiry becomes an inquiry into the scope of the implied license. At first glance, this formulation may seem interchangeable with the exhaustion principle, and United States courts have routinely jumped from one formulation to the other in considering the repair-reconstruction problem.²¹ This Article argues, however, that the implications of the implied license analysis have not been appreciated. In particular, this Article maintains that courts following an implied license model for repair-reconstruction should look first, and predominantly, to evidence of the reasonable expectations of the patentee and the purchaser concerning use and maintenance of the patented device. Courts should, in addition, be free to consult all evidence from which expectations might be inferred, including evidence of commercial custom in the industry. Evidence of "spentness" of the patented device would be relevant in such a regime, but only to the extent that it would illuminate the parties' probable expectations.

Part I considers the dichotomy's origins in the exhaustion principle and its confused evolution in leading Supreme Court decisions. Part II addresses the failings of "spentness," still the dominant rhetoric by which courts attempt to analyze infringement claims involving repair and reconstruction. Part III briefly comments on the uncertain role of patentees' and purchasers' expectations under the exhaustion model. Part IV considers the potential for reconceptualizing the repair-reconstruction dichotomy as an exercise in defining the scope of an implied license. The point here is to consider whether analyses of the scope of an implied license employed in other contexts can be used to illuminate the repair-reconstruction dichotomy. This Part looks to decisions in three areas: intellectual property generally, real property, and contracts. Finally, Part V argues that the adoption of an implied license model would reshape repair-reconstruction doctrine in a number of significant ways.

^{20.} See infra Part III.

^{21.} See infra Part I.B.

I. THE EXHAUSTION OF RIGHTS AND THE REPAIR-RECONSTRUCTION PROBLEM

The origins of the exhaustion principle in United States Supreme Court jurisprudence, and the origins of its progeny—the repair-reconstruction dichotomy—can be traced to litigation over a single, extraordinary patent.²² In America's "Wooden Age,"²³ the cutting edge technology, to be quite literal, consisted of sawmills and planing machines.²⁴ William Woodworth's planing machine, which dominated the marketplace,²⁵ featured rotary cutting cylinders that were eventually adapted for a variety of operations, but were particularly effective in cutting boards for floorboards.²⁶

William Woodworth managed to secure patent protection covering the planing machine,²⁷ and he (and, later, his heirs and their successors) set about enforcing it with considerable vigor.²⁸ Woodworth apparently granted some one thousand licenses under the patent.²⁹ Litigation concerning the patent resulted in more than a dozen Supreme Court cases,³⁰ and countless cases in the lower courts.³¹ Per-

24. See Rosenberg, supra note 22, at 48 (noting that "[p]laning machines were second only to saws in a ranking of woodworking machines by their relative importance").

25. Id.

26. Id. at 48-49.

27. See id. at 48 (noting that the patent was issued on December 27, 1828).

28. See id. ("The many attempts to invent around this 'notorious monopoly,' as it was frequently called, led to numerous suits for patent infringement.").

29. See Paul B. Kebabian & Dudley Witney, American Woodworking Tools 196 (1978).

^{22.} See Nathan Rosenberg, America's Rise to Woodworking Leadership, in AMERICA'S WOODEN AGE: ASPECTS OF ITS EARLY TECHNOLOGY 37, 48 (Brooke Hindle ed., 1975) (referring to the "tortuous history of litigation" of the planing machine invented by William Woodworth).

^{23.} For references to the term, see Brooke Hindle, Introduction: The Span of the Wooden Age, in AMERICA'S WOODEN AGE, supra note 22, at 3, 3 (noting that the "Wooden Age" extended at least into the mid-nineteenth century); William C. Lipke, Introduction to TOOLS & TECHNOLOGIES: AMERICA'S WOODEN AGE 1, 1 (Paul B. Kebabian & William C. Lipke eds., 1979) (discussing an exhibit exemplifying "America's early dependence on wood"). The label, I am convinced, pertains to the dominance of wood as an industrial resource and is not meant to be a wry social or cultural commentary.

^{30.} See Bloomer v. Millinger, 68 U.S. (1 Wall.) 340, 351-52 (1863) (stating that "if a person legally acquires a title to that which is the subject of letters patent, he may continue to use it until it is worn out, or he may repair it or improve upon it as he pleases"); Dean v. Mason, 61 U.S. (20 How.) 198, 202 (1857) (reviewing a claim of a violation of "a territorial right to the exclusive use of the Woodworth patent for planing boards"); Brown v. Shannon, 61 U.S. (20 How.) 55, 56 (1857) (dismissing for lack of jurisdiction a claim for the specific execution of contracts regarding the assignment of the exclusive use of the Woodworth planing machine in Maryland); Livingston v. Woodworth, 56 U.S. (15 How.) 546, 553 (1853) (reviewing "an injunction to restrain [Livingston] from using or vending one or more planing machines substantially the same in construction and mode of operation as the machine which had been patented to William Woodworth"); Brooks v. Fiske, 56 U.S.

haps understandably, the industry reportedly came to refer to the

(15 How.) 212, 222 (1853) (holding that a planing machine known as the Norcross machine did not infringe the Woodworth patent); Bloomer v. McQuewan, 55 U.S. (14 How.) 539, 546 (1852) (affirming the circuit court's dismissal of a bill seeking an injunction "restraining [McQuewan] from the use of two of Woodworth's planing machines in the city of Pittsburgh"); Wilson v. Barnum, 49 U.S. (8 How.) 258, 261 (1850) (remanding due to a lack of jurisdiction a bill requesting "an injunction against the defendant to restrain him from using a certain machine, in which, ... boards were planed, tongued, and grooved in the same manner as in the Woodworth machine"); Wilson v. Sandford, 51 U.S. (10 How.) 99, 101 (1850) (dismissing for lack of jurisdiction a claim to rescind a contract which granted Sandford "permission to use, or vend to others to be used, one of Woodworth's planing machines"); Wilson v. Simpson, 50 U.S. (9 How.) 109, 126 (1850) (holding that the defendants did not violate the rights of the holder of the patent by replacing the cutterknives in their machines); Barnard v. Gibson, 48 U.S. (7 How.) 650, 656 (1849) (dismissing on procedural grounds a "claim [of] conflicting interests as assignees of Woodworth's patented planing-machine"); Woodworth v. Wilson, 45 U.S. (4 How.) 712, 716 (1846) (issuing an injunction to enjoin the defendant's erection and operation of a machine that was substantially like the Woodworth machine); Wilson v. Turner, 45 U.S. (4 How.) 712, 712 (1846) (affirming the circuit court's dismissal of a suit involving the assignment and use of the Woodworth patent); Simpson v. Wilson, 45 U.S. (4 How.) 709, 710 (1846) (reviewing a claim in equity for infringement of the plaintiff's rights under an assignment of the Woodworth patent); Wilson v. Rousseau, 45 U.S. (4 How.) 646, 687-88 (1846) (considering the effect of the Patent Act of 1836 on assignments, extensions, and amendments to the Woodworth patent).

31. References to many of these cases can be found in an editor's note made in Bicknell v. Todd, 3 F. Cas. 334, 336 (C.C.D. Ohio 1851) (No. 1389). See id. (citing Bloomer v. Gilpin, 3 F. Cas. 726 (C.C.S.D. Ohio 1859) (No. 1558); Pitts v. Edmonds, 19 F. Cas. 751 (C.C.E.D. Mich. 1857) (No. 11,191); Jenkins v. Greenwald, 13 F. Cas. 519 (C.C.S.D. Ohio 1857) (No. 7270); Foss v. Herbert, 9 F. Cas. 503 (C.C.N.D. Ill. 1856) (No. 4957); Ritter v. Serrell, 20 F. Cas. 843 (C.C.S.D.N.Y. 1852) (No. 11,866); Sloat v. Patton, 22 F. Cas. 327 (C.C.E.D. Pa. 1852) (No. 12,947); Brooks v. Norcross, 4 F. Cas. 294 (C.C.D. Mass. 1851) (No. 1957); Gibson v. Van Dresar, 10 F. Cas. 329 (C.C.N.D.N.Y. 1850) (No. 5402); Gibson v. Cook, 10 F. Cas. 314 (C.C.N.D.N.Y. 1850) (No. 5393); Gibson v. Gifford, 10 F. Cas. 317 (C.C.N.D.N.Y. 1850) (No. 5395); Wilson v. Sherman, 30 F. Cas. 215 (C.C.N.D.N.Y. 1850) (No. 17,833); Woodworth v. Cook, 30 F. Cas. 561 (C.C.N.D.N.Y. 1850) (No. 18,011); Bloomer v. Stolley, 3 F. Cas. 729 (C.C.D. Ohio 1850) (No. 1559); Motte v. Bennett, 17 F. Cas. 909 (C.C.D.S.C. 1849) (No. 9884); Olcott v. Hawkins, 18 F. Cas. 639 (D.C. Wis. 1849) (No. 10,480); Gibson v. Barnard, 10 F. Cas. 307 (C.C.N.D.N.Y. 1848) (No. 5389); Van Hook v. Pendleton, 28 F. Cas. 998 (C.C.S.D.N.Y. 1848) (No. 16,852); Woodworth v. Curtis, 30 F. Cas. 565 (C.C.D. Mass. 1847) (No. 18,013); Woodworth v. Edwards, 30 F. Cas. 567 (C.C.D. Me. 1847) (No. 18,014); Wilson v. Stolley, 30 F. Cas. 226 (C.C.D. Ohio 1847) (No. 17,839); Woodworth v. Hall, 30 F. Cas. 572 (C.C.D. Mass. 1846) (No. 18,016); Gibson v. Betts, 10 F. Cas. 309 (C.C.N.D.N.Y. 1846) (No. 5390); Gibson v. Harris, 10 F. Cas. 318 (C.C.N.D.N.Y. 1846) (No. 5396); Woodworth v. Weed, 30 F. Cas. 595 (C.C.N.D.N.Y. 1846) (No. 18,022); Woodworth v. Stone, 30 F. Cas. 593 (C.C.D. Mass. 1845) (No. 18,021); Wilson v. Turner, 30 F. Cas. 233 (C.C.D. Md. 1845) (No. 17,845); Brooks v. Stolley, 4 F. Cas. 302 (C.C.D. Ohio 1845) (No. 1962); Woodworth v. Sherman, 30 F. Cas. 586 (C.C.D. Mass. 1844) (No. 18,019); Washburn v. Gould, 29 F. Cas. 313 (C.C.D. Mass. 1844) (No. 17,214); Brooks v. Jenkins, 4 F. Cas. 275 (C.C.D. Ohio 1844) (No. 1953); Lippincott v. Kelly, 15 F. Cas. 571 (C.C.W.D. Pa. 1844) (No. 8381); Brooks v. Bicknell, 4 F. Cas. 247 (C.C.D. Ohio 1843) (No. 1944)).

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Woodworth patent as that "notorious monopoly."³² With hundreds, possibly thousands, of Woodworth planing machines in use around the country, the extent to which the patentee could limit use after an authorized sale became a matter of considerable economic significance. Eventually, the Supreme Court was forced to confront the notions of exhaustion and permissible repair.³³

A. Exhaustion of Intellectual Property Rights

Litigation over the Woodworth planing machine set the stage for the introduction of the exhaustion of rights principle in the Court's jurisprudence.³⁴ In Wilson v. Rousseau,³⁵ the exhaustion issue arose as a by-product of William W. Woodworth's successful effort to secure an extension of the term of the Woodworth patent.³⁶ A few weeks before the patent was due to expire in December 1842, Woodworth successfully petitioned a board comprised of the Patent Commissioner and the Secretaries of State and the Treasury under an extension provision in the 1836 Patent Act to grant an extension of seven years.³⁷ Daniel Webster, the renowned lawyer, congressman, and presidential

35. 45 U.S. (4 How.) 646 (1846).

36. Id. at 687. The inventor, William Woodworth, died in 1839, and William W. Woodworth, in his capacity as the administrator of the inventor's estate, attempted to secure the extension of the patent. Id. at 658-59.

37. Id. The Act provided for a seven-year extension if the board determined that the patentee had failed to obtain, through no fault of his own, sufficient remuneration for the development costs of the patent. See id. at 658 (quoting Act of July 4, 1836, Ch. 357, 5 Stat. 117, § 18 (repealed 1870)). The board granted Woodworth's petition after an evidentiary hearing in November 1842. Id. at 659.

^{32.} See Rosenberg, supra note 22, at 48; see also KEBABIAN & WITNEY, supra note 29, at 196 (relating that even the editor of the Official Gazette of the Patent Office referred to the Woodworth patent as an "odious monopoly").

^{33.} See infra Parts I.A-B.

^{34.} The exhaustion principle does appear in at least one earlier case in the lower courts. See Boyd v. Brown, 3 F. Cas. 1095 (C.C.D. Ohio 1843) (No. 1747). Boyd was a nineteenth century predecessor to current international transboundary exhaustion cases. The plaintiff had certain rights concerning the manufacture and sale of patented bed-steads, but the rights were limited geographically to Hamilton County, Ohio. Id. The defendant had similar rights under the patent, but the rights were limited to Indiana. Id. It appeared that some purchasers from the defendant in Indiana had resold their products in Hamilton County. Id. at 1096. The court held for the defendant, articulating a theory of exhaustion without citing any authority. Id. ("[T]he bedstead, which is the product, so soon as it is sold, mingles with the common mass of property, and is only subject to the general laws of property.").

aspirant,³⁸ was then serving as Secretary of State, and signed the order granting Woodworth's petition.³⁹

Four years later, Daniel Webster represented James G. Wilson (the new owner of the Woodworth patent)⁴⁰ before the Supreme Court in Wilson's suit to determine the legal effect of the extension.⁴¹ Webster's co-counsel was William Henry Seward, former governor of New York, future senator and Secretary of State, and an accomplished lawyer in his own right.⁴² The issue before the Court was whether licensees for the original term continued to enjoy the right to use the Woodworth planing machine under the extended term.⁴³ Although the Court devoted the bulk of its opinion to a tortured construction of a clause in the statute's extension provision,⁴⁴ glimmers of the exhaustion doctrine can be detected. First, the Court addressed the difficulties that would arise if users of patented goods, purchased from authorized sources, could freely be divested of their uses under the extension provision of the 1836 Patent Act:

By the report of the Commissioner of Patents it appears, that five hundred and two patents were issued in the year 1844 ... and embrace articles to be found in common use in every

39. Rousseau, 45 U.S. (4 How.) at 659.

40. Id. at 661 (noting that Woodworth assigned his patent rights in some states to Wilson in 1843).

41. Id. at 673.

42. Id. Seward served as governor in Albany from 1839-42, and would, in succeeding years, go on to serve as Abraham Lincoln's Secretary of State. He would survive a vicious stabbing attack on the night of Lincoln's assassination, and, continuing as Secretary of State under Andrew Johnson, would brilliantly negotiate the purchase of Alaska from Russia. See generally GLNDON G. VAN DEUSEN, WILLIAM HENRY SEWARD (1967). For a highly imaginative and entertaining portrayal of Seward as historical figure, see WALTER A. McDOUGALL, LET THE SEA MAKE A NOISE ... 197, 299-304, 317 (1993).

Webster and Seward's paths had crossed previously in the political arena. While both seeking influence in the Whig party, Seward and Webster had quarreled with one another when Seward was Governor of New York and Webster was Secretary of State in the Tyler administration. See VAN DEUSEN, supra, at 77-78 (describing a trial in the New York courts of a Canadian sheriff who had been attempting to prevent delivery of guns from New York to rebels in Canada).

43. Rousseau, 45 U.S. (4 How.) at 675.

44. The following language created the difficulty:

[T] hereupon the said patent shall have the same effect in law as though it had been originally granted for the term of twenty-one years. And the benefit of such renewal shall extend to assignees and grantees of the right to use the thing patented, to the extent of their respective interest therein.

Id. at 658 (quoting Act of July 4, 1836, Ch. 357, 5 Stat. 117, § 18 (repealed 1870)).

^{38.} For information on Daniel Webster, see MAURICE G. BAXTER, DANIEL WEBSTER & THE SUPREME COURT (1966) (discussing Webster's preeminence as a Supreme Court lawyer); ROBERT V. REMINI, DANIEL WEBSTER: THE MAN AND HIS TIME (1997) (addressing Webster's life and career).

department of labor or art, on the farm, in the workshop, and factory. These articles have been purchased from the patentee, and have gone into common use. But, if the construction against which we have been contending should prevail, the moment the patent of either article is renewed, the common use is arrested, by the exclusive grant to the patentee. It is true the owner may repurchase the right to use, and doubtless would be compelled from necessity; but he is left to the discretion or caprice of the patentee. A construction leading to such consequences, and fraught with such unmixed evil, we must be satisfied, was never contemplated by Congress....⁴⁵

This reasoning set the stage for the Court in a later case to put forward a rationale for the exhaustion doctrine based on the consideration that the purchaser paid to the patentee for the patented goods.⁴⁶

Second, the Court seemed to frame its analysis in terms of a distinction that would emerge as crucial in developing the exhaustion doctrine: exclusive rights of "making" as opposed to exclusive rights of "using." The central concept was that the patentee, upon sale of the patented goods, lost the right to control use exclusively, but maintained the exclusive right to make the claimed invention: "[W]hen in connection with the simple right to use, the exclusive right to make and vend being in another, the right to use the thing patented necessarily results in a right to use the machine, and nothing more."⁴⁷ Webster and Seward would rely on this distinction later in laying the foundational arguments for the repair-reconstruction distinction.⁴⁸

The exhaustion principle is only barely recognizable in Wilson v. Rousseau, but it sufficed as a starting point for later refinements. One such refinement grew out of another case involving the Woodworth patent, Bloomer v. McQuewan.⁴⁹ The Woodworth patent term had again been extended for seven years, this time by special legislation passed by Congress in 1845.⁵⁰ Bloomer, a successor in interest to the ownership of the Woodworth patent, asserted the patent against parties who had constructed planing machines during the original patent

^{45.} Id. at 684.

^{46.} See infra note 60 and accompanying text.

^{47.} Rousseau, 45 U.S. (4 How.) at 683.

^{48.} See infra Part I.B.

^{49. 55} U.S. (14 How.) 539 (1852). Webster died before this case was argued, and there is nothing to indicate that Seward was involved in the case.

^{50.} Id. at 547.

term and who now sought to continue using them during the newlyextended period.⁵¹

The legal issue in *Bloomer v. McQuewan* differed from that in *Wilson v. Rousseau* because, unlike the general provision in the 1836 Act, Congress's special 1845 legislation contained no language directed to the rights of those who had constructed machines with the patent owner's authorization during the original term.⁵² Nevertheless, the Court concluded that the policy interests at stake in *McQuewan* were identical to those in *Rousseau*, and again decided that the defendants, having purchased the right to use the planing machine during the original term of the patent, were entitled to continue its use during the extended term.⁵³

This time, however, the Court expressly set forth a general rule of exhaustion of rights:

[W]hen the machine passes to the hands of the purchaser, it is no longer within the limits of the monopoly. It passes outside of it, and is no longer under the protection of the act of Congress. . . . The implement or machine becomes his private, individual property, not protected by the laws of the United States, but by the laws of the State in which it is situated. Contracts in relation to it are regulated by the laws of the State, and are subject to State jurisdiction.⁵⁴

The concept of a patented device "passing outside" the limits of the patent right upon sale is important. It serves as a reminder that the exhaustion doctrine straddles the fence between the legal regimes of intellectual and tangible property, hinting, perhaps, that property concepts extrinsic to patent law may be analytically important within it.⁵⁵ In addition, this concept seems to imply that the purchaser of patented goods receives an "absolute" personal property right in those

^{51.} Id.

^{52.} Id. at 541-42.

^{53.} Id. at 550. The Court also reinforced the Wilson v. Rousseau distinction between "the right to make and vend the machine, and the grant of the right to use it." Id. at 548.

^{54.} Id. at 549.

^{55.} See Keeler v. Standard Folding Bed Co., 157 U.S. 659, 666 (1895) (reviewing the evolution of the patent exhaustion principle and concluding that the cases establish "that one who buys patented articles of manufacture from one authorized to sell them becomes possessed of an absolute property in such articles, unrestricted in time or place"); Chaffee v. Boston Belting Co., 63 U.S. (22 How.) 217, 223 (1859) ("By a valid sale and purchase, the patented machine becomes the private individual property of the purchaser, and is no longer protected by the laws of the United States, but by the laws of the State in which it is situated."); Incandescent Gas Light Co. v. Cantelo, [1895] 12 R.P.D. & T.M. 262, 264 (1895) (concluding that once the proper sale of a patented item occurs, the seller cannot belatedly place conditions upon the use of the item).

goods. Consistent with the general antipathy towards restraints on alienation, especially of chattels, such a right includes not only use, but also resale.⁵⁶ The exhaustion doctrine, defined according to these basic parameters, rapidly became established in patent cases in the Supreme Court as well as lower courts.⁵⁷ The Court also seemed to signal that the exhaustion principle would be applied broadly in favor of purchasers.⁵⁸ Other cases brought to light the international dimension of the exhaustion problem, arising when a patentee made

57. The Goodyear court stated that, from the rule that a patented article becomes private property upon sale:

[I]t follows that, if a purchaser acquires an absolute, unconditional title to that which is the subject of a patent, he may continue to use it until it is worn out, or he may repair it or improve upon it as he pleases, in the same manner as if dealing with any other kind of property.

Id.; see also Aiken v. Manchester Print Works, 1 F. Cas. 245, 247 (C.C.D.N.H. 1865) (No. 113) (asserting that "[r]epeated decisions" of the Supreme Court have set forth the exhaustion doctrine "until it cannot any longer be regarded as an open question").

The exhaustion principle is also the subject of some British cases from the same general time period. See, e.g., Betts. v. Willmott, 6 Ch. App. 239, 245 (1871) (stating that when someone buys a patented article, "he expects to have the control of it, and there must be some clear and explicit agreement to the contrary to justify the vendor in saying that he has not given the purchaser his license to sell the article, or to use it wherever he pleases as against himself"). For a more recent discussion of the principle enunciated in these cases, see *Interstate Parcel Express Co. v. Time-Life International* (Nederlands) BV (1977) 15 A.L.R. 353, 359 (Austl.) ("[A] patentee is granted exclusive power to 'make, use, exercise and vend' the invention. The sale of a patented article, by the patentee, would be quite futile, from the point of view of the buyer, if the buyer was not entitled . . . to re-sell the article which he had bought.").

Professor Adelman has sought to define the concept of exhaustion more precisely than does this Article. Under Professor Adelman's definition, exhaustion is strictly defined as a rule that operates independently of the intent of the parties. See Martin J. Adelman, The Exhaustion Doctrine in American Patent Law, PROCEEDINGS OF THE SIXTH ANNUAL FORDMAN UNIVERSITY CONFERENCE ON INTERNAL INTELLECTUAL PROPERTY LAW AND POLICY, PROGRAM VB (Apr. 16-17, 1998) (on file with author). Under this definition, a case such as Betts v. Willmot is better characterized as an implied contract case in which exhaustion operates as a default rule. What is important for purposes of the present Article is that exhaustion models, however defined, are always characterized either by the subjugation (or, under Professor Adelman's definition, the elimination) of the expectations of the parties from the analysis.

58. See Adams v. Burke, 84 U.S. (17 Wall.) 453, 456-57 (1873) (holding that an authorized sale by the patentee's assignee within his specified geographic territory carried with it the right to use the patented goods anywhere); see also Hobbie v. Jennison, 149 U.S. 355 (1893) (rejecting the argument that Adams did not apply where the seller knew that the purchased goods would be used outside the seller's territory and suggesting that the patentee could readily protect itself through express restrictions in a formal, written agreement).

^{56.} See Goodyear v. Beverly Rubber Co., 10 F. Cas. 638, 641 (C.C.D. Mass. 1859) (No. 5557) (noting that, upon a valid sale of a patented article, it becomes the private property of the purchaser).

authorized sales in one country to a purchaser, who in turn exported the goods into another country in competition with the purchaser.⁵⁹

The Court also made explicit the consideration rationale for patent exhaustion: when the purchaser paid the patentee for the patented goods, the purchase price was presumed to include fees for use and resale.⁶⁰ Thus, upon sale, the patentee received adequate consideration for the rights in using and selling.⁶¹ This is the prevailing rule today.⁶²

B. The Repair-Reconstruction Problem: Origins, Evolution, Confusion

Two United States Supreme Court cases have principally shaped the law of the repair-reconstruction problem. These cases seem to employ exhaustion as the organizing principle for permissible repair, and clearly establish repair-reconstruction as the operative distinction. They also hint, however, at the inadequacy of the exhaustion model to support a coherent vision of permissible repair. In particular, while these cases raise the possibility that a multiplicity of factors could bear on the repair-reconstruction dichotomy, they fail to explain both the basis of these factors, as well as which of them is important, leaving courts without much guidance in analyzing the repair-reconstruction issue.

61. See id.; see also United States v. Univis Lens Co., 316 U.S. 241, 252 (1942) (stating that, after the first sale of a patented good, the patentee "has received in the purchase price every benefit of that monopoly which the patent law secures to him"); Adams, 84 U.S. (17 Wall.) at 456 (stating that, when the patentee or his assignee receives upon sale "all the royalty or consideration which he claims for the use of his invention in that particular machine or instrument, it is open to the use of the purchaser without further restriction on account of the monopoly of the patentees").

62. There are, to be sure, continuing controversies, especially concerning the impact of express restrictions against reuse on the exhaustion doctrine. For a controversial decision on the issue, see *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 709 (Fed. Cir. 1992), in which the court determined that "the district court erred in holding that the restriction on reuse was, as a matter of law, unenforceable under the patent law." A full discussion of this important issue is outside the scope of this Article.

^{59.} See Boesch v. Graff, 133 U.S. 697, 703 (1890) (asserting that the right to make and sell a patented product under the laws of one country meant that "purchasers from [the patentee] could not be thereby authorized to sell the articles in the United States in defiance of the rights of patentees under a United States patent").

^{60.} See Mitchell v. Hawley, 83 U.S. (26 Wall.) 544, 547 (1872) (stating that when a patentee unconditionally sells a patented item, "and the consideration has been paid to him for the thing patented, the rule is well established that the patentee must be understood to have parted to that extent with all his exclusive right, and that he ceases to have any interest whatever in the patented machine so sold").

1. The Ambivalence of Wilson v. Simpson.—The case of Wilson v. $Simpson^{63}$ once again brought the Woodworth patent before the Supreme Court, this time under extraordinary circumstances.⁶⁴ In the tumultuous opening weeks of 1850, the country was confronting problems far more ominous and intractable than those posed by monopolies, even notorious ones. Amidst serious threats of Southern secession,⁶⁵ the Senate clashed over Henry Clay's compromise proposal.⁶⁶ On March 7, before a packed Senate chamber, Senator Daniel Webster, by now a legendary elder statesman, spoke "not as a Massachusetts man, nor as a Northern man, but as an American," counseling for compromise, even on slavery, and warning against impending war.⁶⁷

Four days later, William H. Seward, a recently elected senator from New York, counterattacked.⁶⁸ Invoking "a higher law than the Constitution," he denounced Webster's notion of compromise on the slavery question.⁶⁹

Yet the preservation of the American republic was one thing, and the practice of law quite another. While upstairs, in the Senate chamber, Seward and Webster's political rivalry became emblematic of a national crisis that would eventually precipitate civil war, downstairs, in the Supreme Court chambers, Seward and Webster had cases to argue. Four years earlier, they had appeared as co-counsel in *Wilson v. Rousseau*, and, in January Term 1850, in the midst of the Senate battle, they collaborated again on behalf of the owner of the Woodworth patent.⁷⁰ Although they lost the case, Seward and Webster crafted arguments that still dominate the current discourse over the repairreconstruction problem.⁷¹

68. Id. at 678.

69. VAN DEUSEN, supra note 42, at 123.

70. Then, as now, patent litigation was a lucrative endeavor, and it seems safe to assume that the promise of generous fees induced Webster and Seward to set aside their ideological clash to take on the joint representation. *See id.* at 98 (providing an account of Seward's role in the Woodworth patent litigation).

71. See, e.g., Aktiebolag v. E.J. Co., 121 F.3d 669, 673-74 (Fed. Cir. 1997) (citing Wilson v. Simpson, 50 U.S. (9 How.) 109 (1850)), cert. denied, 118 S. Ct. 1337 (1998).

^{63. 50} U.S. (9 How.) 109 (1850).

^{64.} See REMINI, supra note 38, at 678-79 (discussing the political tension in 1850 between North and South over the spread of slavery in the territories).

^{65.} The clash of political wills in the Senate presaged a clash of a different dimension altogether. In one well-known episode, Henry Foote, senator from Mississippi, drew a pistol in a heated debate with Thomas Hart Benton, senator from Missouri. *Id.* at 679.

^{66.} Id. at 663-65.

^{67.} Id. at 669.

The case that brought Webster and Seward to the Court in the January Term, 1850, also arose from the continued use of a Woodworth planing machine beyond the original term by a party whose use had been licensed during the original term.⁷² Webster and Seward admitted that under Wilson v. Rousseau's basic principle of exhaustion, the authorized purchase of a machine during the original term of the patent conferred the right to continue to use the machine during the extended term. They argued, however, that this right of use in the invention was not general, but was "strictly limited to a right to the continued use of the specific machine or machines legally in use at the time of the renewal."73 Moreover, Wilson v. Rousseau had specifically excluded such purchasers from enjoying the right to make.⁷⁴ Accordingly, if the tangible machine ceased to exist, the purchaser's right to use would cease with it.75 Further use by the purchaser would be possible only after a remaking of the machine, which would constitute infringement.⁷⁶

Consequently, the most important part of the argument, as Webster and Seward explained it, was to determine when the patented planing machine ceased to exist.⁷⁷ As might be expected, Webster and Seward had a ready answer: the patented planing machine was comprised of a combination of elements, so that "when any one of these elements is either worn out by use, or otherwise destroyed, then the combination invented—the thing patented—no longer exists, and cannot be restored without the exercise of the right to make."⁷⁸ Because the evidence showed that the cutter-knives of the planing machine wore out after two to three months,⁷⁹ it followed that use beyond that time would amount to an improper new making of the patented invention.⁸⁰

The Court incorporated Webster and Seward's argument into its opinion in large part, accepting the argument and disagreeing only as to its application to the facts.⁸¹ To begin with, the Court accepted the argument that it was dealing with a limitation on the principle of ex-

Simpson, 50 U.S. (9 How.) at 110-11.
 73. Id. at 112-13.
 74. Id. at 112.
 75. Id. at 115.
 76. Id.
 77. Id.
 78. Id. at 116.
 79. Id. at 111.
 80. Id.
 81. Id. at 122.

haustion.⁸² Accordingly, it started its analysis by reaffirming the basic rule on exhaustion as established in *Wilson v. Rousseau*: "[W]hen the material of the combination ceases to exist, in whatever way that may occur, the right to renew it depends upon the right to make the invention. If the right to make does not exist, there is no right to rebuild the combination.⁸³ The Court then fashioned the limitation argued for by Webster and Seward, distinguishing between "restoration" and "reconstruction":

But it does not follow, when one of the elements of the combination has become so much worn as to be inoperative, or has been broken, that the machine no longer exists, for restoration to its original use, by the owner who has bought its use. When the wearing or injury is partial, then repair is restoration, and not reconstruction.⁸⁴

This basic distinction became the foundation for jurisprudence in the United States and abroad⁸⁵ for dealing with the extent of the right of

85. The earliest reported British case on the repair-reconstruction distinction appears to be *Dunlop Pneumatic Tyre Co. v. Neal*, [1899] 16 R.P.D. & T.M. 247, 250 (1899) ("Any simple repairs, I think, may be done by a person without any license from the manufacturer, but when he takes the whole thing and sells what is a new tyre with merely the old wires in it, in my opinion there has been no license to use those old wires . . . for the purpose of putting them into and making up precisely the same combination which is the subject of the Letters Patent."). *See also* Sirdar Rubber Co. v. Wallington, Weston & Co., [1905] 1 Ch. 451, 454 (1905) (concluding that the defendant's replacement activity "is not a repair amounting to reconstruction, and a new article, but a fair repair"); Dunlop Pneumatic Tyre Co. v. Holborn Tyre Co., [1901] 18 R.P.D. & T.M. 222, 226 (1901) (addressing whether repairs to tires constituted repair or reconstruction).

For more recent statements of the rule, see *Dellareed Ltd. v. Delkim Developments*, [1988] F.S.R. 329, 344-46 (1987) (summarizing the early cases as establishing the rule that "in respect of repairing a patented article, the implied license is restricted to what 'may fairly be termed a repair'; it does not extend to making a new article 'under cover of repair'"); *British Leyland Motor Corp. v. Armstrong Patents Co.*, [1986] R.P.C. 279, 358 (H.L. 1986) ("In the field of repair it is clear that a person who acquires a patented article has an implied license to keep it in repair, but must stop short of renewal."). *See generally* DAVID YOUNG ET AL., TERRELL ON THE LAW OF PATENTS § 6.62 (14th ed. 1994) (citing British cases on the distinction between repairing and making).

For a Canadian case on repair-reconstruction, see Rucker Co. v. Gavel's Vulcanizing Ltd., 7 C.P.R. (3d) 294 (1985). For authorities from German, French, and Dutch courts, see Friedrich-Karl Beier, Protection for Spare Parts in the Proposals for a European Design Law, 25 INT'L REV. INDUS. PROP. & COPYRIGHT 840, 859 & n.54 (1994) (citing authorities that establish that the repair of patented articles is permissible where replacement parts are not independently protected, and the replacement activity "does not amount to re-manufacturing the entire patented product, but remains within the framework of normal measures to preserve, service and repair the product").

^{82.} Id.

^{83.} Id. at 123.

^{84.} Id.

use enjoyed by the purchaser of authorized patented goods.⁸⁶ In applying the test, however, the *Simpson* Court found that the defendant's replacement of knives on the planing machine constituted permissible repair, and thus affirmed the dismissal of the patentee's complaint.⁸⁷

The result may seem entirely inoffensive on an intuitive level, and no doubt the case would be decided the same way today, even after 150 years of judicial gloss. Yet the Court's opinion in *Simpson* is, if not totally incomprehensible, at least murky.

First, the Court's articulation of the "foundation of the right to repair and replace"⁸⁸ leaves a great deal to be desired. The Court resorted to vague notions of equity and harm:

Has the patentee a more equitable right to force the disuse of the machine entirely; on account of the inoperativeness of a part of it, than the purchaser has to repair, who has, in the whole of it, a right of use? And what harm is done to the patentee in the use of his right of invention, when the repair and replacement of a partial injury are confined to the machine which the purchaser has bought?⁸⁹

The Court did not make clear whether these concerns are merely a restatement of the basic consideration rationale for the exhaustion doctrine, or, by contrast, a new supplementary equitable principle devoted uniquely to the permissible repair aspect of exhaustion. Courts have never squarely addressed this question as to the foundational premise for the repair-reconstruction dichotomy.

Second, in its application of the repair-reconstruction standard, the Court set the stage for decades of confusion by presenting a wandering, unfocused analysis in which nearly anything seemed to have potential relevance to the repair-reconstruction question. In one part of the opinion, for example, the Court seemed to favor an "identity of the machine" standard, under which a replacement activity that altered the identity of the machine triggered the patentee's right to an additional royalty.⁹⁰

^{86.} See, e.g., Sirdar Rubber, 1 Ch. at 454 (noting that a purchaser must be able to repair the patented good in order to "obtain the use of [it] for the fair period of its life").

^{87.} Simpson, 50 U.S. (9 How.) at 126.

^{88.} Id. at 123.

^{89.} Id.

^{90.} See id. at 125 (asserting that replacement of a worn out component of a patented machine would constitute repair when limited to that which was "absolutely necessary to identify the machine with what it was in the beginning of its use, or before that part of it had been worn out").

In other parts of the opinion, however, the expected useful life of the replaced component (i.e., whether or not it was a "temporary" part) seemed the dominant factor: If the replaced component was a temporary one anyway, then the replacement activity could be deemed repair.⁹¹ Similarly, the Court seemed to differentiate between replacement of a worn part, which would be considered an instance of repair, and replacement of a broken or useless part, which tended to suggest reconstruction.⁹² The Supreme Court in *Aro 1*⁹³ later seized upon this distinction.⁹⁴

In still other portions of its opinion, the Simpson Court considered whether the repair-reconstruction dichotomy could be analyzed by reference to the importance (or "essentialness") of the replaced component.⁹⁵ Here, the Court conveyed a mixed message. On the one hand, the Court observed that if a replaced component "is a part of an original combination, essential to its use, then the right to repair and replace recurs."⁹⁶ On the other hand, the Court seemed to declare the essentialness of the component to be irrelevant, stating that there was no reconstruction if the defendant could replace the cutterknives from time to time "though they are an essential and distinct constituent of the principle or combination of the invention."⁹⁷

Finally, even as the Court explained the repair-reconstruction problem in terms of the physical qualities of the overall device and its

97. Id. at 125.

^{91.} Importantly, the Court was not interested in the perishability of the replaced component absolutely, but instead its perishability relative to the useful life of the overall machine. See id. (noting that "[t]he right... to replace the cutter-knives is not because they are of perishable materials, but because the inventor of the machine has so arranged them as a part of its combination, that the machine could not be continued in use without a succession of knives at short intervals"). The machine at issue was designed to last for several years, while the cutting-knives would wear out and require replacement every sixty to ninety days. Id. at 111.

^{92.} The Court spoke in the quaint language of nineteenth century technology: Between repairing and replacing there is a difference.

Form may be given to a piece of any material—wood, metal, or glass . . . It would be the right of the purchaser to repair such a thing as that, so as to give to it what was its first shape, if it had been turned from it, or, by filing, grinding, or cutting, to keep it up to the performance of its original use. But if, as a whole, it should happen to be broken, so that its parts could not be readjusted, or so much worn out as to be useless, then a purchaser cannot make or replace it by another, but he must buy a new one. The doing of either would be entire reconstruction.

Id. at 124.

^{93.} Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336 (1961) (Aro I).

^{94.} See infra Part I.B.2.

^{95.} Simpson, 50 U.S. (9 How.) at 124.

^{96.} Id.

components,⁹⁸ it afforded some role to expectations, *both* those of the inventor and, it would seem, of the purchaser of the patented product.⁹⁹ For example, in connection with its discussion of the useful life of the replaced component as compared to the useful life of the machine, the Court spoke of the right to replace a component "which is liable to be often worn out or to become inoperative for its *intended* effect, which *the inventor contemplated* would have to be frequently replaced anew, during the time that the machine, as a whole, might last."¹⁰⁰ The Court also showed that the contrast between these "temporary" parts that were subject to permissible replacement, and permanent parts that were not, could also be framed in terms of intent:

[Some components] are contemplated by the inventor to last so long as the materials of which they are formed can hold together in use in such a combination. . . . With such intentions, they are put into the structure. So it is understood by a purchaser . . . 101

This passage raises important issues. Even a relatively confined reading of the passage suggests that there is a nexus between the rhetoric of spentness and the rhetoric of intent: The physical qualities of the replaced components might be analyzed because they serve as a useful proxy for the patentee's intent. This in turn suggests that the patentee's intent has a greater role in the repair-reconstruction analysis than is evident from other parts of the *Simpson* opinion.

Construed more broadly, the passage opens the door to considerations that are potentially separate from the rhetoric of spentness. The patentee's, and perhaps the purchaser's, intents and expectations might be evidenced directly, or by circumstantial evidence quite apart from the physical qualities of the device at issue. But the Court in *Simpson* was silent on the question of whether such evidence could be considered. This has left unclear what role the inventor's and purchaser's expectations should play in the analysis, if any.

To summarize, *Simpson* left open a number of questions. Most broadly, is permissible repair a direct application of the principle of exhaustion, or a special case involving additional equitable considerations? More narrowly, is permissible repair to be analyzed by way of a loose, multiple-factor approach in which all factors receive equal

^{98.} This Article will refer to this mode of analysis as the rhetoric of "spentness." See infra Part II.

^{99.} Simpson, 50 U.S. (9 How.) at 126. For additional analysis of the role of intent in the repair-reconstruction inquiry, see infra Part III.

^{100.} Simpson, 50 U.S. (9 How.) at 125 (emphasis added).

^{101.} Id. at 126 (emphasis added).

weight, or by way of a more structured standard? If the latter, is the standard to be defined in terms of spentness, in terms of the parties' expectations, or in terms of something different entirely?

2. A "Pandora's Flock" and Two Contradictory Notions of Spentness: The Aro I Case.—Just over a hundred years after Wilson v. Simpson, the Supreme Court delivered another major decision on the repair-reconstruction problem.¹⁰² In Aro Manufacturing (Aro I), the Court dealt with claims covering a folding top for a convertible automobile that consisted of "a flexible top fabric, supporting structures, and a mechanism for sealing the fabric against the side of the automobile body in order to keep out the rain."¹⁰³ Defendants manufactured and sold

In contrast, a great deal of the literature criticized the Court's opinion. See, e.g., Michael Conner, Editorial Note, Contributory Infringement: The Aro Manufacturing Case, 31 U. CIN. L. REV. 61, 70 (1962) (arguing that Justice Brennan's concurring opinion represents the correct approach to repair-reconstruction and asserting that Aro I virtually eliminates the contributory infringement remedy); Melvin F. Jager, Recent Decision, 1961 U. ILL. L.F. 343, 350 (1961) (arguing that Aro I severely undercuts the contributory infringement remedy); Note, 30 FORDHAM L. REV. 373, 376 (1961) (arguing that courts following Aro I will give "short shrift to claims of reconstruction"); Julius A. Shafran, Note, 49 CAL. L. REV. 988, 992 (1961) (same). Other commentary discussed the future implications of the case. See, e.g., Sease, supra note 18, at 85 (arguing against the broad sweep of the Aro I decision and proposing specific standards for certain sets of cases); Donald H. Ray, Note, 40 TEX. L. REV. 728, 732 (1962) (discussing the limitation of the contributory infringement remedy); The Supreme Court, 1960 Term, 75 HARV. L. REV. 40, 243 (1961) (discussing whether Aro I abandoned the contributory infringement rationale).

103. Aro I, 365 U.S. at 337. Justice Black, wondering how the invention could have been the result "of anything more than the simplest childlike mechanical skill," *id.* at 351 (Black, J., concurring), was moved to song: "[T]he patentee must have known all about the oldfashioned surrey with the fringe on top and with isinglass curtains you could roll right down in case of a change in the weather." *Id.* As another example of prior art, Justice Black referred to the "tops of Model T Fords which began to scare horses on country roads nearly half a century ago." *Id.* Although patentability over the prior art was not at issue, hostility towards the validity of the grant of the patent may have played a part in the Court's noninfringement determination.

^{102.} Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336 (1961). The Aro I decision generated a flurry of commentary, some of which approved of the Court's opinion. See, e.g., James C. Bageman, Note, Contributory Infringement and the "Repair" Doctrine, 38 S. CAL. L. REV. 363, 371 (1965) (approving of Aro I as providing a "clearer, more welldefined standard"); Thomas F. Caffrey, Case Note, 7 VILL. L. REV. 149, 152 (1961) (approving of Aro I as lending greater certainty to the repair-reconstruction problem); Comment, 36 N.Y.U. L. REV. 1395, 1400 (1961) (approving of Aro I as striking the proper balance of interests between the patentee and the supplier of unpatented components); Stuart Lubitz, Case Note, 29 GEO. WASH. L. REV. 952, 955-56 (1961) (approving of Aro I's shift away from an intent-based rationale and concluding that Aro I is a proper extension of Wilson v. Simpson); Irwin M. Stein, Note, Repair and Reconstruction in Patented Combinations, 23 U. PITT. L. REV. 184, 197 (1961) (arguing that Aro I is a justifiable extension of Wilson v. Simpson).

replacement fabrics that had been cut to fit into the patented combination.¹⁰⁴

The Court concluded that replacement of the fabric constituted permissible repair¹⁰⁵ in an opinion whose reasoning was endorsed by only four justices.¹⁰⁶ Justice Black filed a strongly worded concurrence,¹⁰⁷ and Justice Brennan filed an equally strong opinion concurring only in the result.¹⁰⁸ Justice Harlan, joined by Justices Frankfurter and Stewart, dissented.¹⁰⁹

Two broad aspects of these confused and confusing opinions merit close scrutiny. First, the Court's opinion expressly proscribed the use of a multifactor approach to repair-reconstruction, resorting instead to a unitary "spentness" standard.¹¹⁰ Second, the Court's "spentness" standard allowed for two entirely contradictory interpretations, and the Court's opinion did not make clear which one was correct.¹¹¹

a. Aro I's Rejection of a Multifactor Approach to Repair-Reconstruction.—The Wilson v. Simpson opinion can rightly be criticized for its meandering rhetoric, and the Court in Aro I could have taken the opportunity to make a clear break from it. Instead, the Court tried to have it both ways. In some passages, the Court's opinion purported to endorse Wilson v. Simpson as the authoritative exposition of the repairreconstruction doctrine.¹¹² In other passages, however, the Court's opinion repudiated the multifactor approach to repair-reconstruction, asserting inaccurately that such an approach had appeared only in lower court opinions.¹¹³

In particular, the Court's opinion chided the Aro I appellate tribunal for focusing attention "on operative facts not properly determinative of the question of permissible repair versus forbidden reconstruction."¹¹⁴ Such forbidden operative facts included, for example, whether the fabric was "'a minor or relatively inexpensive com-

114. Id. at 343.

^{104.} Aro I, 365 U.S. at 338.

^{105.} Id. at 346.

^{106.} Id. at 337.

^{107.} Id. at 346 (Black, J., concurring).

^{108.} Id. at 362 (Brennan, J., concurring).

^{109.} Id. at 369 (Harlan, J., dissenting).

^{110.} See infra notes 112-124 and accompanying text.

^{111.} See infra notes 125-130 and accompanying text.

^{112.} Aro I, 365 U.S. at 342, 343 n.9.

^{113.} Id. at 345 (admitting that "there is language in some lower court opinions indicating that 'repair' or 'reconstruction' depends on a number of factors" but claiming that Supreme Court opinions had avoided that approach).

ponent,^{"115} and whether the fabric would be expected to have a particularly short useful life.¹¹⁶ Justice Black's concurring opinion was even more strident, criticizing the appellate court for using a "Pandora's flock of insignificant standards" instead of the "simple test of 'making," for analyzing the repair-reconstruction problem.¹¹⁷

Yet the Simpson opinion clearly discussed multiple factors on the way to its repair-reconstruction conclusion, including some of the very factors that the Aro I Court's opinion disparaged.¹¹⁸ The Aro I opinion, accordingly, has left courts to sort out the dilemma under which Simpson must be treated as authoritative, but Simpson's multifactor approach must be avoided.

Many courts have resolved the dilemma by default, upon discovering that thoughtful analysis of the repair-reconstruction problem inevitably required a return to at least some form of a multiple-factor approach. For example, in *Fromberg, Inc. v. Thornhill*,¹¹⁹ the Fifth Circuit cited *Aro I*'s reduction of the multifactor approach to a "simpler" inquiry,¹²⁰ but then proceeded to invoke what appeared to be a multifactor test:

[I]t does not take long to recognize that such simplicity is beguiling, and in the process of a judicial determination [of

117. Id. at 355 (Black, J., concurring).

118. See supra text accompanying notes 90-101. Justice Brennan's concurring opinion in Aro I correctly characterized Wilson v. Simpson as articulating a multiple factor analysis. Aro I, 365 U.S. at 363-64 (Brennan, J., concurring). According to Justice Brennan, the appropriate factors include:

the life of the part replaced in relation to the useful life of the whole combination, the importance of the replaced element to the inventive concept, the cost of the component relative to the cost of the combination, the common sense understanding and intention of the patent owner and the buyer of the combination as to its perishable components, whether the purchased component replaces a worn-out part or is bought for some other purpose, and other pertinent factors. *Id.* at 363-64 (footnotes omitted).

119. 315 F.2d 407 (5th Cir. 1963). See *infra* text accompanying notes 383-396 for a more detailed discussion of the Fifth Circuit's *Fromberg* decision and the Ninth Circuit's contrary approach taken in a related case.

120. Fromberg, Inc., 315 F.2d at 412. The court stated:

Where once the ultimate question seems to have been fractured into a series of subsidiary inquiries as to the length of life, cost, etc. of the replaced element of a combination patent in relation to other elements or the completed device as a whole, it has now been reduced to the simpler one: does this really *make* a new device?

Id. (citing Aro I, 365 U.S. at 336).

^{115.} Id. (quoting Aro Mfg. Co. v. Convertible Top Replacement Co., 270 F.2d 200, 205 (1st Cir. 1959)).

^{116.} Id. at 343-44.

repair versus reconstruction] a number of factors must be considered.¹²¹

Courts continue to pay lip service to Aro I's proscription against the multiple-factor approach, yet they still apply it to one degree or another. This is particularly evident in the Federal Circuit's most recent decisions on the issue. For example, in Aktiebolag v. E.J. Co.,¹²² the court acknowledged Aro I's rejection of certain classical factors as relevant to the repair-reconstruction distinction,¹²³ but then proceeded unabashedly to declare that "a number of factors" are relevant to this distinction.¹²⁴ Aro I has thus made more difficult an already complicated inquiry.

b. Aro I's "Spentness" Standard.—Having discarded the multifactor approach by means of a questionable analysis of precedent, the Aro I Court sought to impose a unitary spentness standard for repair-reconstruction.¹²⁵ In searching for a "plain and practical" test to stand in the stead of the multifactor standard, the Court adopted an offhand comment by Judge Learned Hand from a lengthy antitrust opinion as the "distilled essence" of the permissible repair doctrine: "The [patent] monopolist cannot prevent those to whom he sells from . . . reconditioning articles worn by use, unless they in fact make a new article."¹²⁶ This observation, of course, is nothing but a restatement of the exhaustion principle, unaccompanied by any thoughtful analysis as to whether exhaustion is an appropriate organizing principle for repair-reconstruction. This is Aro I's crucial omission.¹²⁷

^{121.} Id. A district court more recently expressed a similar sentiment:

[[]H]ow can one determine whether the article as a whole has been spent, if not by reference to whether some proportion of its individual parts are in fact worn or broken? In practice, an article becomes ripe for discarding or replacement for one of two reasons: Either it will have enough worn or broken parts that it is no longer economically rational to repair it, or it will have become obsolete due to advances in the art.

FMC Corp. v. Up-Right, Inc., 816 F. Supp. 1455, 1462 (N.D. Cal. 1993), aff'd, 21 F.3d 1073 (Fed. Cir. 1994).

^{122. 121} F.3d 669 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1337 (1998).

^{123.} See id. at 673 (noting Aro I's rejection of component inventiveness as a factor in repair-reconstruction analysis); infra Part II.B (discussing component importance and inventiveness as a repair-reconstruction factor).

^{124.} Aktiebolag, 121 F.3d at 673.

^{125.} Aro I, 365 U.S. at 343-46. The reference to a "unitary" standard here means something other than a multifactor standard, reflecting the Court's insistence on avoiding the multifactor approach.

^{126.} Id. at 343 (ellipsis and alteration in original) (quoting United States v. Aluminum Co. of Am., 148 F.2d 416, 425 (2d Cir. 1945)).

^{127.} See infra Parts IV-V (analyzing this issue).

Another critical problem with the Aro I opinion is its choice of the spentness rhetoric as the repair-reconstruction standard.¹²⁸ The exhaustion model encourages courts to think about the repair-reconstruction problem in terms of spentness. Distinguishing making from using seems to call for close attention to the physical qualities of the device and, perhaps, the physical nature of the replacement activities being performed on the device. Spentness is a very natural rubric here, and the Aro I opinion resorted to it in formulating a holding:

The decisions of this Court require the conclusion that reconstruction of a patented entity, comprised of unpatented elements, is limited to such a true reconstruction of the entity as to "in fact make a new article," *after the entity*, *viewed as a whole, has become spent.* In order to call the monopoly, conferred by the patent grant, into play for a second time, it must, indeed, be a second creation of the patented entity . . . Mere replacement of individual unpatented parts, one at a time, whether of the same part repeatedly or different parts successively, is no more than the lawful right of the owner to repair his property.¹²⁹

On its face, the inquiry into the spentness of the article may appear to be appealing, but the Court left almost no guidelines by which lower courts could implement this inquiry. The *Aro I* opinion provides a perplexing mix of messages regarding traditional indicia of spentness, such as machine identity, component importance, component perishability and useful life, and dominance of new over old components. Courts are thus left to seek guidance from the myriad cases before and after *Aro I* that have explored these aspects of spentness.

Another major problem with Aro I concerns the Court's contradictory uses of the spentness rubric. Under one notion of spentness, which would seem to be supported by the passage quoted above, the fact of device spentness presages impermissible reconstruction. That is, the notion is one of overall spentness. Patentees would presumably argue, for example, that the failure of a component of a patented device rendered the device itself spent, and efforts to replace that component would be impermissible attempts to reconstruct the spent device.

One could also speak, however, of the spentness of an individual component. The Aro I opinion refers to spentness in this fashion as well, but without explanation: "We hold that maintenance of the 'use

^{128.} Aro I, 365 U.S. at 346.

^{129.} Id. (citation omitted) (emphasis added).

of the whole' of the patented combination through replacement of a spent, unpatented element does not constitute reconstruction."¹³⁰ Used in this way, spentness cuts in the opposite direction: defendants would argue that a replaced component was spent, and that its replacement constitutes mere permissible repair of the patented device.

In sum, Aro I installed spentness as the standard for repair-reconstruction, but failed to provide reasonable guidance for analyzing spentness, and failed to specify whether spentness referred to the whole device or to a part of it. More fundamentally, the Court, again perhaps unwittingly, adopted an exhaustion model without considering its limitations, or what alternative models might have had to offer.

II. The Heart, the Soul, and the Parts of the Whole: The Failure of Spentness as a Standard for Repair-Reconstruction

If spentness is the operative standard after Aro I for analyzing the repair-reconstruction problem, how can one evaluate whether a patented device has indeed become spent? Case law before and after Aro I reveals a dizzying array of potential approaches. While some are more satisfactory than others, they share a common weakness because they force attention towards the peculiarities of the patented device and away from the circumstances surrounding the sales transaction between the patentee and the purchaser. In particular, spentness analyses overemphasize the importance of the physical qualities of patented devices and fail to recognize that the physical qualities should merely function as a proxy for the reasonable expectations of the parties. Ultimately, long experience with the spentness standard highlights the limitations inherent in it and undercuts the proposition that exhaustion is a satisfactory model by which to resolve repair-reconstruction disputes.

A. The Soul of the Invention: The Metaphysics of Machine Identity

One approach to assessing spentness is to consider whether, in the course of a series of replacement activities, the patented device at issue has undergone a change in identity. At the point at which the original device becomes transformed, through replacement activities, to a new device, the original device is deemed spent and the replacement activities responsible for the transformation, and certainly any future additional replacement activities, would amount to impermissible reconstruction.

It would be difficult to imagine a more intractable legal standard. Nevertheless, there is ample precedential support for the "identity of the machine" test. Wilson v. Simpson includes language that can be taken as an expression of this test.¹³¹

The identity of the machine standard also shows up in quite a number of pre-Aro I cases,¹³² but, it seems, to very little ultimate effect. In some cases the standard seems to have been merely recited by rote.¹³³ In other cases, the court proceeded only marginally further in attempting to apply the standard, usually injecting it as a conclusory label in the analysis. For example, in Gottfried v. Conrad Seipp Brewing Co.,¹³⁴ the court stated that the defendant had the right to replace parts that wore out, as often as necessary, "so long as the identity of the machine is retained."¹³⁵ The court's analysis amounts to little more than a declaration that "[t]he proof in this case shows, to my satisfaction, that as the grates, pipes, and blowers were worn out, they were renewed, and therefore the identity of the machine is re-

132. See infra notes 133, 134 and 137. It appears that a number of treatises of the time had also picked up on the "identity of the machine" standard. See Miller Hatcheries, Inc. v. Buckeye Incubator Co., 41 F.2d 619, 621 (8th Cir. 1930) (citing treatises).

133. For cases mentioning the standard in passing, see Morrin v. Robert White Engineering Works, 143 F. 519, 520 (2d Cir. 1905); Ideal Wrapping, 23 F.2d at 850; C. & R. Research Corp. v. Write, Inc., 19 F.2d 380, 381 (D. Del. 1927); Young v. Foerster, 37 F. 203, 204 (C.C.S.D.N.Y. 1889); Singer Manufacturing Co. v. Springfield Foundry Co., 34 F. 393, 395 (C.C.D. Mass. 1888).

134. 8 F. 322 (C.C.N.D. Ill. 1881). 135. Id. at 323.

^{131.} See Wilson v. Simpson, 50 U.S. (9 How.) 109, 126 (1850) (noting that the "replacement of temporary parts does not alter the identity of the machine, but preserves it, though there may not be in it every part of its original material"). In this regard, the Aro I case contains mischaracterizations of Simpson. See Aro I, 365 U.S. at 352-53 (Black, I., concurring) (arguing that the Simpson Court rejected the "conceptualistic and misleading argument" that "the machine ceased to exist or have any 'material existence' the moment its knives wore out, ... [so that] replacement of the knives amounted to a[n] [impermissible] 'making,'" in favor of a "common-sense rule"). Despite Justice Black's characterization, the Simpson Court, and several after it, did adopt the "conceptualistic" "identity of the machine" standard. See, e.g., Ideal Wrapping Mach. Co. v. George Close Co., 23 F.2d 848, 850 (D. Mass. 1928) (noting that although "[d]ifficulties arise in determining the legal limits between repair and reconstruction [,] . . . [t]he test is whether the identity of the machine is preserved by the repairs"), aff'd, 29 F.2d 533 (1st Cir. 1928). For an early British case to the same effect, see Dunlop Pneumatic Tyre Co. v. Holborn Tyre Co., [1901] 18 R.P.D. & T.M. 222, 226 (1901) (implying an identity of the machine test by asking "[i]s [the item] substantially, in common parlance, honestly, a new article, or is it an old article repaired?").

tained."¹³⁶ Similar conclusory assessments of machine identity can be found in a number of cases.¹³⁷

Several reasons might explain why the identity of the machine standard has proven to be such a dismal failure. First, it seems at best highly unlikely that courts could ever reliably formulate an "identity" of a machine, much less assess whether that identity had "changed." Second, and more importantly, the identity standard, as applied in many cases, will call for the court to confront the riddle of the apocryphal axe. This means that the court will have to determine whether "identity" of a machine is something definable only with regard to certain components, certain groups of components, or separately from the components altogether.

The British court in Dunlop Pneumatic Tyre Co. v. Holborn Tyre $Co.^{138}$ offers a simple illustration of the identity standard that betrays its difficulties:

Take the case of an ordinary farm cart. A man has at the beginning a new cart. By-and-bye the wheels, one or both of them, have worn out, and he puts on a pair of new wheels. Is it or is it not the old cart? Few people would doubt that it is the old cart. . . . But by-and-bye the shafts fail, and for the old shafts are substituted new ones. I do not wish to express a decided opinion, but it is quite possible you have still the old cart. But if after that you come to the body of the cart, and the body of the cart is either taken away and a new body is put there, or new wood is put for a large portion of the cart, surely it is impossible to then say that the old cart still remains.¹³⁹

The court's hesitance as it proceeds through the sequence of replacements is significant. Is there something inherent about the wood of the cart's body that makes it uniquely an identifier of farm carts, so that whenever the body is replaced, a new cart is constructed? Or does the significance really lie in the sequence of replacements, so

^{136.} Id.

^{137.} See, e.g., Morgan Gardner Elec. Co. v. Buettner & Shelburne Mach. Co., 203 F. 490, 493 (7th Cir. 1913) (concluding that "[t]o replace the hollow washer and other separate parts of the protective device did not destroy the identity of the patented device").

Many of these cases also followed Simpson's lead in treating the identity of the machine standard as one consideration among other indicia of repair, rather than as an overarching standard. See, e.g., Wagner Typewriter Co. v. F.S. Webster Co., 144 F. 405, 416 (C.C.S.D.N.Y. 1906) (delineating a number of factors that the court should consider in rendering its determination, in addition to whether an item "is easily removable and replaced without affecting the identity of the machine").

^{138. [1901]} R.P.D. & T.M. 222 (1901).

^{139.} Id. at 226.

that the cumulative replacement of wheels, shafts, and then body finally works the change in identity?¹⁴⁰ If this is so, then what about the case in which the body is replaced, but not the wheels or shaft?

It is obvious that these questions could continue endlessly in any given repair-reconstruction case, which might involve multiple farm carts having vastly different repair histories. One could conclude that the fault here lies merely with the choice of the "identity" standard, which delves hopelessly into the metaphysics of machinery. But the failure of the identity standard should also raise questions about the wisdom of Aro Is heavy reliance on spentness as an overarching standard for repair-reconstruction disputes. Is the point of the repair-reconstruction distinction really to draw hypertechnical distinctions between making and using? Or is it to give legal effect to the unstated expectations of the patentee and purchaser regarding the use of the patentee device? The spentness rhetoric, unfortunately, encourages the former.

B. The "Heart of the Invention": Component Importance and Inventiveness

Courts have shown no great proclivity for identifying the soul of the invention pursuant to the identity of the machine test, but they have continued to search for its heart. Courts have frequently considered whether the component replaced in the course of a replacement activity amounts to the "inventive" or "important" part of the patented device. Under this approach, replacement constitutes permissible repair if the purchaser replaces only the unimportant or non-inventive components of the device.¹⁴¹ Ordinarily, component inventiveness has been used as one factor in a multifactor analysis of repairreconstruction.¹⁴²

A number of decisions have included an analysis that purports to assess the "inventiveness" of a component of the claimed combination. For example, in *Electric Auto-Lite Co. v. P. & D. Manufacturing* Co.,¹⁴³ which involved a patent directed to an automobile ignition sys-

^{140.} This question arises in modern cases in the form of the "dominance" test. See infra Part II.D.

^{141.} This standard, then, may be classified as another overall spentness standard, like the identity of machine test. That is, the fact that replacement of an "inventive" or "important" component is required indicates that the original device has become spent overall.

^{142.} See, e.g., Wagner Typewriter Co. v. F.S. Webster Co., 144 F. 405, 417 (C.C.S.D.N.Y. 1906) (noting that in the case of a typewriter patent, "[t]he typewriter ribbon and spool do not constitute a vital element . . . of the patented device," and as such, their replacement does not "affect[] the identity of the machine").

^{143. 78} F.2d 700 (2d Cir. 1935).

tem, the court listed the replacement parts sold by the defendant (springs, condensers, coils, and the like), and declared that none of the parts "is the essence of the inventions sued upon, nor do any constitute the part which serves to distinguish the invention."¹⁴⁴ This, coupled with other factors, justified a finding of repair.¹⁴⁵ Similarly, in *Micromatic Hone Corp. v. Mid-West Abrasive Co.*,¹⁴⁶ which concerned a holder for an abrasive stone, the court found it important that the replaced part (the stone) was not a "dominant" inventive element in the patent.¹⁴⁷ Perhaps expressing a similar approach, in *Standard Stoker Co. v. Berkley Machine Works & Foundry Co.*,¹⁴⁸ the Court of Appeals for the Fourth Circuit ruled that it was "not infringement for the defendant to manufacture repair parts old in the art."¹⁴⁹

Some early decisions, at least, appeared to recognize the fallacy of attempting to analyze a combination claim in terms of "inventive" and "non-inventive" components.¹⁵⁰ As the court in *Automotive Parts Co. v.* Wisconsin Axle Co.¹⁵¹ stated:

The invention is for a composite thing, embracing several elements or parts, all of which are necessary to and cooperate in the operation of the patented unit. We cannot subscribe to the view that the test of contributory infringement in the furnishing of parts for a combination invention

146. 177 F.2d 934 (6th Cir. 1949).

147. Id. at 937 (finding permissible repair because "the abrasive stone is not patented, . . . [and is not] the dominant element of the invention").

148. 106 F.2d 475 (4th Cir. 1939).

149. Id. at 477. The decisions in Foglesong Machine, Micromatic, and Standard Stoker probably reflect a distinct lack of comfort with the notion of a contributory infringement remedy. The supply of unpatented components can give rise to liability under a contributory infringement theory. Requiring that those unpatented components at least be "patentable" or "inventive" may have seemed attractive to courts which thought that, otherwise, the patent right was being extended too far.

150. The fallacy is, of course, that the combination as a whole is inventive; each of the components may well be, and often are, "old" when considered in isolation. As Judge Markey put it, with characteristically acerbic wit: "Only God works from nothing. Man must work with old elements." Howard T. Markey, *Why Not the Statute?*, 65 J. PAT. OFF. Soc'Y 331, 334 (1983); *see also* Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc., 807 F.2d 955, 959 (Fed. Cir. 1986) (arguing that because virtually all patent claims are drawn to combinations of elements, "[c]asting an invention as 'a combination of old elements' leads improperly to an analysis of the claimed invention by the parts, not by the whole"); Fromson v. Advance Offset Plate, Inc., 755 F.2d 1549, 1556 (Fed. Cir. 1985) ("There is no basis in the law . . . for treating combinations of old elements differently in determining patentability.").

151. 81 F.2d 125 (6th Cir. 1935).

^{144.} Id. at 703.

^{145.} Id. at 704; see also Foglesong Mach. Co. v. J.D. Randall Co., 239 F. 893, 895 (6th Cir. 1917) (finding permissible repair because the defendant did not disturb those elements "which represent the advance in the art").

is whether the parts furnished constitute the gist or essence of the invention; indeed, we cannot see how it may be said that any one element or another marks the advance step or is the essence of such an invention. There are cases, it is true, in which the phrase "essence of the invention" is used; but in our view, when the facts in those cases are considered, it cannot be said that the conclusions reached were the result of a logical selection of one or more elements of the combination as the gist or essence of the invention.¹⁵²

In addition to focusing on the "inventive" status of the replaced component, some courts have attempted to distinguish reconstruction from permissible repair by assessing the relative importance of the components. For example, in *Wagner Typewriter Co. v. F.S. Webster Co.*,¹⁵³ which addressed a typewriter ribbon mechanism that included a ribbon spool, the court found that the spool was not a "chief" or "vital" element of the combination, but merely an "ordinary working part," thus supporting the conclusion that replacement of the spool was permissible repair.¹⁵⁴ The Supreme Court, in *Leeds & Catlin Co. v. Victor Talking Machine Co. (No. 2)*,¹⁵⁵ tentatively endorsed this approach. The Court found that the sale of records to replace ones that were sold as part of a "talking machine," but that had worn out, constituted infringement because the records were "important" to the invention, and because, by contrast to the stylus, they served "to distinguish the invention—to mark advance upon the prior art."¹⁵⁶

Like the exercise of identifying the "inventiveness" of a replaced component, analyzing an individual component against some notion of "importance" presents fundamental difficulties.¹⁵⁷ First, like the failure of an "important" component, the failure of even a seemingly

155. 213 U.S. 325 (1909), overruled in part by Mercoid Corp. v. Mid-Continent Inv. Co., 320 U.S. 661 (1944).

156. Id. at 330.

^{152.} Id. at 126.

^{153. 144} F. 405 (C.C.S.D.N.Y. 1906).

^{154.} Id. at 417; see also Thomson-Houston Elec. Co. v. Kelsey Elec. Ry. Specialty Co., 75 F. 1005, 1009 (2d Cir. 1896) (stating that the permissible repair doctrine was "not intended to permit the unauthorized substitution of the vital and distinctively new part of an invention in place of one worn out by use"); Hayslip v. Textag Co., 94 F. Supp. 425, 427 (N.D. Ga. 1950) (concluding that because "the tags are the main inventive element of the system ... they are protected by the patent irrespective of whether they are separately patented"), aff'd, 192 F.2d 435 (5th Cir. 1951).

^{157.} At least one British court came to this conclusion very early on. See Dunlop Pneumatic Tyre Co. v. Holborn Tyre Co., [1901] 18 R.P.D. & T.M. 222, 226 (1901) (rejecting an "essential element" test). But cf. Sirdar Rubber Co. v. Wallington, Weston & Co., 1 Ch. 451, 454 (1905) (finding no impermissible reconstruction because defendant's replacement activities did not change "the distinguishing feature of the invention").

trivial component may, of course, render the entire combination inoperable. As the District Court in F.F. Slocomb & Co. v. A.C. Layman Machine Co.¹⁵⁸ stated:

It has been said that the furnishing of a vital feature or part of a patented mechanism, when essential to its construction and operation for the accomplishment of the ends for which it is intended, will amount, if unauthorized by the patentee, to a wrongful construction. But this cannot be sound as a general rule. The wearing out or breaking of a screw or bolt will as effectually prevent the operation of the mechanism as the destruction of a larger and more expensive feature. The wearing out or breaking down of a particular part essential to the operation of the mechanism therefore cannot be relied on as furnishing the test whether reconstruction, or merely repair or renewal, is required.¹⁵⁹

This reasoning may reflect the court's instinctive reaction against giving dispositive weight to device-oriented factors. One might speculate, for example, that the *Slocomb* court thought that the relative importance of a component was not likely to indicate the patentee's and purchaser's expectations; the importance of the component might have little to do with whether the purchaser could reasonably expect to need to replace the component in order to keep the combination in working order.

Second, the idea of dissecting a component from a patented combination and analyzing it violates principles that, today at least, are well-settled in patent law: Patent law inquiries as to the inventiveness of a claim must consider the combination as a whole, rather than isolate an individual element, whether or not the element is identifiable as the gist or heart of the invention.¹⁶⁰ The Supreme Court in *Aro I* rejected the patentee's argument that the "particular shape of the fabric" in a convertible top assembly "was the advance in the art—the very 'heart' of the invention—which brought the combination up to the inventive level," so that replacement of the fabric constituted reconstruction.¹⁶¹ The Court stated:

[I]f anything is settled in the patent law, it is that the combination patent covers only the totality of the elements in the claim.... [T]his Court has made it clear in the two *Mercoid* cases that there is no legally recognizable or protected "es-

^{158. 227} F. 94 (D. Del. 1915), aff'd, 230 F. 1021 (3d Cir. 1916).

^{159.} Id. at 97-98.

^{160.} Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 344 (1961). 161. *Id.*

sential" element, "gist" or "heart" of the invention in a combination patent.¹⁶²

One would suppose that in the wake of Aro I, it would be clear that reliance on an evaluation of the inventiveness or importance of an individual replaced component, isolated from the entirety of the patented combination, would be erroneous. The Supreme Court seemed to take this position when it explained Aro I's impact in Dawson Chemical Co. v. Rohm & Haas Co.¹⁶³ Additionally, the Federal Circuit has gone out of its way to reinforce the notion that considering the heart of the invention in any of a variety of contexts, including the doctrine of permissible repair, would be improper.¹⁶⁴ Unfortunately, vestiges of the "heart of the invention" analysis have persisted, despite Aro I's unmistakable denunciation.

For example, in *High Voltage Engineering Corp. v. Potentials, Inc.*,¹⁶⁵ the District Court paid lip service to the relevant language in *Aro I*, but then found it "appropriate to note that the essential advance in the art of Plaintiff's patented inclined-field acceleration tube is the inclina-

165. 398 F. Supp. 18 (W.D. Tex. 1974), aff'd, 519 F.2d 1375 (5th Cir. 1975).

^{162.} Id. at 34445. The cases referred to by the Court are Mercoid Corp. v. Minneapolis-Honeywell Regulator Co., 320 U.S. 680 (1944) and Mercoid Corp. v. Mid-Continent Inv. Co., 320 U.S. 661 (1944). In these cases, the Court used the proscription against considering the "heart" of the invention to restrict the availability of the contributory infringement remedy; because there was no "heart" of the invention, there could be no contributory infringement even when a supplier sold articles specifically adapted for use as components in a patented combination. See Minneapolis-Honeywell, 320 U.S. at 684; Mid-Continent, 320 U.S. at 666-67. Accordingly, licensing others to sell such articles constituted patent misuse. Minneapolis-Honeywell, 320 U.S. at 684; Mid-Continent, 320 U.S. at 668. In the latter case, Justice Douglas declared that the Court "limit[ed] substantially the doctrine of contributory infringement. What residuum may be left we need not stop to consider." Id. at 669. However, less than ten years later, Congress restored the contributory infringement remedy. See 35 U.S.C. § 271(b), (c) (1994 & Supp. 1996).

The Aro I Court, too, undoubtedly was motivated by the desire to limit the contributory infringement remedy, and thus gave considerable weight to the language of the Mercoid cases notwithstanding the intervening passage of §§ 271(b) and (c). See Aro I, 365 U.S. at 340-41.

^{163.} See 448 U.S. 176, 217 (1980) (explaining that the Court had "eschewed the suggestion that the legal distinction between 'reconstruction' and 'repair' should be affected by whether the element of the combination that has been replaced is an 'essential' or 'distinguishing' part of the invention").

^{164.} See, e.g., Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc., 73 F.3d 1085, 1087 (Fed. Cir. 1995) ("[W]hen determining obviousness, the claimed invention should be considered as a whole; there is no legally recognizable 'heart' of the invention."); Porter v. Farmers Supply Serv., Inc., 790 F.2d 882, 887 (Fed. Cir. 1986) (rejecting an apparent "heart of the invention argument" in the context of a permissible repair decision). But cf. Perkin-Elmer Corp. v. Westinghouse Elec. Corp., 822 F.2d 1528, 1533 n.8 (Fed. Cir. 1987) (acknowledging dicta that suggests that the "gist" or "essence" of the invention may be considered in determining priority of invention, and in determining infringement under the doctrine of equivalents, so long as claim limitations are not ignored).

tion of the electrodes to minimize the drag on particles being accelerated through the tube."¹⁶⁶ The fact that the defendant never altered the inclination characteristic in the course of defendant's replacement activities seemed to weigh importantly in its favor on the issue of permissible repair.¹⁶⁷

In other cases, courts have resurrected the heart of the invention notion, but their use of it may have been justifiable on other grounds. The Supreme Court itself, speaking only a few years after Aro I, arguably relied upon this concept in finding permissible repair in Wilbur-Ellis Co. v. Kuther.¹⁶⁸ Reviewing an infringement claim arising when the purchaser of secondhand fish canning machines refurbished them and resized some of the components, Justice Douglas seemed to consider it important that the invention did not reside in "either the size or locational characteristics of the replaced elements . . . or the size of the commodity on which the machine operated."¹⁶⁹ If this is an assertion that repair should be found because the replaced components were those other than the essential or novel components, then Justice Douglas's analysis unquestionably strays from Aro I and cannot be squared with the Court's subsequent statements in Dawson Chemical.¹⁷⁰ On the other hand, the language might be read as merely reciting, albeit in clumsy fashion, the rule that the permissible repair doctrine does not apply when the replaced component is itself separately patented, because the replacement activity would in most circumstances clearly constitute an unauthorized making.

There is another example in Federal Circuit jurisprudence. In Lummus Industries, Inc. v. D.M. & E. Corp.,¹⁷¹ the patentee had apparently argued that a component of its patented cutting apparatus amounted to the heart of the invention, and the "heart" language found its way into the district court's jury instructions.¹⁷² Fortunately for the patentee, the Federal Circuit determined that the language concerning the "heart of the invention" had been presented in connection with the requirement of 35 U.S.C. § 271(c) that a component giving rise to a contributory infringement claim be "a material part of

172. Id. at 271.

^{166.} Id. at 20.

^{167.} Id.

^{168. 377} U.S. 422 (1964).

^{169.} Id. at 423; see id. at 424-25 (noting that the "size of cans serviced by the machine was no part of the invention; nor were characteristics of size, location, shape and construction of the six elements in question patented").

^{170.} See supra note 163.

^{171. 862} F.2d 267 (Fed. Cir. 1988) (per curiam).

the invention."¹⁷³ Acknowledging the Aro I and Dawson Chemical proscriptions against considering the "heart" in the repair-reconstruction analysis, the Federal Circuit nevertheless found the instructions free from error given the connection to the materiality language in § 271(c).¹⁷⁴

While it would seem that reference to the "heart" of the invention could be rationalized in this fashion in nearly any repair-reconstruction case, more recent pronouncements from the Federal Circuit confirm that cases like *Lummus* will be the exception. In *Sage Products, Inc. v. Devon Industries, Inc.*,¹⁷⁵ the court insisted that "[t]he size or relative importance of the replacement part to the patented combination is not relevant when determining whether conduct constitutes repair or replacement."¹⁷⁶

C. The Parts of the Invention: Component Spentness

It seems unlikely that quests for the heart or soul of the invention will ever yield satisfactory results in repair-reconstruction disputes. Many courts, however, have turned to an analysis of the remaining parts of the invention to distinguish repair from reconstruction. In general, courts have attempted to assess the physical qualities of the replaced component as an indicator of repair or reconstruction, reasoning that if the replaced component is perishable, has a short useful life, or is a low cost component, replacement of such a component should be deemed repair.¹⁷⁷

Twin notions of spentness are at work in many of these cases. Certainly, many of them may be considered true component spentness cases, insofar as a perishable component that has become worn out through use or has otherwise reached the end of its useful life might be considered spent. Courts inclined to find reconstruction, however, have used the concept of useful life to substantiate overall spentness, by concluding that when a component reaches the end of

^{173.} Id.

^{174.} Id.

^{175. 45} F.3d 1575 (Fed. Cir. 1995).

^{176.} Id. at 1578 (citing Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 345-46 (1961)).

^{177.} Often, these qualities are relative measures—e.g., the useful life of the component relative to the useful life of the overall device. Thus, the inquiry is immediately more complicated than it would initially appear, because the qualities of the overall device, in addition to the qualities of the component, must be assessed.

its useful life, this is an indication that the patented device as a whole has become spent.¹⁷⁸

What is perhaps most striking about the perishability and useful life cases, however, is that they, too, illustrate the pitfalls of the spentness rhetoric. Indeed, a number of courts have an intuitive sense for this problem, and have employed perishability and useful life concepts as a proxy for the parties' expectations, rather than as evidence of spentness.

1. Component Perishability, or How the Supreme Court Declared Toilet Paper To Be Disposable.—Notwithstanding Simpson's express rejection of a component's "perishability" as a rationale for finding that a replacement activity concerning the component was permissible repair,¹⁷⁹ courts have, to varying degrees, considered perishability in their analyses. This is especially true of courts considering the repair-reconstruction problem prior to the Supreme Court's 1961 Aro I decision, although some post-Aro I cases also discuss perishability.

A notable early example is *Morgan Envelope Co. v. Albany Perforated Wrapping Paper Co.*,¹⁸⁰ in which the Court addressed the issue of tissue. The claimed invention concerned a problem of no little moment: the "temptation offered to greed or wastefulness" in the dispensing of toilet paper by the traditional cylindrical roll.¹⁸¹ The pertinent patent claims recited a toilet paper dispenser and an oblong or oval toilet paper roll designed to fit into the dispenser.¹⁸² Defendant produced the "Wheeler Pocket Companion,"¹⁸³ an oval toilet paper roll, with "the knowledge and intention that the paper so sold was to be used" by customers who had made authorized purchases of the plaintiff's toilet paper dispenser.¹⁸⁴

The Court struggled greatly with interrelated concepts of claim interpretation,¹⁸⁵ contributory infringement,¹⁸⁶ and the repair-reconstruction distinction. The Court purported to decide the case on con-

- 182. Id. at 427-30.
- 183. Id. at 429.
- 184. Id. at 431.

^{178.} See, e.g., Williams v. Barnes, 234 F. 339, 340 (7th Cir. 1916) (noting that "[t]he test [of contributory infringement] is whether the element, as part of the patent combination, is perishable in its nature, consumed in the use, and necessarily to be replaced in each successive use of the combination").

^{179.} See supra notes 87-92 and accompanying text.

^{180. 152} U.S. 425 (1894).

^{181.} Id. at 426. In the true American entrepreneurial spirit, the inventors set out confidently to address this intractable problem of human nature via improved technology.

^{185.} In particular, the Court had difficulty with the notion that the oval roll of toilet paper could properly be an element of the claimed combination. The court stated:

tributory infringement principles, finding that the patentee could not invoke the rationale of the contributory infringement cases because:

these cases have no application to one where the element made by the alleged infringer is an article of manufacture perishable in its nature, which it is the object of the mechanism to deliver, and which must be renewed periodically, whenever the device is put to use. . . . In this view, the distinction between repair and reconstruction becomes of no value, since the renewal of the paper is . . . neither the one nor the other.¹⁸⁷

Nevertheless, the Court proceeded to consider the repair-reconstruction distinction, concluding that an owner of the plaintiff's dispensers who purchased oval replacement rolls from the defendant did not directly infringe because he was doing "precisely what the patentee intended he should do: he replaces that which is in its nature perishable, and without the replacement of which the remainder of the device is of no value."¹⁸⁸ According to the Court, this result was consistent with the repair-reconstruction cases due to the perishable nature of the replaced component.¹⁸⁹

If this be so, then it would seem to follow that the log which is sawn in the mill; the wheat which is ground by the rollers; the pin which is produced by the patented machine; the paper which is folded and delivered by the printing press, may be claimed as an element of a combination of which the mechanism doing the work is another element.

Id.

186. Today, contributory infringement is governed by 35 U.S.C. § 271(c) (Supp. 1996), which provides that:

Whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.

Although at the time of *Morgan Envelope* no statutory provision on contributory infringement existed in U.S. patent law, the Court had recognized the doctrine in a number of cases. *See Morgan Envelope*, 152 U.S. at 433 (citing cases); *supra* note 3 and accompanying text (discussing contributory infringement).

187. Morgan Envelope, 152 U.S. at 433.

188. Id. at 434. The Court stated that the case was analogous to *Simpson*, and quoted the *Simpson* Court's language rejecting perishability as a factor in the repair-reconstruction analysis. Id. at 434-35.

189. Id. at 433-35.

Id.

The Supreme Court again turned to the perishability factor in *Leeds & Catlin Co. v. Victor Talking Machine Co. (No. 2).*¹⁹⁰ The patent claims concerned a record player and recorded disc. The patentee alleged that the defendant's sale of discs which could be played on the patentee's machine violated an injunction that had been entered after an infringement proceeding.¹⁹¹ The Court stated that "the lower courts found that the discs were not perishable," distinguishing the earlier case of *Morgan Envelope* where "it was made a determining circumstance that the paper perished by its use."¹⁹² Indeed, as might be guessed, the defendant's customers generally were purchasing discs "to increase the repertory of tunes," not to replace worn-out or broken records.¹⁹³ This fact counseled in favor of reconstruction.¹⁹⁴

Some courts appeared to hold up the inherently perishable or non-perishable nature of the replaced components as the standard of repair.¹⁹⁵ For example, in *Goodyear Shoe Machinery Co. v. Jackson*,¹⁹⁶ the court expressly defined repair as "'restoration to a sound, good, or complete state after decay, injury, dilapidation, or partial destruction.'"¹⁹⁷

This definition may have encouraged other courts to take the device-oriented spentness rhetoric to its extreme. For example, in *Micromatic Hone Corp. v. Mid-West Abrasive Co.*,¹⁹⁸ the court characterized cases such as *Simpson* and *Morgan Envelope* as resting on a distinction between "soft" and "hard" parts:

It has long been the established rule that if one of the parts of a patented combination, the part being not patentable per se, is made of soft material and wears out, the other parts of the combination remaining capable of performing their normal and expected functions, the right to replace the

194. Id. at 336-37; cf. William v. Barnes, 234 F. 339, 340 (7th Cir. 1916) (finding permissible repair under the Morgan Envelope principle that a purchaser may replace an inherently perishable component in a patented combination).

195. See, e.g., Hayslip v. Textag Co., 94 F. Supp. 425, 427 (N.D. Ga. 1950) (noting as a factor counting in favor of reconstruction the fact that replaced tags were not "perishable, fragile or intended to be consumed or exhausted in normal operation of the system"), aff'd, 192 F.2d 435 (5th Cir. 1951).

196. 112 F. 146 (1st Cir. 1901). 197. *Id.* at 150.

^{190. 213} U.S. 325 (1909), overruled in part by Mercoid Corp. v. Mid-Atlantic Inv. Co., 320 U.S. 661 (1944).

^{191.} Id. at 329-31.

^{192.} Id. at 335.

^{193.} Id. at 336 (quoting Victor Talking Mach. Co. v. Leeds & Catlin Co., 150 F. 147, 147 (S.D.N.Y. 1907)).

^{198. 177} F.2d 934 (6th Cir. 1949).

worn-out part exists quite as definitely as in the case of breakage.¹⁹⁹

The court seemed to be suggesting that the repair-reconstruction inquiry—which might seem to be about actions and expectations in addition to being about devices themselves—turns predominantly on the inherent qualities of the replaced component.²⁰⁰

Like the "importance" and "inventiveness" criteria, perishability usually appears in these cases as one factor in a multifactor analysis. It might be argued, then, that if *Aro I* rejected the multifactor approach,²⁰¹ it must have thrown out the perishability factor as well. While the Court's opinion in *Aro I* is unclear, Justice Black's concurring opinion does declare that the Court did, indeed, expunge the perishability factor.²⁰²

Nevertheless, the perishability criterion has continued to manifest itself in post-Aro I case law. For example, in TSC Industries, Inc. v. International Harvester Co.,²⁰³ the Seventh Circuit analogized to the Micromatic Hone²⁰⁴ decision, apparently persuaded by the distinction between "soft" components and other types of components.²⁰⁵ In the Federal Circuit, in Porter v. Farmers Supply Service, Inc.,²⁰⁶ the court, taking note of lower court findings that the replaced components—harvester disks used in a tomato harvesting machine—had to be repeatedly replaced due to wear, and that the patentee sold replacement disks, made a determination of repair.²⁰⁷ The Federal Circuit

207. Id. at 885.

^{199.} Id. at 936 (citations omitted); see also Automotive Parts Co. v. Wisconsin Axle Co., 81 F.2d 125, 126-27 (6th Cir. 1935) (stating that "if one of the parts is made of defective or soft material and wears out, the other parts of the combination being capable of performing their normal and expected functions, the right to replace the worn-out part exists ... quite as definitely as in the case of breakage"). For an earlier British case on point, see Sirdar Rubber Co. v. Wallington, Weston & Co., 1 Ch. 451, 454 (1905) (finding permissible repair in a case involving a patent on a tire and rim combination, because only the tire, which was "the soft wearing part" of the combination, was replaced).

^{200.} See Micromatic Hone, 177 F.2d at 936-37.

^{201.} See supra notes 112-124 and accompanying text.

^{202.} Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 354 (1961) (Black, J., concurring) (arguing that "deciding whether a patented article is 'made' does not depend on whether an unpatented element of it is perishable").

^{203. 406} F.2d 53 (7th Cir. 1968).

^{204.} See supra notes 198-200 and accompanying text.

^{205.} Id. at 55 (concluding that the replacement of certain parts in a "doffer assembly" in a rotary cotton-picking machine constituted permissible repair). The district court, by contrast, had concluded that after Arv I perishability was not a factor which courts should consider. See Tractor Supply Co. v. International Harvester Co., 155 U.S.P.Q. (BNA) 420, 423 (N.D. Ill. 1967) (noting that "[t]he remaking of a patented article does not depend upon whether an element thereof is perishable" (citing Arv I, 365 U.S. at 338-39)).

^{206. 790} F.2d 882 (Fed. Cir. 1986).

stated that courts in "a number of cases, before and after Aro I, that involve[d] tools having parts subject to wear . . . 'have held almost uniformly that replacement of a worn part in a patented combination is repair.'"²⁰⁸

The continued use of the perishability factor is probably unfortunate because it binds the repair-reconstruction standard too tightly to the qualities of the device at issue. This may be counterproductive because, first, as a matter of precedent, it seems difficult to square the notion of perishability as presented in later cases with *Simpson*'s express prohibition and *Aro I*'s apparent disapproval of this criterion.²⁰⁹ Second, a perishability standard might create too broad a right of repair. Most repair-reconstruction cases concern the replacement of worn components, and, as at least one court recognized long ago, it would seem that any component that becomes so worn that a user is motivated to replace it is, for this very reason, perishable.²¹⁰

On the other hand, reliance on perishability could also be underinclusive to the extent that the replacement activities concerned perfectly durable parts that broke as a result of ordinary use of the patented combination. For example, in a case involving tips on "blowpipes" used in metal cutting and welding operations, the plaintiff argued that the doctrine of permissible repair could not apply because the evidence showed that tips had to be replaced "not because the tips wear out, but because they are abused by careless and incompetent workers and destroyed by accidents."²¹¹ Rather than admitting to the inadequacy of the perishability standard, the court "deemed" the replaced tips perishable:

If it is usual for a material number of accidents to occur in carrying on the trade, if it is customary for hasty workmen to accelerate the completion of their tasks by rough handling of their blowpipes, if the blowpipes are frequently used by un-

^{208.} Id. at 886 (quoting Porter v. Farmers Supply Serv., Inc., 617 F. Supp. 1175, 1186 (D. Del. 1985)).

^{209.} See supra notes 91, 202 and accompanying text.

^{210.} See F.F. Slocomb & Co. v. A.C. Layman Mach. Co., 227 F. 94 (D. Del. 1915), aff'd, 230 F. 1021 (3d Cir. 1916). This court stated:

If the parts of the mechanism replaced by the repair parts furnished by the defendant were "substantially non-perishable" I fail to perceive why they should have been replaced, unless the owners and users of the machines desired to throw away their money in paying the defendant for repair parts of which there was no need. It is more reasonable to conclude that repair parts were bought from the defendant because the owners and users of the machines found there was need of them for the operation or efficient operation of the patented mechanism.

Id. at 98.

^{211.} Harris Calorific Co. v. Marra, 95 F.2d 870, 871 (3d Cir. 1938).

skilled welders, and if these practices result in or contribute to the destruction of the tips, then we are of the opinion that the tips may be deemed perishable through use.²¹²

Third, heavy reliance on perishability, or on spentness rhetoric generally, threatens to retard the common law evolution of repair-reconstruction standards because the standards cannot easily be divorced from the physical peculiarities of the devices at issue. Decisions become purely device-specific, leading to the emergence of a crazy quilt pattern in which "knife" cases abide by one standard, "drill" cases another, and so forth.

Finally, reliance on the inherently perishable nature of the goods as a criterion in itself would simply miss the point. In a correct analysis, perishability would be a useful factor, among many others, as a proxy for the patentee's and the purchaser's expectations.

Indeed, careful analysis of the early cases yields abundant evidence that at least some courts followed precisely this approach,²¹³ while others employed perishability as a proxy for intent. For example, in *Morgan Envelope*, the perishable nature of the toilet paper easily supported the inference that the purchaser who replaced the toilet paper was doing "precisely what the patentee intended he should do."²¹⁴ In another early case which concerned a claim directed to a coal-mining machine in combination with a protective device, the court found it "evident that the protective device was of a perishable character" because "[i]ts destruction, or that of some of its parts, *was contemplated by the appellant*."²¹⁵ Finally, the use of perishability as a proxy for intent, expressed as merely one of a number of factors that might bear on repair-reconstruction, is precisely the use of perishability urged by Justice Brennan's concurrence in *Aro I*.²¹⁶

^{212.} Id. The court's reliance on customary practice is important, because this may be the most reliable indicator of the patentee's and purchaser's expectations. See infra Parts IV-V.

^{213.} See, e.g., Goodyear Shoe Mach. Co. v. Jackson, 112 F. 146, 150 (1st Cir. 1901) (favoring a multifactor approach taking into account "all the facts and circumstances presented, with an intelligent comprehension of the scope, nature, and purpose of the patented invention, and the fair and reasonable intention of the parties"); see also Wagner Typewriter Co. v. F.S. Webster Co., 144 F. 405, 416 (C.C.S.D.N.Y. 1906) (holding that perishability is one of several factors for courts to consider in evaluating infringement).

^{214.} Morgan Envelope Co. v. Albany Perforated Wrapping Paper Co., 152 U.S. 425, 434 (1894).

^{215.} Morgan Gardner Elec. Co. v. Buettner & Shelburne Mach. Co., 203 F. 490, 493 (7th Cir. 1913) (emphasis added).

^{216.} Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 364 (1961) (Brennan, J., concurring) (listing among factors for consideration the "common sense understanding and intention of the patent owner and the buyer of the combination as to its

Another line of cases seems to employ perishability as a proxy for the patentee's intent, although perhaps less directly. One such case concerned a patent claiming a horse collar stuffing machine containing numerous parts, some of which had been replaced by the defendant.²¹⁷ The court found it significant that the replaced components "were such as the plaintiff sold or voluntarily furnished to customers for use in repairing."²¹⁸ It might seem that the evidence would be significant as an indicator of the patentee's expectations, and perhaps the court had that in mind.²¹⁹ However, it articulated its analysis in device-oriented terms: by participating in a replacement parts market, the plaintiff recognized the "perishable nature" of the components.²²⁰ This is a fine example of the roundabout analysis that the spentness rhetoric encourages, because the real significance in finding the components "perishable" was to indicate that the patentee could not complain when the defendant replaced those parts.²²¹

2. Component Useful Life and Cost.—Many courts have analyzed the repair-reconstruction problem by assessing component useful life and, on occasion, component cost. Two distinct uses of these concepts are apparent. First, a number of courts have employed the useful life concept to support a conclusion of reconstruction. They reason that the patented device becomes spent overall when a certain component reaches the end of its useful life, so that its replacement constitutes reconstruction. Other cases more closely resemble the perishability cases, in that a finding that a component has reached the end of its useful life before being replaced justifies a conclusion that the replacement is mere repair.

An example of the first approach can be found in the prototypical reconstruction case, *Cotton-Tie Co. v. Simmons*,²²² which concerned claims to a cotton bale tie that included a metallic band and a buckle

perishable components"); see also Hildreth, supra note 18, at 535 (arguing that the patentee's intent is the controlling factor underlying component spentness).

^{217.} Foglesong Mach. Co. v. J.D. Randall Co., 239 F. 893, 894-95 (6th Cir. 1917).

^{218.} Id. at 895.

^{219.} Id.; see also Aktiebolag v. E.J. Co., 121 F.3d 669, 673 (Fed. Cir. 1997) (stating that the existence of a replacement parts market is a factor in the repair-reconstruction determination, but failing to explain whether the factor is a proxy for the parties' reasonable expectations), cert. denied, 118 S. Ct. 1337 (1998).

^{220.} Foglesong Mach., 239 F. at 895.

^{221.} See also Westinghouse Elec. & Mfg. Co. v. Hesser, 131 F.2d 406, 410 (6th Cir. 1942) (placing significance on the recognition by the patentee of the "perishable nature of the parts" in finding repair and not reconstruction).

^{222. 106} U.S. 89 (1882).

capable of receiving the free end of the band.²²³ In this case, the defendants pieced together sections of old bands and attached to the refurbished band a used buckle, notwithstanding a warning against reuse that the patentee had stamped into the metal bands.²²⁴

The Court found reconstruction because a component of the patented device—specifically, the band—had reached the end of its useful life once the bales had been delivered to their destination.²²⁵ Because the functionality of the band had been exhausted, the Court determined that the patented device as a whole was spent, and that the piecing together of the bands was impermissible reconstruction.²²⁶ As the Court stated:

The band was voluntarily severed by the consumer at the cotton-mill because the tie had performed its function of confining the bale of cotton in its transit from the plantation or the press to the mill. Its capacity for use as a tie was voluntarily destroyed. As it left the bale it could not be used again as a tie. As a tie the defendants reconstructed it²²⁷

Another early case, *Davis Electrical Works v. Edison Electrical Light* $Co.,^{228}$ similarly presents an excellent example of the resort to a useful life concept as part of a reconstruction determination.²²⁹ Defendants refurbished patented Edison incandescent light bulbs²³⁰ by breaking off the tip of the glass lamp bulb, removing and replacing the burned-out filament, and then evacuating and resealing the bulb.²³¹

228. 60 F. 276 (1st Cir. 1894).

229. Id. at 279.

230. Edison's claim was broadly stated as "[t]he combination of carbon filaments with a receiver made entirely of glass, and conductors passing through the glass, and from which receiver the air is exhausted." *Id.* at 278.

231. Id. at 276.

^{223.} Id. at 92.

^{224.} See id. at 91 (noting that the warning stated "Licensed to use once only").

^{225.} Id. at 94.

^{226.} Id.

^{227.} Id. Although the Court noted that Wilson v. Simpson stood for the principle that "temporary parts wearing out in a machine might be replaced to preserve the machine," id., the Court clearly applied an overall spentness approach, noting that the device's "use as a tie was voluntarily destroyed," id. Moreover, the component spentness approach might have yielded the opposite result. The defendant might have argued that the metal band was a "temporary" part because it had a shorter useful life than the combination as a whole and that replacement of the band was therefore permissible repair. Had the Court followed this approach, the label license on the bands would have figured more prominently in the analysis. The role of the label license in Cotton-Tie has been a source of considerable debate. See Fromberg, Inc. v. Gross Mfg. Co., 328 F.2d 803, 809 (9th Cir. 1964) (stating that, "if [Cotton-Tie] still has validity," it has been given "a very narrow effect").

Had the court adhered strictly to a component perishability analysis, perhaps it would have reached the uncomfortable result that the defendant's activities amounted to permissible repair, because it would have been difficult to avoid the conclusion that the filament was a perishable component of the combination.²³² Instead, the court looked to the combination as a whole in light of an economic conception of overall spentness; the court implied that the combination was spent prior to the replacement activity, and that the replacement activity should be categorized as reconstruction because the cost of the replacement activity was far greater than the sale price of the original light bulb.²³³

This persuaded the court, speaking "in view of things as things, and of a practical understanding of reparation and reconstruction,"²³⁴ to adopt the district court's conclusion that opening the glass bulb and inserting a new filament was the act of making a new lamp, and thus reconstruction.²³⁵

A second group of cases employs the useful life concept to justify a conclusion of repair. A good early example can be found in Justice Holmes's opinion in *Heyer v. Duplicator Manufacturing Co.*²³⁶ The claim was directed to a copying machine that included a machine frame, a "duplicating band" containing a gelatine substance, and "a spool on which said duplicating band [was] wound."²³⁷ The duplicating band apparently contained enough gelatin to make about 100 copies.²³⁸ Justice Holmes found the defendant's sale of replacement duplicator bands to be permissible repair based in part upon the relatively short expected useful lifetime of the bands: "The [copying] machine lasts indefinitely, the bands are exhausted after a limited use

^{232.} The same result would have followed if the court, applying a component spentness approach, had considered the filament to have reached the end of its useful life.

^{233.} Davis, 60 F. at 281; see id. at 282 (invoking the identity of the machine standard by observing that the combination without a filament was not a lamp at all, but a mere manufacturer's blank).

^{234.} Id.; see also Monroe Auto Equip. Co. v. Precision Rebuilders, Inc., 229 F. Supp. 347, 352 (D. Kan. 1964) (finding impermissible reconstruction because the seal that was replaced "was intended to last the life of the shock absorber . . . and was not merely a temporary part; and [because] at the time the used shock absorbers were processed, they had fulfilled their intended purpose and had been substantially destroyed as intended, and were considered junk"); Champion Spark Plug Co. v. Emener, 16 F. Supp. 816, 821 (E.D. Mich. 1936) (distinguishing permissible reconditioning of used spark plugs from impermissible refabrication of the "functional properties" of spark plugs that had "fully performed their purpose and had no further value except as scrap").

^{235.} Davis, 60 F. at 282.

^{236. 263} U.S. 100 (1923).

^{237.} Id. at 101 n.1.

^{238.} Id. at 101.

and manifestly must be replaced."²³⁹ In addition, Justice Holmes observed that while the copying machine was "costly," the duplicator bands were "cheap."²⁴⁰ This factor, too, clearly contributed to the Court's conclusion that the defendant was engaged in mere permissible repair.²⁴¹

Courts have employed a cost-of-component criterion in the same fashion,²⁴² but the current status of the cost-of-component factor is uncertain. The *Aro I* opinion arguably rejects it as one of the improper factors considered by the lower courts.²⁴³ However, this factor finds at least some limited support among Federal Circuit cases.²⁴⁴

Superficially, the useful life concept seems attractive, whether used as part of an "overall spentness" approach to find reconstruction, or as part of a component spentness approach to find repair. Useful life (and, relatedly, component cost) would seem to be readily quantifiable, and might be invested with a bit more precision than uncertain notions of "perishability."²⁴⁵ Whether the case law supports this con-

240. Id.

241. Id.

242. That is, where the cost of the replaced component is low relative to the cost of the entire combination, the court is more likely to find repair. See, e.g., Electric Auto-Lite Co. v. P. & D. Mfg. Co., 109 F.2d 566, 567 (2d Cir. 1940) (per curiam) (asserting that permissible repair depends in part on whether "it is cheaper to insert a new part than to cobble the old one back into service").

243. Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 345 (1961) ("No element, not itself separately patented, that constitutes one of the elements of a combination patent is entitled to patent monopoly, however essential it may be to the patented combination and no matter how costly or difficult replacement may be." (emphasis added)).

244. See, e.g., Porter v. Farmers Supply Serv., Inc., 790 F.2d 882, 885 (Fed. Cir. 1986) (acknowledging that the district court took into account the fact that the replaced components were inexpensive compared to the cost of the patented machine). Other cases have proposed to consider the cost of the component as a way of determining whether the overall combination should be deemed spent. See infra Part II.D.

245. See, e.g., F.F. Slocomb & Co. v. A.C. Layman Mach. Co., 227 F. 94, 98 (D. Del. 1915) (criticizing the "perishability" rhetoric, and embracing an analysis that blended useful life and component cost), aff'd, 230 F. 1021 (3d Cir. 1916). The court stated:

If, by way of illustration, patented mechanism be composed of various parts and elements the most expensive of which have an average life of twenty years, and

^{239.} Id. at 102 (citing Wilson v. Simpson, 50 U.S. (9 How.) 109, 126 (1850)). Like the cases that adopt the perishability rhetoric, this case places considerable importance on the spentness of a component. It is important to recognize that this analysis differs fundamentally from an analysis of the overall spentness of the combination. The former analysis assesses spentness of the component and finds repair where the replaced component is truly spent at the time of the replacement activity. The latter might also involve an assessment of the spentness of the component, but only as a way of determining whether the overall combination was spent. Accordingly, under the latter analysis, a finding that the component was truly spent at the time of the replacement activity might lead to the conclusion that the overall combination was rendered incomplete and that replacing the spent component would be tantamount to remaking the combination.

cept of useful life depends upon whether Aro I strictly forbids resort to a multiple-factor inquiry. The Aro I majority opinion does not explicitly preclude the analysis of useful life, and the concurring opinions provide contradictory signals.²⁴⁶

In practice, however, the useful life/component cost standard has given rise to numerous dilemmas. One difficulty, of course, is that the assessment of useful life (or of component cost) might conflict with the assessments of component importance or inventiveness. Even worse, assessments of useful life and of component cost might conflict with each other. For example, in *Micromatic Hone*, the patentee contended that the replacement of the abrasive stone was reconstruction because the stone was a relatively expensive component compared to the cost of the overall combination.²⁴⁷ Although correct, this contention conflicted with the court's assessment of useful life, and of the importance and inventiveness contributed to the overall combination by another element of the combination—the backing member or "stone holder."²⁴⁸ Unable to resolve this conflict, the court discarded the cost-of-component standard:

Obviously, the dominant element in the patent was in the improved stone holder, regardless of its low cost of manufacture. It also seems clear to us that while its low cost of manufacture warranted a purchaser in throwing it away after the initial stone was worn down, rather than returning it for a refill when the purchaser did not care to be bothered with such details, nevertheless, the metal stone holder was not expended or destroyed, but, on the contrary, had a continued useful life and was available to the purchaser of it for refilling if he desired to do so Under the circumstances, it does

Id.

other parts or features of comparatively trifling cost are subjected in the operation of the mechanism to such wear as to require renewal or replacement within a period of a few months, or of a year or two, it would seem reasonable and sensible to treat such renewal or replacement as involving repairs in contradistinction to reconstruction.

^{246.} Compare Aro I, 365 U.S. at 363 (Brennan, J., concurring) ("Appropriately to be considered are the life of the part replaced in relation to the useful life of the whole combination.") with id. at 357 (Black J., concurring) ("[T]here should be no attempt to decide whether there is a making by comparing the time that the different elements of such a patent normally will exist if let alone.").

^{247.} Micromatic Hone Corp. v. Mid-West Abrasive Co., 177 F.2d 934, 937 (6th Cir. 1949) (stating the patentee's contention that "the cost of the metal backing member is materially less than the cost of the stone").

^{248.} Id.

not follow that the [useful] life of the metal stone holder is the same as the life of the abrasive stone.²⁴⁹

Another example of this dilemma is Landis Machine Co. v. Chaso Tool Co.²⁵⁰ The patented combination concerned die heads fitted with "chasers," which were cutters for cutting threads.²⁵¹ The defendants sold replacement chasers.²⁵² The chasers were relatively inexpensive compared to the cost of the overall combination—about nine dollars for the chasers compared to between ninety dollars to \$350 for the overall combination, depending on the patentee's prices.²⁵³ While this factor suggested that replacement of the chasers was permissible repair, the evidence also seemed to indicate that customers replaced the chasers before they were truly worn out; the chasers could, apparently, be ground and sharpened for additional use. This fact suggested a finding of reconstruction.²⁵⁴

The court addressed the conflict by discarding the useful life criterion.²⁵⁵ The court stated that it was "unimportant that the parts replaced would, if properly used, last as long as the patented heads."²⁵⁶ Instead, the court focused not only on the relatively low cost of the replaced component, but also on the patentee's own business practices.²⁵⁷ The patentee had adopted the age-old tactic of selling the die heads for a reduced price, hoping to reap a profit by controlling the market for replacement chasers.²⁵⁸ This practice, according to both the district court and the circuit court, confirmed that the patentee intended the chasers to be "perishable," and justified the conclusion of permissible repair.²⁵⁹

Another more serious problem that has arisen in a number of cases concerns the fact that, like the perishability standard, the useful life/cost standard has proved underinclusive. This problem arises in cases in which the replaced component has not reached the end of its useful life when it is replaced (which suggests reconstruction), yet the court seeks a way to justify the replacement activity as permissible repair. For example, early courts had difficulty determining whether a

249. Id.
250. 141 F.2d 800 (6th Cir. 1944).
251. Id. at 802.
252. Id.
253. Id. at 803.
254. Id. at 804.
255. Id.
256. Id.
257. Id. at 803.
258. Id.
258. Id.
259. Id.

component that was broken through careless handling (as distinct from becoming worn in the course of careful use) had reached the end of its useful life, so that replacement would be justified as permissible repair.²⁶⁰

Another controversial example concerns replacement activities in which components of the patented device are modified for purposes of achieving improved performance, even where those components are not necessarily spent. This scenario arose in an early case involving a patented candy wrapping machine whose main components were a cutter table and a wrapping wheel.²⁶¹ The defendant modified a patented machine so that it could wrap candy of a different size, which necessitated changes to the sizes of the pockets in the wrapping wheel and the arrangement of the cutting knives on the cutting table, among others.²⁶² Obviously, useful life remained in the components of the patented device, but the court nevertheless found reconstruction.²⁶³

The Supreme Court took a different approach in Wilbur-Ellis Co. v. Kuther.²⁶⁴ The defendant purchased secondhand some corroded, inoperable fish canning machines that had been designed to pack one-pound cans, but then cleaned and modified them to handle smaller cans.²⁶⁵ The modifications entailed grinding down certain components and fitting inserts to others, thus affecting six of the thirty-five components of the machine.²⁶⁶ The appellate court found reconstruction under the authority of *George Close*,²⁶⁷ but the Supreme Court reversed.²⁶⁸ In a remarkably opaque opinion that seems to rest on a notion of component inventiveness,²⁶⁹ the Court refused to craft an absolute rule that improvements to purchased patented goods con-

264. 377 U.S. 422 (1964).

265. Id. at 423.

^{260.} See, e.g., Harris Calorific Co. v. Marra, 95 F.2d 870, 871 (3d Cir. 1938) (finding that components "may be deemed perishable through use," whether the use is "careful and skillful" or "rough"). See supra notes 211-212 and accompanying text.

^{261.} Ideal Wrapping Mach. Co. v. George Close Co., 23 F.2d 848, 849 (D. Mass.), aff'd, 29 F.2d 533 (1st Cir. 1928).

^{262.} Id.

^{263.} See id. at 850 (employing the identity of machine standard); see also Miller Hatcheries, Inc. v. Buckeye Incubator Co., 41 F.2d 619, 622 (8th Cir. 1930) (stating that modifications to incubator trays to enable them to increase their capacities constituted reconstruction because they altered the identity of the machine).

^{266.} Id.; see also Leuschner v. Kuther, 314 F.2d 71, 72-73 (9th Cir. 1963) (discussing the facts of the case at the appellate level), rev'd sub nom. Wilbur-Ellis Co. v. Kuther, 377 U.S. 422 (1964).

^{267.} Leuschner, 314 F.2d at 74.

^{268.} Wilbur-Ellis, 377 U.S. at 425.

^{269.} See supra Part II.B (discussing component inventiveness).

stitute reconstruction.²⁷⁰ The Court also employed the useful life concept. The machines at issue "had years of usefulness remaining though they needed cleaning and repair."²⁷¹ The Court refrained from characterizing the defendant's activities as true repair, but instead stated that "in adapting the old machines to a related use [they] were doing more than repair in the customary sense; but what they did was kin to repair for it bore on the useful capacity of the old combination, on which the royalty had been paid."²⁷²

On an intuitive level, the finding in Wilbur-Ellis of permissible repair seems correct, yet this case demonstrates that the notion of useful life is not as predictable as it would initially appear to be. Subsequent decisions building on Wilbur-Ellis are to the same effect. For example, in the Federal Circuit's recent decision of Hewlett-Packard Co. v. Repeat-O-Type Stencil Manufacturing Co., 273 the court relied upon the reasoning in Wilbur-Ellis to conclude that defendant's modifications to the plaintiff's patented ink cartridges constituted permissible repair.²⁷⁴ The defendant purchased unused, filled ink cartridges from the patentee, modified a cap on the cartridge so that the cartridge would be refillable by end users, and sold the cartridges as "refillable" cartridges.²⁷⁵ Here again, the case is difficult when evaluated under the useful life criterion. On the one hand, when the ink is exhausted, the cartridge is rendered nonfunctional for its intended purposes. On the other hand, useful life remains in the cartridge itself. The court determined that useful life was defined by the life of the entirety of the cartridge, not merely by the duration of the ink supply,²⁷⁶ on the basis of Wilbur-Ellis, in which the purchase price of the patented item included a royalty payment intended to extend for the full useful life of the entire patented combination.²⁷⁷ It is worth asking, however, whether the court really reached this result by strict consideration of useful life. It seems at least equally plausible that the court was really analyzing the parties' expectations, although it stoutly denied that the patentee's intentions informed the analysis.²⁷⁸

274. Id. at 1452-53.

^{270.} Wilbur-Ellis, 377 U.S. at 425.

^{271.} Id. at 424.

^{272.} Id. at 425.

^{273. 123} F.3d 1445 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1304 (1998).

^{275.} Id. at 1448.

^{276.} Id. at 1453.

^{277.} Id. at 1452 (citing Wilbur Ellis Co., 377 U.S. 422).

^{278.} See infra Part III (exploring the role of intent in repair-reconstruction analysis in this case and others); see also Electric Auto-Lite Co. v. P. & D. Mfg. Co., 109 F.2d 566, 567 (2d Cir. 1940) (per curiam) (linking useful life to intent by stating that "[t]he theory on which the repair of a patented article is allowed at all is that the patentee intends the buyer

In a third set of recent cases, courts have seriously mangled the concept of useful life by turning to a notion of "effective spentness" to explain why the replacement of a part that retains additional useful life is nevertheless permissible repair. In Everpure, Inc. v. Cuno, Inc., 279 the claims were directed to a filter assembly comprised of a head and a filter cartridge, which featured a neck designed for insertion into the head.²⁸⁰ A filter was sealed into the cartridge.²⁸¹ The defendant, Cuno, sold cartridges fitted with filters, and also sold an adapter that would allow purchasers of Cuno cartridges to attach them to Everpure heads.282

Analyzed by resort to a device-oriented standard such as component useful life, this case presents difficulties on multiple fronts. The useful life of the filter is relatively short, but the useful life of the cartridge itself is much longer. Accordingly, the useful life standard cannot resolve the repair-reconstruction problem. Moreover, the adapter would seem to defy analysis altogether under the useful life standard.

Seeming to understand this dilemma, the court turned unhesitatingly to a consideration of the patentee's business practices, just as the Landis Machine court had done.²⁸³ Rather than attempt to ascribe a useful life or a degree of perishability to the composite filter-and-cartridge structure, the court considered the design as indicative of the patentee's deliberate business decision to force its customers to replace the entire cartridge, including the filter, rather than the filter alone.²⁸⁴ This theory was confirmed by the patentee's instruction to customers to "[s]ervice with a new cartridge . . . at least once a year," which accompanied the directions for changing the cartridge.²⁸⁵

The court could have advanced matters by pointing out its need to depart from the useful life standard to render its decision. Instead, the court framed its holding in the language of component spentness: "Thus Everpure has designed and conducts a business scenario in which the entire cartridge, including its sealed-in neck and filter, is

285. Id.

to have a longer use of it than the life of the shortest-lived part" (citing Wilson v. Simpson, 50 U.S. (9 How.) 109, 126 (1850); Heyer v. Duplicator Mfg. Co., 263 U.S. 100 (1923))). 279. 875 F.2d 300 (Fed. Cir. 1989).

^{280.} Id. at 301; see id. at 304-05 (Newman, J., dissenting) (reciting claim four of the patent-in-suit).

^{281.} Everpure, 875 F.2d at 301.

^{282.} Id.

^{283.} Id. at 303; see supra notes 257-259 and accompanying text (discussing the Landis Machine court's attention to the patentee's business practices).

^{284.} Everpure, 875 F.2d at 303 (stating that Everpure "is 'hoist on its own petard," because "Everpure and Everpure alone made the business decision to sell disposable cartridges and to render its filter irreplaceable without replacement of the entire cartridge").

spent when the filter wears out."²⁸⁶ Instead of admitting the limitations of the spentness rubric, the court extended it beyond any reference to physical facts.²⁸⁷

Later cases have continued to cling to the spentness rhetoric, further extending this notion of "effective" spentness. These cases concerned medical devices that included components subject to contamination in ordinary use. In *Sage Products*,²⁸⁸ the claims were directed to a "sharps" disposal system that included an outer enclosure and a removable inner container for receiving sharp instruments used in medical procedures.²⁸⁹ There was abundant evidence that the patentee encouraged customers to dispose of the inner container when it became filled with sharps: the patent specification as well as the patentee's sales literature recommended disposal;²⁹⁰ the inner container itself was marked with a warning;²⁹¹ and the patentee had evidently refused to deal with hospitals suspected of having reused the containers.²⁹²

An analysis in terms of component spentness—and particularly in terms of component useful life—would seem to lead straightforwardly to a conclusion that the replacement of the inner container constituted permissible repair. The patentee's own statements clearly indicated that the patentee believed that the inner container's useful life would extend only until the container was filled, while the outer container could last indefinitely.²⁹³

Yet the useful life standard left open another avenue of attack for the patentee. Sage Products pointed out that the useful life of the inner container did not end when the container was full of sharps because it was physically possible (although apparently difficult and presumably risky) to clean and reuse the inner container.²⁹⁴ This seems a plausible argument, and illustrates once again how easily the useful life standard can be manipulated, yielding entirely different

290. Id. at 1577.

^{286.} Id.

^{287.} See id. at 305-06 (Newman, J., dissenting) (rejecting any notion of nonphysical "effective" spentness and arguing that replacement of unworn elements amounted to impermissible reconstruction).

^{288.} Sage Prods., Inc. v. Devon Indus., Inc., 45 F.3d 1575 (Fed. Cir. 1995).

^{289.} Id. at 1576-77.

^{291.} Id. The warning declared: "BIOHAZARD—SINGLE USE ONLY." Id.; see supra note 224 and accompanying text (discussing Cotton-Tie, which involved a similar label on the patented goods at issue in which the Court concluded that the defendant reconstructed the patented goods).

^{292.} Sage Products, 45 F.3d at 1577.

^{293.} Id.

^{294.} Id. at 1578.

outcomes depending upon whether the court chooses to characterize useful life in terms of safe practices of physical capacity.

Unfortunately, the court persisted in attempting to adapt the component spentness rationale. The court dismissed as insignificant the fact that it might be physically possible to clean and reuse the inner container; prudence (and the patentee's own admonitions) counseled otherwise.²⁹⁵ To square this prudential concern with the notion of component spentness, the court reached for a notion of "effective" spentness: "This court has never said that an element is spent only when it is impossible to reuse it. Like the district court, we believe that when it is neither practical nor feasible to continue using an element that is intended to be replaced, that element is effectively spent."²⁹⁶

"Effective" spentness reared its head again in a case factually similar to Sage Products. In Kendall Co. v. Progressive Medical Technology, Inc.,²⁹⁷ the claims concerned a medical device used for applying pressure to a patient's limbs.²⁹⁸ The device included a pump, pressure sleeves (designed to be wrapped around the patient's limbs), and tubes connecting the pump and the sleeves.²⁹⁹ The patentee instructed users, through a warning label on its packaging,³⁰⁰ against reusing the sleeves, because the sleeves could become contaminated through direct contact with the patient's skin.³⁰¹ The patentee objected to the defendants' sale of replacement sleeves on the ground that it was physically possible to use the sleeves for about three years or more before they became worn out.³⁰²

Unfortunately, rather than capitalize on the opportunity to explain the limitations of the component spentness approach to permissible repair, the court simply viewed this case as a rerun of *Sage Products.*³⁰³ Indeed, perhaps without realizing it, the court spoke in

301. Id.

302. Id.

303. Although the patentee attempted to distinguish Sage Products by emphasizing that the patent specification in that case had expressly instructed users to dispose of the inner container, while its own patent specification was silent on whether disposing of the sleeve after a single use was prudent, the court rejected this hair-splitting distinction: "A purchaser may repair or replace any unpatented component that wears out or otherwise be-

^{295.} Id. ("It might be prudent to replace an expendable element before it has been completely exhausted.").

^{296.} Id. (citing Everpure, Inc. v. Cuno, Inc., 875 F.2d 300, 303 (Fed. Cir. 1989)).

^{297. 85} F.3d 1570 (Fed. Cir. 1996).

^{298.} Id. at 1571.

^{299.} Id. at 1571-72.

^{300.} Like the label at issue in Sage Products, this label warned: "FOR SINGLE PATIENT USE ONLY. DO NOT REUSE." Id. at 1572.

terms that seem impossible to square with a notion of component spentness:

[A]s long as reconstruction does not occur or a contract is not violated, nothing in the law prevents a purchaser of a device from prematurely repairing it or replacing an unpatented component. Premature repair is the business of the purchaser of the product, who owns it, rather than the patentee, who sold it.³⁰⁴

The lesson to be drawn from these cases is that the useful life criterion, like other spentness criteria, seems most productive when it serves the modest role of indicating the patentee's and purchaser's intentions. In retrospect, the underlying concern with reasonable expectations can be glimpsed in a number of the more satisfactory useful life cases. For example, in Heyer v. Duplicator Manufacturing Co., 305 Justice Holmes made this plain: "The owner when he bought one of these machines had a right to suppose that he was free to maintain it in use, without the further consent of the seller, for more than the sixty days in which the present gelatine might be used up."306 Justice Holmes seemed to recognize that his analysis differed fundamentally from an assessment of inherent physical and functional characteristics of a patented device. His analysis was a filter for intent-an analysis that sounded, perhaps, in contract. As Justice Holmes stated, "We have only to establish the construction of a bargain on principles of common sense applied to the specific facts."307

Other courts that have applied *Heyer* seemed to understand that its analysis really centered on intent and only indirectly dealt with the characteristics of the device.³⁰⁸ In *El Dorado Foundry, Machine & Supply Co. v. Fluid Packed Pump Co.*,³⁰⁹ the patent claimed a pump for use in connection with an oil rig, and the defendant supplied certain re-

309. 81 F.2d 782 (8th Cir. 1936).

comes 'spent,' whether or not the patentee believed at the time the patent application was filed that it would be necessary to do so." *Id.* at 1575.

^{304.} Id. It is difficult to know what to make of this announcement because it presupposes the conclusion that "reconstruction does not occur."

^{305. 263} U.S. 100 (1923); see supra notes 236-241 and accompanying text.

^{306.} Heyer, 263 U.S. at 101-02.

^{307.} Id. at 102 (emphasis added).

^{308.} At least one case that preceded *Heyer* similarly concentrated on intent. See Farrington v. Board of Water Comm'rs, 8 F. Cas. 1086, 1088 (C.C.E.D. Mich. 1870) (No. 4687) (arguing that, under Simpson, permissible repair depends on whether the parts were temporary in relation to the whole machine, and that this, in turn, requires that the nature of the parts "must have been so understood by the inventor in selling and the purchaser in buying the machine").

placement parts for the pump.³¹⁰ Drawing heavily from *Heyer*, the *El Dorado* court found permissible repair because the parts of the pumps replaced by the defendant were those that wore out quickly, *and* because the patentee contemplated that this would occur.³¹¹ The decision of the Tenth Circuit in *Williams v. Hughes Tool Co.*³¹² reflects a similar interpretation of *Heyer.*³¹³ Collectively, these cases suggest that useful life is a helpful factor in distinguishing repair from reconstruction, especially when it is focused on eliciting the underlying intentions of the parties.

D. The Dominance Test

A final "spentness" approach to the repair-reconstruction dichotomy is the "dominance" of components test. The dominance test as it appears in cases such as *Automotive Parts Co. v. Wisconsin Axle Co.*³¹⁴ can be viewed as an early effort to implement the overall spentness standard. The dominance test stresses "the relation of the two classes of parts—those supplied and those remaining in the original construction—to the patented unit."³¹⁵ In making this comparison:

if the new parts so dominate the structural substance of the whole as to justify the conclusion that it has been made anew, there is a rebuilding or reconstruction; and conversely, where the original parts, after replacement, are so large a part of the whole structural substance as to preponderate over the new, there has not been a reconstruction but only repair.³¹⁶

^{310.} Id. at 783-84. The patent included claims to the pump itself and to a plunger subassembly for the pump, but it appeared that the defendant did not supply replacement parts that would allow reconstruction of the plunger assembly. Id. at 783.

^{311.} Id. at 785-86. The patentee's contemplation of this result was evidenced by statements in the patentee's advertisements, which specified in some detail "[w]hen to [r]eplace [t]ubes." Id.

^{312. 186} F.2d 278 (10th Cir. 1950).

^{313.} The court stated:

Where a patented device of long life has among its integrated elements a part which, as a result of use of the device, quickly wears out and, therefore, is temporary in duration, and the patentee licenses the use of the device, it will be presumed that the patentee and the licensee contemplated and intended that such temporary part would be replaced by the licensee and that replacing it would constitute permissible repair and not reconstruction amounting to infringement of the patent.

Id. at 282.

^{314. 81} F.2d 125 (6th Cir. 1935).
315. *Id.* at 127.
316. *Id.*

The court recognized that its test would entail more than mere parts counting, but did not make clear what other considerations (for example, the importance of the component in overall combination functionality, or the relative cost of the component) would be germane.³¹⁷ Moreover, because the court remanded the case to be decided under the test it had set forth, it did not have the occasion to apply this test.³¹⁸

Courts were not quick to embrace the dominance test.³¹⁹ Indeed, after *Aro I*'s rejection of the multifactor test and apparent rejection of approaches to repair-reconstruction that focused on individual components of the overall combination, some courts claimed that the dominance test had been overruled. For example, in *National-Standard Co. v. UOP, Inc.*,³²⁰ the defendant sold replacement sieves for plaintiff's patented "apparatus for classifying fine-grain solids in wet conditions," used to draw off solid particles from coal slurries.³²¹ After observing that the sieve was merely "one of three elements in the patented combination,"³²² the court rejected the argument that the replacement sieve so dominated the overall combination as to justify a conclusion of reconstruction.³²³ Finally, the court noted that *Aro I* had rejected similar arguments.³²⁴

319. Indeed, only a single case preceding the Federal Circuit era can be found in which a court relied even in part on the dominance test. See Standard Stoker Co. v. Berkley Mach. Works & Foundry Co., 29 F. Supp. 349, 373-75 (E.D. Va. 1938) (citing Automotive Parts for the dominance test), aff'd, 106 F.2d 475 (4th Cir. 1939).

320. 616 F.2d 339 (7th Cir. 1980) (per curiam).

- 322. Id. at 340.
- 323. Id. at 340-41.

324. Id. at 341. The plaintiff in this case, relying on Automotive Parts, had argued that the sieve was a dominant component. Id. at 340. While this argument seems similar to the "heart of the invention" test rejected by Aro I, see supra text accompanying note 162, it differs because the dominance test, presumably, could take into account considerations such as the number of replaced components (as a percentage of the overall combination) and their cost and functional importance. See also Porter v. Farmers Supply Serv., Inc., 790 F.2d 882, 886 n.5 (Fed. Cir. 1986) (casting doubt on the dominance test in light of Aro I). But see Wilbur-Ellis Co. v. Kuther, 377 U.S. 422, 424 (1964) (arguably invoking the dominance test by including in its analysis the fact that "six of the 35 elements of the combination patent were resized or relocated"); Comment, Repair and Reconstruction of Patented Combinations, 32 U. CHI. L. REV. 353, 359 (1965) (suggesting that Aro I might be interpreted as adopting a dominance approach).

^{317.} Cf. id. (noting that the difficulties of the dominance test spring from "the necessity of determining which of the two classes of parts, those supplied or the remaining original parts, dominates the structure as a whole").

^{318.} Id. at 128; see Timken-Detroit Axle Co. v. Automotive Parts Co., 93 F.2d 76, 76 (6th Cir. 1937) (affirming the district court's finding upon remand of permissible repair on the ground that the replacement parts at issue (a gear pair and a half-axle) did not so dominate the structure of the overall combination (an axle) as to make it a new structure).

^{321.} Id. at 339-40.

Notwithstanding this interpretation of Aro I, subsequent courts, including the Federal Circuit, have continued to wrestle with the implications of a "dominance" approach to overall spentness. One case that goes far towards demonstrating the ultimate futility of the dominance analysis is the Court of Claims' decision in *General Electric Co. v.* United States.³²⁵ The case involved the refurbishing of patented gun mounts used on Navy vessels.³²⁶ The gun mounts were removed from their vessels and shipped to a Navy-operated replacement facility, where the components were disassembled and sent to separate work stations for inspection, cleaning, and replacement, if necessary.³²⁷ However, when the components were reassembled, there was no attempt to reunite the original components of any given gun mount, nor was there any effort to ensure that a given gun mount ³²⁸

Both the trial judge and the appellate tribunal applied a variety of spentness analyses, all to little effect.³²⁹ The trial judge focused on useful life, reasoned that the useful life of the gun mounts was voluntarily ended—rendering the gun mounts "spent" overall—when the Navy disassembled the gun mounts, and concluded that the Navy had engaged in impermissible reconstruction.³³⁰ The appellate tribunal reversed,³³¹ basing its analysis on a variation on the dominance approach.³³² Attempting to determine whether the new components dominated the original components for any given gun mount would have been impossible; no individual gun mount maintained its identity during the process.³³³ Instead, the court sidestepped the riddle of the apocryphal axe and resorted to averages: On average, of seventeen components in the gun mount, the patentee had supplied spare parts for at least fifteen, suggesting that in any average gun mount, the

^{325. 572} F.2d 745 (Ct. Cl. 1978) (en banc) (per curiam).

^{326.} Id. at 779-82.

^{327.} Id. at 780. Some of the replacement parts came from gun mounts that had been scrapped and cannibalized for a spare parts pool. Id.

^{328.} Id.

^{329.} See id. at 781-82 (applying a dominance analysis); General Elec. Co. v. United States, 191 U.S.P.Q. (BNA) 594, 621 (Ct. Cl. 1976) (employing a useful life analysis), modified, 572 F.2d 745 (Ct. Cl. 1978) (en banc) (per curiam).

^{330.} General Electric, 191 U.S.P.Q. (BNA) at 621.

^{331.} General Electric, 572 F.2d at 786 (dismissing the petition).

^{332.} The court also employed a fractional cost approach. The court attributed significance to the fact that the refurbishing activity cost, on average, only about \$100,000, while the value of the overall combination was roughly \$1 million. *Id.* at 782.

^{333.} Id. at 780.

dominant components would be authorized components from the patentee, and that the overhauling was a permissible repair.³³⁴

One might reasonably ask whether parts counting, or even the contrived average parts counting of the variety employed in *General Electric*, is an efficient means for determining the scope of the purchaser's permissible repair right. Dominance as applied in *General Electric* is cumbersome and ultimately highly artificial. And to what end does it really go? If the court is attempting to preserve the purchaser's reasonable expectations in use of the patented goods, does parts counting really serve this end? Even if it does, are there not more direct ways to get at the purchaser's reasonable expectations?

These questions remain open in Federal Circuit jurisprudence. The Federal Circuit relied on *General Electric* to avoid another potential confrontation with the apocryphal axe in *Dana Corp. v. American Precision Co.*³³⁵ The patent concerned clutch assemblies, and, as in *General Electric*, the replacement activities entailed production line disassembly and rebuilding of used clutches.³³⁶ The Federal Circuit, like its predecessor court, rejected the argument that the clutches became spent upon being disassembled.³³⁷

The patentee in *Dana* also proposed an "economic" approach to the dominance test.³³⁸ This approach called for the court to find overall spentness "when a user, making an objective economic decision, would replace the product rather than repair it, because it has no value to the owner except as scrap."³³⁹ While the *Dana* patentee suggested that the economic analysis would yield more predictable outcomes in repair-reconstruction cases, the Federal Circuit was not persuaded to adopt the approach.³⁴⁰ First, the court seemed unconvinced that the analysis would indeed enhance predictability.³⁴¹ Sec-

339. Id. Presumably, this economic evaluation could involve a consideration of the value of the replaced parts as compared to the value of the overall combination.

340. See id. (acknowledging that this approach was interesting, but rejecting it on the ground that it entailed as much uncertainty as existing case law).

341. Id. The court stated that truck owners might decide to replace the patented clutch assembly, rather than repairing it, merely because the replacement might more quickly enable the truck driver to return to the road. Id. That decision, according to the court, "rests little, if at all, on the owner's objective view of the defective clutch's condition." Id. But this seems to miss the point of substituting an economic analysis, which is to allow the

^{334.} Id. at 783-84.

^{335. 827} F.2d 755 (Fed. Cir. 1987).

^{336.} Id. at 756-57.

^{337.} Id. at 760. Although the court did not make it clear, a dominance approach of the General Electric type apparently would have revealed that in an average rebuilt clutch assembly, only four parts out of many parts were new—a fact similar to those in General Electric. See id. at 757.

^{338.} Id. at 760.

ond, the court seemed to think that the analysis departed from the "guidelines laid down in *Aro I* and its progeny," which, of course, the court considered itself bound to follow.³⁴²

The "economic" approach to overall spentness fared no better in a British case, *Solar Thomson Engineering Co. v. Barton.*³⁴³ The court expressly rejected proposed alternative tests that would have called for a comparison of (1) "the relative values of what has been replaced and the rest of the patented article" or (2) "the relative cost of carrying out the alleged repair and of making the complete article anew."³⁴⁴ Quite sensibly, the court reasoned that a purchaser should be entitled to carry out repair activities whether or not they are economical.³⁴⁵ Having rejected the proffered test, however, the court could do little more in formulating its own test than to restate the broad inquiry: "The cardinal question must be whether what has been done can fairly be termed a repair, having regard to the nature of the patented article."³⁴⁶

The most thorough exploration of the dominance approachand, likewise, the most dramatic illustration of the ultimate impracticability of reliance on spentness standards—appears in the district

342. Id. It is difficult to see why economic analysis should stand on any shakier ground than does the parts-counting approach to dominance. Both the economic analysis and the parts counting are ways to assess overall spentness, just as Aro I requires.

343. [1977] R.P.C. 537, 554-57 (1977).

344. Id. at 555.

345. Id. The court also rejected a component importance criterion, stating that the purchaser should have the right to repair whether or not the replaced part "is crucial to the function of the patented article." Id.

346. Id. Yet another proposal that is based upon an economic calculation-although not one devoted to a notion of component dominance-would provide that a replacement activity constitutes reconstruction only "when the patentee could reasonably have made the sale of a whole unit if no parts were available." Comment, Combination Patents: The Right to Prohibit Sales of Replacement Parts, 70 YALE L.J. 649, 660 (1965). This reasoning is derived from a consideration of Mercoid Corp. v. Mid-Continent Investment Co., 320 U.S. 661 (1944), and the language of 35 U.S.C. § 271(d) (the patent misuse provision), and their effect on the patentee's ability to control the replacement part market through express license restrictions. Comment, supra, at 658-60. But this preoccupation with Mid-Continent and patent misuse in the repair-reconstruction context seems a bit like allowing the tail to wag the dog. This test, like so many others used in this area, works best if considered within the context of the parties' probable intentions. If the purchaser would reasonably purchase a new unit rather than attempt to repair the old when a component breaks or wears out, then the purchase price of the original goods presumably reflected that understanding, and the patentee will be undercompensated if the purchaser is entitled to extend the life of the original goods without payment to the patentee.

court to escape the confines of a strictly device-oriented approach to spentness. If both the patent owner and the customer would reasonably have expected this pattern of replacement, then it presumably would be reflected in the price of the patented product and a court would be fully justified in concluding that the implied license to repair did not extend to clutch replacement.

court and Federal Circuit decisions in *FMC Corp. v. Up-Right, Inc.*³⁴⁷ FMC, which held a patent on a grape picking head, sued Up-Right, which sold a so-called "Rotary Pulsator" grape picking head in competition with FMC.³⁴⁸ In prior litigation, FMC prevailed and the parties settled.³⁴⁹ Consistent with the settlement agreement, Up-Right ceased its sales of Rotary Pulsator heads, but Up-Right continued to sell replacement parts to customers who previously had purchased Rotary Pulsator heads.³⁵⁰ FMC alleged that the customers were engaging in impermissible reconstruction; Up-Right countered that the customers were permissibly repairing.³⁵¹

Reviewing the law of repair and reconstruction through Dana,³⁵² the *FMC* district court declared that Dana had rejected the "economic analysis" for overall spentness and had commanded instead that the dominance test be used.³⁵³

The patent owner FMC recognized that if the court applied the dominance test on a straightforward parts-counting basis, its case for dominance would be weak, because Up-Right had never replaced a majority of the parts in any given head in the course of any individual servicing.³⁵⁴ Attempting to circumvent this problem, FMC argued that the court was entitled to consider the aggregation of replacement activities occurring over time for each Rotary Pulsator head.³⁵⁵ The facts showed that, as the customer periodically replaced parts, the total number of replacement parts would increase relative to the total number of parts, so that eventually the number of replacement parts

353. FMC, 816 F. Supp. at 1463. The court noted:

Dana seems to hold that the "spentness" of a product is to be determined by "examination of its physical characteristics," rather than consideration of the owner's subjective evaluation of value.

Thus, determination of whether the original patented combination has become spent must be made by reference to the physical condition of the combination taken as a whole. This was the approach of the court in *Automotive Parts Co.* v. Wisconsin Axle Co. . . .

Id. While the District Court's characterization of Dana may be sound, it is not at all clear that the Dana court accepted the Automotive Parts dominance test. See Dana, 827 F.2d at 758-60 (omitting any reference to Automotive Parts or the test articulated therein).

^{347. 21} F.3d 1073 (Fed. Cir. 1994); 816 F. Supp. 1455 (N.D. Cal. 1993).

^{348.} FMC, 816 F. Supp. at 1457.

^{349.} Id.

^{350.} Id. at 1458.

^{351.} Id.

^{352.} Dana Corp. v. American Precision Co., 827 F.2d 755 (Fed. Cir. 1987).

^{354.} FMC, 816 F. Supp. at 1464. 355. Id.

would exceed fifty percent in satisfaction of the dominance criterion.³⁵⁶

The argument exposes a fundamental weakness in the dominance approach to overall spentness. As the district court recognized, if the dominance approach ignored the aggregated effect of sequential replacement activities, an owner could extend the life of a patented combination indefinitely without ever "reconstructing" the combination; he would need merely to be certain that no more than half the parts were replaced during any given servicing.³⁵⁷ Every part in the device ultimately could be replaced without a finding of reconstruction. This presented the philosophical riddle of the apocryphal axe: "At some point, the overhauled device will resemble the apocryphal axe, of which the owner brags: 'This is my great-grandfather's original axe, although the handle has been replaced five times, and the head twice.'"³⁵⁸

Despite this problem, Aro I seems to command expressly that the overall spentness analysis ignore the aggregated effect of sequential replacement activities.³⁵⁹ The *FMC* district court found that, despite the apparent command from Aro I, there would be some point in time where sequential replacement activities would rise to the level of reconstruction.³⁶⁰ However, the *FMC* court found it unnecessary on the facts before it to determine exactly at which point in time that would occur, because Up-Right's replacement activities did not even meet the minimum threshold at which "the invention as a whole . . . at some specified time [has] outlived its usefulness and [is] ready for the scrapheap."³⁶¹ Although the *FMC* court did not reach the issue of whether replacement activities aggregated over time would constitute reconstruction,³⁶² it nevertheless provided a thoughtful analysis of this position out of "an excess of caution."³⁶³

359. See id. at 1464 (stating that "'[m]ere replacement of individual unpatented parts, one at a time, whether of the same part repeatedly or different parts successively, is no more than the lawful right of the owner to repair his property" (quoting Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 346 (1961))). See *supra* note 129 and accompanying text for a discussion of this language in context in *Aro I*.

360. See FMC, 816 F. Supp. at 1464 (observing that "[t]here is considerable intuitive appeal to the argument that, at some point, successive replacement of every part in a device will result in the creation of a new device for purposes of infringement").

361. Id. In arriving at this conclusion, the court seemed to be guided both by the small number of replaced parts relative to the total number of parts, and by the low replacement parts cost (about \$900 annually) relative to the cost of the head (\$30,000). Id.

362. Id.

363. Id. at 1465.

^{356.} Id. at 1464-65.

^{357.} Id. at 1464.

^{358.} Id. at 1464 n.15.

Here again, the analysis demonstrates the ultimate futility of a device-oriented, dominance approach to overall spentness. First, as the district court clearly appreciated, a pure parts-counting approach, in which anything that is identifiable as an individual "part" is given equal weight with any other identifiable "part," can too easily be manipulated to achieve untoward results. For example, FMC sought to count two rails on the picking heads as two parts, while the entire drive means of the picking head as only one.³⁶⁴ This would be much like asserting that an improved six-cylinder engine was composed of seven parts—the engine and six spark plugs, so that replacement of all of the spark plugs would be considered replacement of a majority of the parts of the combination, and would constitute reconstruction.³⁶⁵

Second, even an approach that seeks to incorporate component value (relative to the overall value of the combination) presents difficult choices. Should component value be based upon cost or retail price?³⁶⁶ If these methods yield different results, what is the basis for choosing between them? The question is difficult to resolve precisely because the dominance inquiry, elaborated at this level, seems completely cut loose from its foundation. The problem is that the dominance inquiry encourages courts to think of the repair-reconstruction problem in terms of spentness rhetoric without pausing to consider how and whether that rhetoric is connected to the fundamental underlying expectations of the parties.³⁶⁷

366. See FMC, 816 F. Supp. at 1465-66 (rejecting the patentee's computation of the percentage value of replaced parts as 97%, recalculating this percentage as less than 50% on both the cost and retail bases, yet concluding that even these recalculations overstate the percentage by failing to consider "the economics of scale in producing parts for initial manufacture, and the increased overhead attendant with inventorying and selling individual parts").

367. The district court in *FMC* also considered a "hybrid" approach to the component value question in which certain parts were chosen as "integral," and a percentage value of replaced integral parts was computed. *Id.* at 1466-67. It is difficult to understand how this approach could square with *Aro I*'s proscription against considering the "heart of the invention." *See supra* note 162 and accompanying text.

^{364.} Id.

^{365.} Id. There are other examples of the potential absurdity of the parts-counting approach to overall spentness. See Westinghouse Elec. & Mfg. Co. v. Hesser, 131 F.2d 406, 410 (6th Cir. 1942) (noting that it would be "a fruitless task to determine when, in the replacement of useless parts in a given [patented combination], the new would dominate the old" because "some of the replaced units would themselves need replacing before other original units failed" and because "considerations of quantities, relative weights, and costs, are of little aid on the question of domination"); Morrin v. Robert White Eng'g Works, 143 F. 519, 520 (2d Cir. 1905) (arguing that the replacement of a single generating tube within a steam generator would constitute repair, and the replacement of an entire series of tubes would constitute reconstruction, but that "[b]etween these two extremes lies a debatable ground, the precise limits of which cannot be determined in advance").

Reviewing the district court's exhaustive analysis, the Federal Circuit confirmed that the lower court need not have reached the question of the aggregation of sequential replacement activities.³⁶⁸ The determination that no single instance of replacement itself constituted reconstruction was sufficient to resolve the case in favor of the defendants on the authority of *Aro I*'s express language.³⁶⁹ Moreover, a dominance test that did take into account the aggregate effect of sequential replacement would not only contravene *Aro I*, but would also be "unworkable from a practical standpoint" because the owner of the patented product would need to have a precise record of the product's repairs in order to know when the purchaser's activities had exceeded the fifty percent threshold.³⁷⁰ Finally, the court echoed *Dana*'s rejection of an "economic" approach to overall spentness.⁸⁷¹

The Federal Circuit's opinion in *FMC* leaves the dominance analysis in an intolerable state.³⁷² Despite the mandate from *Aro I* to analyze overall spentness, the Federal Circuit has rejected not only the economic analysis proffered in *Dana*, but also the parts-counting dominance analysis of cases such as *Automotive Parts*.³⁷³ While the court in *FMC* takes refuge in the oft-repeated statement that the repair-recon-

370. Id. at 1078 n.7.

373. See supra notes 370-371 and accompanying text.

^{368.} FMC Corp. v. Up-Right, Inc., 21 F.3d 1073, 1078 (Fed. Cir. 1994).

^{369.} See id. at 1077 n.6 (defining a "single instance of repair" as the replacement of "one or more parts" carried out "at the same time as part of the same servicing"); id. at 1077 (noting that, in light of the rule that "'[m] ere replacement of individual unpatented parts, one at a time . . . is no more than the lawful right of the owner to repair his property," this case did not present the "difficult issue of how much repair to a grape harvester made altogether at any single point in time would have risen to the level of reconstruction of a 'spent' grape harvester" (quoting Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 346 (1961))).

^{371.} See id. at 1078 n.8 (counseling that "caution should be exercised in any analysis involving placing values, economic or otherwise, on the elements of a patented combination" (citing Dana Corp. v. American Precision Co. Inc., 827 F.2d 755, 760 (Fed. Cir. 1987))).

^{372.} At least one commentator reviewing FMC has proposed an alternative approach. See Thomas A. Polcyn, Note, FMC Corporation v. Up-Right, Inc.: Sequential Replacement of Parts Does Not Turn Permissible Repairs into Impermissible Reconstruction, 14 ST. LOUIS UNIV. PUB. L. REV. 269, 286 (1994) (proposing a test that would consider whether, "but for a series of replacements, the entity viewed as a whole would have become spent," and measuring spentness by the "conventional useful life" of the patented device). While the author correctly points out that this test might be free of the "accounting imponderables" that plagued the court in the FMC case, id. at 287, the test restates the overall spentness standard in terms of "conventional useful life," without giving any guidelines as to how conventional useful life would be calculated. In addition, the infirmities of the useful life standard are significant. See supra Part II.C.2. A more attractive proposal would identify conventional useful life as a factor that might have informed the reasonable expectations of the patentee or the purchaser at the time of purchase. See infra note 402 and accompanying text.

struction problem must be resolved on a case by case basis, this gives scant comfort, especially because *FMC* sidestepped the difficult question of sequential replacement.

It should be evident that the riddle of the apocryphal axe will inevitably arise in sequential replacement cases like *FMC*, so long as the analysis revolves around spentness notions. The *FMC* case thus presented the perfect vehicle for challenging the assumption that spentness should be the dominant rubric for repair-reconstruction. *FMC* aptly encapsulated the infirmities lying beneath the surface of many of the various types of spentness cases. It is unfortunate that the Federal Circuit allowed the opportunity to pass without giving serious consideration to an alternative model for repair-reconstruction that does not commit itself so thoroughly to the peculiarities of particular patented devices and the attendant obstacles posed by the "apocryphal axe."

III. MIRACLE PLUGS, RUBBER RIVET RELOADS, AND THE ROLE OF INTENT IN THE REPAIR-RECONSTRUCTION ANALYSIS

This Article has suggested that the major failing of the spentness rhetoric employed to distinguish repair from reconstruction is that it encourages courts to consider the physical qualities of the subject devices in a vacuum, rather than considering those qualities as a proxy for the underlying expectations of the patent owner and purchaser. That the expectations of the parties are fundamental to the correct resolution of the repair-reconstruction problem is a notion that is developed in the remaining parts of this Article. In this part, the Article considers the role intent has played in the repair-reconstruction cases to date.

Wilson v. Simpson unquestionably left open the possibility that courts should consider the expectations of both the patentee and the purchaser in distinguishing repair from reconstruction.³⁷⁴ Of course, this could also be said for a multitude of other potential considerations.³⁷⁵ In any event, early courts routinely made reference to the intent of the patentee and the purchaser. Typically, courts recited the "reasonable intention of the parties" as one factor in a multifactor approach to repair-reconstruction,³⁷⁶ or made some reference to whether the replacement activity comported with the "implied under-

^{374.} See Wilson v. Simpson, 50 U.S. (9 How.) 109, 125 (1850) (noting that the law permits replacement of certain parts that "the inventor contemplated would have to be frequently replaced").

^{375.} See supra Part I.B.1 (discussing the ambivalence of Simpson).

^{376.} Goodyear Shoe Mach. Co. v. Jackson, 112 F. 146, 150 (1st Cir. 1901).

standing" of the parties³⁷⁷ or was "contemplated by the patentee and purchaser and user."³⁷⁸ The Supreme Court itself has spoken of the repair-reconstruction distinction in terms of establishing "the construction of a bargain."³⁷⁹

Aro I, with its rejection of a multifactor approach and its apparent adoption of an overall spentness standard, created confusion concerning the role of intent in the repair-reconstruction analysis. The Court's opinion did not address the role of intent specifically, but Justice Black insisted that "[d]eciding whether a patented article is 'made' does not depend on . . . what the patentee's or a purchaser's intentions were."⁵⁸⁰ Indeed, Justice Black was convinced that "the scope of a patent should never depend upon a psychoanalysis of the patentee's or purchaser's intentions, a test which can only confound confusion."³⁸¹ Yet Justice Brennan, concurring in the result, was equally convinced that the appropriate factors to be considered include "the common sense understanding and intention of the patent owner and the buyer of the combination as to its perishable components."³⁸²

Courts typically have intertwined notions of intent with device-centered rhetoric. See Electric Auto-Lite, 78 F.2d at 704 ("Indeed, the ignition apparatus is so designed and built as to make it possible to quickly and simply detach, for replacement purposes, the parts referred to and thus to meet the demands of wear or destruction."); F.F. Slocomb & Co. v. A.C. Layman Mach. Co., 227 F. 94, 99-100 (D. Del. 1915) (carrying out the repair-reconstruction analysis "in view of the character of the repair parts and of the attitude of the parties toward them," and noting that the replaced parts were "intended to be replaced from time to time"), aff'd, 230 F. 1021 (3d Cir. 1916); supra notes 306, 308, 311 and accompanying text.

378. Wagner Typewriter Co. v. F.S. Webster Co., 144 F. 405, 416 (C.C.S.D.N.Y. 1906). In addition to inferring intent from the design features of the patented devices, courts have also found the patentee's sales materials to be a fruitful source of evidence on intent. See El Dorado Foundry, Mach. & Supply Co. v. Fluid Packed Pump Co., 81 F.2d 782, 786 (8th Cir. 1936) ("That the replacement of worn tubes is regarded by the [patentees] as a repair only is shown by the statement in their catalogue"); Morrin v. Robert White Eng'g Works, 143 F. 519, 520-21 (2d Cir. 1905) (noting that "[t]he necessity for repairs and the right to make them is recognized in the [licensee's] catalogue").

379. Heyer v. Duplicator Mfg. Co., 263 U.S. 100, 102 (1923).

380. Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 354 (1961) (Black, J., concurring).

381. Id. at 355.

^{377.} Shickle, Harrison & Howard Iron Co. v. St. Louis Car-Coupler Co., 77 F. 739, 742 (8th Cir. 1896); see also Electric Auto-Lite Co. v. P. & D. Mfg. Co., 78 F.2d 700, 704 (2d Cir. 1935) ("In selling its ignition apparatus, the plaintiff did so expecting the car owner to have service during the life of the car and upon the implied understanding that the car owner is entitled to repair the same by replacing parts."); Ideal Wrapping Mach. Co. v. George Close Co., 23 F.2d 848, 851-52 (D. Mass.) (noting the absence of any "implied representation" that the patented device could be modified to wrap different size products), aff'd, 29 F.2d 533 (1st Cir. 1928).

^{382.} Id. at 364 (Brennan, J., concurring).

Two appellate decisions delivered in short succession after Aro I illustrate quite plainly that courts took no clear signal from Aro I on the proper role of intent. In Fromberg, Inc. v. Thornhill,³⁸³ the patentee, Fromberg, sold a tire repair device comprised of a hollow metal tube and a cylindrical rubber plug that could be discharged from the tube into a hole in a punctured tire, leaving an empty metal tube when the operation was completed.³⁸⁴ The defendant sold the "Miracle Plug," a tapered rubber plug sized to fit into an empty Fromberg tube.³⁸⁵

In analyzing whether defendant's customers were repairing or reconstructing the Fromberg combination, the court acknowledged the command from Aro I that the inquiry focus on overall spentness.³⁸⁶ Although this command seemed to make it "essential" for the court "to examine the Fromberg device to determine its function and purpose," the court moved directly to the proposition that the examination of the device was merely a proxy for intent: "The principal point of this inquiry is whether, when sold by the Patentee, it is reasonably contemplated that the device will be repeatedly used."³⁸⁷ The court, with little analysis, concluded that the device was designed, manufactured, sold, and used as a "unit" having "a single-shot function and purpose for a one-time use"; once the rubber plug was injected into the tire, the plug could not be used again, "[n]or is it expected that the metal tube will be."³⁸⁸ In the court's view, this brought the defendant's activities squarely within the realm of reconstruction.³⁸⁹

A panel of the Ninth Circuit flatly disagreed with this analysis in a case involving the same patent, *Fromberg, Inc. v. Gross Manufacturing Co.*³⁹⁰ In this case, the defendant purchased a complete Fromberg tube-and-plug device, sold it in a package with rubber plugs made by defendants, and specifically identified the kit as the "Rubber Rivet Reloads for use with Fromberg Cartridges."³⁹¹ The court affirmed a grant of summary judgment in favor of the defendant.⁵⁹²

383. 315 F.2d 407 (5th Cir. 1963).
384. Id. at 410.
385. Id.
386. Id. at 412.
387. Id.
388. Id. at 413.
389. Id.
390. 328 F.2d 803 (9th Cir. 1964).
391. Id. at 804.
392. Id.

The court made it clear that it viewed Aro I as treating the intent factor the same way that it had treated the "heart of the invention" factor:

We do not see how it can be maintained, under the Aro decision, that the intent or understanding of the patentee or licensee, or the "essence" or "heart" of the combination, is any longer controlling, at least in a case such as this, where one element of the combination is necessarily removed and finally used, while the other remains and is capable of further use.³⁹³

Thus, contrary to the Fifth Circuit's consideration of whether the patentee had "expected" that the tube would be reused, the Ninth Circuit refused "to probe the mind of [the] patentee in order to know whether he is infringing."³⁹⁴ But the Ninth Circuit's analysis belies this refusal to consider intent, because the patentee's intent, as manifested in the design of the article in question, clearly is material to the outcome of the case:

Viewing the matter objectively, that is, looking at the patent and the patented combination without adding an assumption as to what may be in the mind of the patentee, we find nothing to indicate such an expectation [that the metal tube will be used only once]... [The tube] is intended to be, and is, removed from the tire, and is then capable of being reused.³⁹⁵

Plainly, the court here wanted it both ways. Subjective intent as evidenced directly—through the patentee's own assertions, for example—was not *material*, but the patentee's subjective intent as manifested in the design of the article was *dispositive*.³⁹⁶ This is nothing more than appellate court prejudgment of the patentee's credibility; the appellate court seemed to believe that the patentee's assertions as to his intent were per se incredible and so should be accorded no weight. This is troubling; either intent, however evi-

^{393.} Id. at 808.

^{394.} Id. at 809 (stating that "neither the desire nor the hope of the patentee in this regard either is or ought to be material, much less controlling").

^{395.} Id. The court seemed to suggest that its analysis differed from the Fifth Circuit's analysis because that court included what was in the mind of the patentee, along with what was manifested by the design of the patented combination, while the Ninth Circuit's analysis included only the latter. It seems equally probable, however, that the Ninth Circuit simply disagreed about what could be inferred from the design of the patented combination.

^{396.} See id. (holding that the patentee's mental desire or hope is immaterial, and then finding nothing to indicate such an intent in the patent or the patented combination).

denced, is relevant or it is not. The relative weight to be given to the evidence on intent is a matter for the trial court.

In some of its decisions the Federal Circuit has returned to pre-Aro I usages of the patentee's intent in the repair-reconstruction analysis. For example, in Dana, the court found permissible repair, pointing out that "Dana intends that its clutches be repairable; it sells repair parts and publishes a repair manual."³⁹⁷ Similarly, the court's decision in Everpure can perhaps best be explained as a consideration of device structure as a proxy for intent, consistent with early cases.³⁹⁸

The Federal Circuit's most recent decisions, however, inexplicably diverge on the issue of the role of the patentee's intent, and will lead to further confusion on the point.³⁹⁹ In *Aktiebolag*, the Federal Circuit proposed a multifactor test for repair-reconstruction, including as one of the factors "objective evidence of the intent of the patentee."⁴⁰⁰ The court analyzed this factor by resorting to traditional sources of circumstantial evidence of the patentee's intent:

[The patentee] did not manufacture or sell replacement drill tips. It did not publish instructions on how to retip its patented drills or suggest that the drills could or should be retipped.... There is, therefore, no objective evidence that [the patentee's] drill tip was intended to be a replaceable part.⁴⁰¹

The court emphasized that, while the repair-reconstruction analysis did not turn on the patentee's intent alone, "the fact that no replacement drill tips have ever been made or sold by the patentee is consistent with the conclusion that replacement of the carbide tip is not a

398. See Everpure, Inc. v. Cuno, Inc., 875 F.2d 300, 303 (Fed. Cir. 1989) (suggesting that the fact that the patentee had sealed the filter into the filter cartridge was indicative of the patentee's intent that purchasers who replace the filter also replace the cartridge).

^{397.} Dana Corp. v. American Precision Co., 827 F.2d 755, 759 (Fed. Cir. 1987); see also Kendall Co. v. Progressive Med. Tech., Inc., 85 F.3d 1570, 1575 (Fed. Cir. 1996) (inferring patentee's intent from product labeling); Sage Prods., Inc. v. Devon Indus., Inc., 45 F.3d 1575, 1578 (Fed. Cir. 1995) (inferring patentee's intent from product labeling and statements in patent specification concerning disposability of component); R2 Med. Sys., Inc. v. Katecho, Inc., 931 F. Supp. 1397, 1443 (N.D. Ill. 1996) (arguing that "[b]ecause these cable systems are intended to endure beyond a single use of the electrode, the structure of the electrodes and cable systems imply [the patentee's] intent that its customers will regularly replace these electrodes in normal use of the machine").

^{399.} The Federal Circuit has not spoken on the reasonable expectations of the purchaser, creating the potential for additional confusion here as well.

^{400.} Aktiebolag v. E.J. Co., 121 F.3d 669, 673 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1337 (1998).

^{401.} Id. at 674. The court distinguished this case from Sage Products and Kendall by noting the evidence of intent contained in those cases. Id.

permissible repair."⁴⁰² Surprisingly, the court made no effort to explain how its consideration of "objective evidence of intent" squared with *Aro I*. Of course, as already noted, the court likewise made no effort to explain why it was articulating the very multifactor approach that *Aro I* had explicitly denigrated.⁴⁰⁸

Worse still, less than a week after Aktiebolag, in a decision that included two panel members who also had sat on the Aktiebolag panel, the court took an entirely different approach regarding intent. In *Hewlett-Packard Co. v. Repeat-O-Type Stencil Manufacturing Corp.*,⁴⁰⁴ the patentee Hewlett-Packard argued expressly for adoption of an "intentof-the-patentee" analysis, and cited traditional forms of objective evidence of its intent: its package insert suggested discarding empty cartridges (rather than refilling them with ink), and it did not sell refillable cartridges or ink refills for empty cartridges.⁴⁰⁵ But in addressing the patentee's argument that the evidence of intent was relevant on the authority of *Simpson*, the court refused to permit any deviation from a purely device-oriented spentness rhetoric:

HP has misread *Wilson*. Although at times speaking in terms of the intention of the inventor, the Court focused on the nature of the device sold, and specifically on the fact that the machine was designed such that one group of components, the knives, would wear out long before the remaining components 406

While this passage appears wholly to reject the relevance of intent, this rejection is belied by other parts of the court's opinion. Attempting to harmonize its result with *Cotton-Tie* and *Mallinckrodt*, both of which involved express label restrictions on reuse of the patented product,⁴⁰⁷ the *Hewlett-Packard* court declared that evidence of intent manifested in acts of contractual significance would be relevant to the repair-reconstruction question, while lesser evidence would not be relevant:

^{402.} Id. Consistent with pre-Aro I cases, the court tied other factors to intent in its analysis, such as the useful life of the replaced part. See id. (noting that the drill tip "was not intended or expected to have a life of temporary duration in comparison to the drill shank").

^{403.} See supra note 113 and accompanying text.

^{404. 123} F.3d 1445, 1446 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1304 (1998).

^{405.} Id. at 1453.

^{406.} Id.

^{407.} Cotton-Tie Co. v. Simmons, 106 U.S. 89, 91 (1882) (noting that the words "Licensed to use only once" were stamped into each metal buckle); Mallinckrodt, Inc. v. Medipart, Inc. 976 F.2d 700, 702 (Fed. Cir. 1992) (observing that the phrase "Single Use Only" was inscribed on each device, and that a package insert provided with each unit stated "For Single Patient Use Only").

[A]bsent a restriction having contractual significance, a purchase carries with it the right to modify as long as reconstruction of a spent product does not occur. . . . The question is not whether the patentee at the time of sale intended to limit a purchaser's right to modify the product. . . [A] seller's intent, unless embodied in an enforceable contract, does not create a limitation on the right of a purchaser to use, sell, or modify a patented product as long as a reconstruction of the patented combination is avoided. A noncontractual intention is simply the seller's hope or wish, rather than an enforceable restriction.⁴⁰⁸

This passage indicated that the court's quarrel was with the manner in which the patentee's intent was evidenced, not with the use of intent per se. This is but another example of the court losing its way in a repair-reconstruction decision for lack of an adequate organizing principle. The fact that circumstantial evidence is a less persuasive indicator of intent does not explain why it should be impermissible to resort to such evidence. After all, if the repair-reconstruction problem is about defining the scope of an implied license, a proposition developed in the remaining parts of the Article, it is highly problematic to suggest that only express statements of contractual significance can bear on that scope.

Perhaps the court was also reacting against the possibility that the patentee's expectations alone would determine the outcome of a repair-reconstruction analysis.⁴⁰⁹ But this fear need not be addressed by throwing out all evidence of intent. Instead, the court should have recognized that its task was to balance the reasonable expectations of *both* the patentee and the purchaser of the patented goods. Viewed in this manner, it would be correct to say that evidence of the patentee's unilateral intentions should not alone govern the analysis, but incorrect to say that evidence of the patentee smust be discarded.

In any event, it is critical to recognize that the exhaustion model does not facilitate analysis of the repair-reconstruction problem in terms of parties' expectations. An implied license model would be more productive for these purposes.

^{408.} Hewlett-Packard, 123 F.3d at 1453; cf. Farley, supra note 18, at 153-56 (arguing that Simpson and some other repair-reconstruction cases prior to Aro I give some significance to intent factors, particularly the intent of the patentee).

^{409.} See Hewlett-Packard, 123 F.3d at 1453 (arguing that the patentee's "unilateral intentions" cannot change the fact that it sold the cartridge at issue without restriction and that the cartridge had a useful life longer than the supply of ink that it contained).

IV. REPAIR AND RECONSTRUCTION RECONCEPTUALIZED AS A DETERMINATION OF IMPLIED LICENSE SCOPE

An "exhaustion of rights" model for the repair-reconstruction problem has historical basis, but presents a major difficulty because it thrusts the analysis towards device-oriented rhetoric and leaves the role of intent unclear. This is only to be expected because the exhaustion model focuses on whether a party's activities amount to impermissible making as opposed to permissible using, usually framed in terms of whether the device is "spent" before the replacement activities occur. In this context, the use of spentness rationales seems logical, even though it may be ill-advised.

What are the alternative models, if exhaustion has been demonstrated to be unsatisfactory? Three deserve mention, but only one the implied license model—really presents a fundamentally different rubric from which to draw guidelines for determining what constitutes a repair or a reconstruction.

First, of course, one might simply eliminate the notion of reconstruction altogether. One commentator suggested this approach in the wake of Aro I.⁴¹⁰ Under this proposal, only replacement of all of the elements would trigger liability; anything less would constitute permissible repair.⁴¹¹ According to the commentator, "standard economic assumptions" may establish that the patentee is actually better off without the concept of reconstruction.⁴¹²

Whatever the force of economic arguments, expunging reconstruction would not necessarily eliminate the difficult cases. For example, sequential replacement practices might still pose a challenge. Where a purchaser replaced each component but the last screw or bolt on one day, and added the screw or bolt on the next, would this avoid liability? That is, does the standard require replacement of all components at one time before liability is triggered?

Second, one might explore an approach that is embodied in the Community Patent Convention (CPC). The CPC,⁴¹³ which has, of course, not yet come into force, defines direct infringement (Article 25)⁴¹⁴ and indirect infringement (Article 26)⁴¹⁵ in terms roughly simi-

414. Article 25 ("Prohibition of direct use of the invention") provides in relevant part:

^{410.} Comment, supra note 324, at 353-54.

^{411.} Id. at 363.

^{412.} Id. at 364.

^{413.} Agreement Relating to Community Patents, Dec. 15, 1989, 1989 O.J. (L 401) 1. For the complete text of the Community Patent Convention, see Gerald Paterson, The European Patent System: The Law and Practice of the European Patent Convention app. 19 at 714-76 (1992).

lar to corresponding provisions in U.S. patent law.⁴¹⁶ CPC Article 28 incorporates an exhaustion by sale principle, again roughly equivalent to the exhaustion doctrine of U.S. law.⁴¹⁷ Commentary on these provisions, however, suggests that they seek to define infringement "exhaustively."⁴¹⁸ Accordingly, because the right to repair is not expressly prohibited, it is absolutely protected.⁴¹⁹ It could be said, then, that the "right" to repair under the CPC is not akin to an implied license interest, and in fact not akin to a license interest at all, because it cannot be limited even by a patentee's express statement at the point of sale.⁴²⁰

At first glance, this model seems to diverge conceptually from the repair-reconstruction framework prevalent in U.S. law. Yet, in application, it seems doubtful that the differences would be very significant.

Agreement Relating to Community Patents, supra note 413, at 14.

2. Paragraph 1 shall not apply when the means are staple commercial products, except when the third party induces the person supplied to commit acts prohibited by Article 25....

Id. at 14-15.

416. 35 U.S.C. § 271(a)-(c) (1994 & Supp. 1996).

The rights conferred by a Community patent shall not extend to acts concerning a product covered by that patent which are done within the territories of the Contracting States after that product has been put on the market in one of these States by the proprietor of the patent or with his express consent, unless there are grounds which, under Community law, would justify the extension to such acts of the rights conferred by the patent.

Agreement Relating to Community Patents, supra note 413, at 15.

418. AMIRAM BENYAMINI, PATENT INFRINGEMENT IN THE EUROPEAN COMMUNITY 58-59 (Studies in Industrial Property and Copyright Law, Vol. 13, Friedrich-Karl Beier & Gerhard Schricker eds., 1993). By defining infringement exhaustively, the drafters of the CPC hoped to preclude national courts from developing national standards that might expand or contract the scope of the Community patent grant. *Id.* at 60. No correlative need for such an aggressive use of patent exhaustion principles is present in U.S. law.

419. Id. at 104-05.

420. Id. at 105.

A Community patent shall confer on its proprietor the right to prevent all third parties not having his consent:

⁽a) from making, offering, putting on the market or using a product which is the subject-matter of the patent, or importing or stocking the product for these purposes....

^{415.} Article 26 ("Prohibition of indirect use of the invention") provides in relevant part: 1. A Community patent shall also confer on its proprietor the right to prevent all third parties not having his consent from supplying or offering to supply within the territories of the Contracting States a person, other than a party entitled to exploit the patented invention, with means, relating to an essential element of that invention, for putting it into effect therein, when the third party knows, or it is obvious in the circumstances, that these means are suitable and intended for putting that invention into effect.

^{417.} Article 28 ("Exhaustion of the rights conferred by the Community patent") provides that:

CPC Article 25 prevents the unauthorized "making" of a claimed invention, so a court faced with an allegation that a defendant's replacement activities infringe the patent must still determine whether those activities constitute a new "making" or something less. Carrying out this exercise would seem to be very much like applying the unadorned exhaustion standard of *Aro I*. Indeed, one commentator suggests that courts might, for example, resort to a dominance test to decide the question.⁴²¹

A recent case from the U.K. Patents County Court provides an illustration of the point that decisions under the CPC model are still likely to turn on common law conceptions of repair and reconstruction. In *Hazel Grove (Superleague) Ltd. v. Euro-League Leasure Products Ltd.*,⁴²² the patentee held patents on pool tables, and the defendant refurbished and resold pool tables that had originally been purchased from the patentee.⁴²³ The court determined that it must begin its analysis by reference to CPC principles, explaining that the infringement provision in the Patents Act 1977 had been designed to correspond to Articles 25 through 28 of the Community Patents Convention.⁴²⁴

Considering these principles, the court declared that "the concept of an 'implied license' to repair is alien to the CPC, because it is based upon the idea that a purchaser needs a licence to repair a patented product and that the patentee may restrict that right."⁴²⁵ That is, because there are no rights to prohibit an activity that is less than a "making," there are no such rights to be exhausted upon sale.⁴²⁶

Yet, having reached this conclusion, the court in *Hazel Grove* immediately turned back to the common law standards for repair and reconstruction to analyze whether the defendants had engaged in a "making."⁴²⁷ Referring to British and German authority, the court found that the defendant's activities indeed constituted impermissible new "making."⁴²⁸ It is difficult to see how the analysis would have differed at all had the court merely proceeded to apply the traditional repair-reconstruction analysis.

Implied license, a third alternative model for the repair-reconstruction analysis, deserves more attention. In one sense, this is the

^{421.} Id. at 112-14.
422. [1995] R.P.C. 529 (Patents County Ct.) (1995).
423. Id. at 531.
424. Id. at 537.
425. Id. at 539 (citing BENYAMINI, supra note 418, at 105).
426. Id.
427. Id. at 541-42.
428. Id. at 541-43.

least radical of the three alternatives. The principle, of course, is that upon the unconditional, authorized sale of patented goods, the purchaser takes a license to use (and resell) the goods. Because the license is not formalized in any express written agreement, it can be referred to as an implied license.

A number of repair-reconstruction cases refer to the concept of an implied license.⁴²⁹ In most, if not all, of these cases, the courts employed the implied license more as a convenient label than as a serious analytical tool, and there is no dramatic distinction between these cases and those employing the model of exhaustion.

If we are to take the implied license more seriously as a model for analyzing the repair-reconstruction problem, some additional precision is needed. The repair-reconstruction problem is a particular type of implied license problem. Fundamentally, it is a problem of the *scope* of an implied license: deciding that an activity constitutes "repair" is simply deciding that it falls within the scope of the purchaser's implied license, while deciding that an activity constitutes "reconstruction" is, of course, determining that the activity falls outside the properly defined scope of the license. The repair-reconstruction inquiry has, upon occasion, been framed in this manner by scholars⁴³⁰ and, albeit rarely, by judges.⁴³¹

429. See, e.g., Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 123 F.3d 1445, 1451 (Fed. Cir. 1997) ("The question before us is whether this modification is authorized, or whether it exceeds the scope of the implied license granted to ROT and subsequent purchasers by the sale of the ink jet cartridges."), cert. denied, 118 S. Ct. 1304 (1998); Aktiebolag v. E.J. Co., 121 F.3d 669, 672 (Fed. Cir. 1997) (reasoning that "when [patentee] sold its patented drills to its customers, it granted them an implied license to use the drill for its useful life ... and the implied license to use includes the right to repair the patented drill" (citing Aro Mfg. Co. v. Convertible Top Replacement Co., 377 U.S. 476, 484 (1964); Standard Havens Prods., Inc. v. Gencor Indus., Inc., 953 F.2d 1360, 1376 (Fed. Cir. 1991))), cert. denied, 118 S. Ct. 1337 (1998); Green v. Electric Vacuum Cleaner Co., 132 F.2d 312, 314 (6th Cir. 1942) (noting that "the license implied from sale in the usual channels of trade does not apply to a sale of an article to be scrapped" (citing Cotton-Tie Co. v. Simmons, 106 U.S. 89 (1882); Tindel-Morris Co. v. Chester Forging & Eng'g Co., 163 F. 304 (C.C.E.D. Pa. 1908))); Pettibone Corp. v. Fargo Mach. & Tool Co., 447 F. Supp. 1278, 1281 (E.D. Mich. 1978) ("[T]he purchaser is granted an implied license to use the purchased patented machine. The right to use encompasses repair but not reconstruction of the machine "); National Malleable Casting Co. v. American Steel Foundries, 182 F. 626, 640 (C.C.D.N.J. 1910) (referring to an "implied license to make repairs").

430. See Oddi, supra note 3, at 102-05 (discussing Aro I as a "scope of implied license" case); see also Gregory M. Luck, The Implied License: An Evolving Defense to Patent Infringement, 16 I.P.L. NEWSLETTER 3, 29 (Fall 1997) (observing that the "scope of the implied license is oftentimes the dominant issue in cases dealing with repair versus reconstruction").

431. See, e.g., Electric Auto-Lite Co. v. P. & D. Mfg. Co., 109 F.2d 566 (2d Cir. 1940) (per curiam). The court stated:

While in the nature of things there can be no rule as to where repair ends and reconstruction begins, clearly the implied license must be understood to cover a

What are the benefits of reconceptualizing the repair-reconstruction problem as an inquiry into the scope of an implied license? One major benefit is that, unlike the exhaustion model, the implied license model does not impel us towards spentness rationales and the complexity of device-oriented rhetoric. Instead, the implied license model gives a prominent role to the expectations of the parties.

Problems, of course, remain. Determining the scope of an implied license is no easy work. At first glance, in fact, it may seem no easier than determining the "spentness" of a component or a combination.

However, a second major benefit of the implied license model is that it is not unique to the repair-reconstruction problem, or even unique to patent law. Courts and commentators have confronted questions of implied license scope in a wide array of contexts. In the next three subparts, this Article considers teachings from these other contexts, the extent to which they reinforce what we already know to be true of the repair-reconstruction problem, and the extent to which they can be injected into the repair-reconstruction analysis by analogy. If the repair-reconstruction analysis can be enhanced by this exercise in cross-fertilization, then the shift to a rigorous notion of implied license scope is easily justified.

This Article considers analogies from three areas: first, cases and commentary on implied license scope in other intellectual property settings; second, implied license scope as developed in the law of servitudes in real property; and third, implied license scope as developed in the law of contracts.

A. Implied License Scope in Intellectual Property Cases

A number of patent cases explore the issue of implied license scope.⁴³² A series of cases involve the sale of unpatented goods which

reasonable enjoyment of the privilege; and if it is cheaper to insert a new part than to cobble the old one back into service, the license covers just that; if it did

not, the very presupposition on which it rests would be falsified. Id. at 567.

^{432.} In addition to the cases discussed specifically in the text, other patent cases in which the implied license is employed involve certain types of involuntary sales and disputes over damages liability where the infringer has already satisfied a judgment for past damages. See, e.g., Union Tool Co. v. Wilson, 259 U.S. 107, 114 (1922) (finding that the sale of spare parts "made with full knowledge of all relevant facts" where there was no implied license violated a court-ordered injunction); McCoy v. Mitsuboshi Cutlery, Inc., 67 F.3d 917, 920-22 (Fed. Cir. 1995) (finding that an implied license arose upon a sale pursuant to a Texas commercial code provision that allowed the seller to sell specially ordered goods upon the buyer's refusal to pay); King Instrument Corp. v. Otari Corp., 814 F.2d 1560, 1564 (Fed. Cir. 1987) (stating that upon satisfying a judgment for previously infring-

are components of a patented combination or are used to practice a patented process. For example, in *Edison Electric Light Co. v. Peninsular Light, Power & Heat Co.*,⁴³³ Edison Electric held certain exclusive rights in Edison patents concerning methods for distributing electricity. Edison had installed a wiring system in the Livingston Hotel in Grand Rapids, Michigan, and had supplied electricity to the hotel.⁴³⁴ This wiring system was connected to transformers in accordance with a patented method owned by Edison.⁴³⁵ When the hotel decided to switch to another electricity provider (Peninsular), Edison Electric sued Peninsular for contributory infringement.⁴³⁶

Based upon well-established exhaustion principles, it could not seriously be questioned that a license to use the patented method should be implied in favor of the hotel based upon its purchase of the wiring system designed to carry out the patented method.437 The question was whether the scope of the implied license was limited to the provision of electricity from Edison Electric.438 Significantly, in articulating a general rule for analyzing implied license scope, the court did not constrain itself to a consideration of the physical qualities of the patented combination at issue. Instead, it was "evident" to the court that: "[T]he extent of an implied license must depend upon the peculiar facts of each case. The question in each case is whether or not the circumstances are such as to estop the vendor from asserting infringement."439 In the court's view, the circumstances clearly indicated that Edison Electric intended for the hotel to have the benefits of the Edison distribution system, and the hotel clearly understood that it would be free to secure electricity from any source.⁴⁴⁰ Accordingly, the implied license was sufficient in scope to

436. Id. at 832.

440. Id. at 836-37.

ing the sales of machines, the defendant received an implied license extending throughout the useful life of the machines); Sawin v. Guild, 21 F. Cas. 554, 555 (C.C.D. Mass. 1813) (No. 12,391) (finding that an implied license arose upon sheriff's sale).

^{433. 101} F. 831 (6th Cir. 1900).

^{434.} Id. at 831-32.

^{435.} Id. at 833.

^{437.} See id. at 835 (noting the general rule "that if a patentee make a structure embodying his invention, and unconditionally make a sale of it, the buyer acquires the right to use the machine without restrictions, and, when such machine is . . . unconditionally sold, no restriction upon its use will be implied in favor of the patentee" (internal quotation marks omitted) (quoting Heaton-Peninsular Button-Fastener Co. v. Eureka Specialty Co., 77 F. 288, 290 (6th Cir. 1896))).

^{438.} Id. at 837.

^{439.} Id. at 836.

protect the hotel (and its new supplier of electricity) from infringement liability.⁴⁴¹

A recent Federal Circuit case, Carborundum Co. v. Molten Metal Equipment Innovations, Inc.,⁴⁴² endorses a totality of the circumstances approach to determining the scope of an implied license, including the reasonable expectations of the patentee and purchaser. Plaintiff Carborundum owned a patent on an apparatus for melting scrap metal, one component of which was a pump specifically designed for conveying molten metal.⁴⁴³ Carborundum sold only the pump, not the entire apparatus.⁴⁴⁴ When defendant Molten Metal also began selling molten metal pumps to Carborundum customers, Carborundum sued.⁴⁴⁵

As in *Edison Electric*, the existence of an implied license in this case could not reasonably be disputed: Under exhaustion principles, the purchasers of the Carborundum pump acquired a license to combine the pump with other elements to form the patented apparatus.⁴⁴⁶ The only question concerned the scope of this implied license. The patentee argued that the implied license extended only for the life of the purchased pump, while the defendant argued that the implied license extended without restriction, for the entire term of the patent.⁴⁴⁷

The court turned to a flexible all-circumstances approach:

We must further look to the circumstances of the sale to determine the scope of the implied license. This determination must be based on what the parties reasonably intended as to the scope of the implied license based on the circumstances of the sale. One party's unilateral expectations as to the scope of the implied license are irrelevant.⁴⁴⁸

Based upon the circumstances, the Federal Circuit concluded that the implied license extended only for the life of the pump, and the court hinted that this conclusion would be the typical outcome.⁴⁴⁹

441. Id.

444. Id. at 876.

- 446. Id. at 879.
- 447. Id. at 878-79.
- 448. Id. at 878 (citations omitted).

449. See id. at 879 ("Unless the circumstances indicate otherwise, an implied license arising from sale of a component to be used in a patented combination extends only for the life of the component whose sale and purchase created the license.").

^{442. 72} F.3d 872 (Fed. Cir. 1995).

^{443.} Id. at 875-76.

^{445.} Id.

Courts have also confronted implied license scope in a variety of patent cases involving litigation over the "shop right," under which an employer receives a royalty-free, nonexclusive license to use its employees' inventions where, for example, the employee has developed the invention during work hours, using the employer's facilities.⁴⁵⁰ In many of these cases, it was relatively free from doubt that the employer had some right of use in the employee's inventions, but questions arose as to the duration of the use right, or whether it extended to improvements.⁴⁵¹

Courts adjudicating implied license scope in this context again have been disinclined to rest the inquiry on a constrained set of considerations.⁴⁵² They consider all circumstances, with a particular emphasis on the reasonable intentions of the parties.⁴⁵³ A statement from an early Sixth Circuit decision is typical:

The duration and scope of a license must depend upon the nature of the invention and the circumstances out of which an implied license is presumed, and both must at last depend upon the intention of the parties.⁴⁵⁴

451. See, e.g., Teets, 83 F.3d at 409 (finding an implied-in-fact contract for an employee to assign patent rights to an employer because the latter had designated the employee to work on a business related "problem [that] entailed invention").

452. See id. at 407-09 (considering the factual and contractual aspects of the employment relationship in order to determine ownership of patent).

453. See id.

^{450.} See, e.g., Teets v. Chromalloy Gas Turbine Corp., 83 F.3d 403, 407 (Fed. Cir. 1996) ("[A]n employer may obtain a shop right in employee inventions where it has contributed to the development of the invention." (citation omitted)); McElmurray v. Arkansas Power & Light Co., 995 F.2d 1576, 1580-81 (Fed. Cir. 1993) (discussing both the basis and application of the "shop right" between employer and employee). For the common law origins of the shop right, see, for example, United States v. Dubilier Condenser Corp., 289 U.S. 178, 180, amended by 289 U.S. 706 (1933); Gill v. United States, 160 U.S. 426, 435 (1896); Solomons v. United States, 137 U.S. 342, 346 (1890); McClurg v. Kingsland, 42 U.S. (1 How.) 202, 210-11 (1843).

^{454.} Withington-Cooley Mfg. Co. v. Kinney, 68 F. 500, 506 (6th Cir. 1895); see also Finley v. Asphalt Paving Co., 69 F.2d 498, 506 (8th Cir. 1934) (noting that "the scope of an implied license depends upon the circumstances which created it, and it rests ultimately upon the intention of the parties" (citing Neon Signal Devices, Inc. v. Alpha-Claude Neon Corp., 54 F.2d 793, 794 (W.D. Pa. 1931))); Barber v. National Carbon Co., 129 F. 370, 374 (6th Cir. 1904) (noting that "[t]he duration and scope of a license must depend on the nature of the invention, and the circumstances out of which an implied license must be presumed, and both must depend on the intention of the parties" (quoting *Withington-Cooley*, 68 F. at 506)); Neon Signal Devices, 54 F.2d at 794 ("Naturally, the scope of an implied license depends upon the circumstances which created it, and it rests ultimately upon the intention of the parties." (citing *Withington-Cooley*, 68 F. at 500; Tin Decorating Co. v. Metal Package Corp., 29 F.2d 1006 (S.D.N.Y. 1928))); Tin Decorating Co., 29 F.2d at 1007 ("[T]he scope of an implied license is to be determined by the circumstances out of which it arises, including the relation and conduct of the parties... and all the other circumstances upon which agreement may be implied or estoppel enforced."), aff'd, 37 F.2d 5 (2d Cir. 1930);

A number of copyright cases also deal with questions of implied license scope,⁴⁵⁵ particularly where authors or artists have created copyrightable works at another's request and have delivered the finished product without providing for any formal, written agreement respecting copyright ownership or other allocation of rights in the copyrightable works.⁴⁵⁶ None of these cases imposes an artificial restriction on the nature of the evidence that might be received to determine the scope of the implied license. In at least one case, the court, "not see[ing] how it [could] be argued that only the existence and not the scope of a license can be proved by parol evidence," found a genuine issue of material fact that precluded summary judgment on the question of implied license scope.⁴⁵⁷ Another court more clearly embraced an all-circumstances approach, ruling that "[t]he existence and scope of . . . an implied license depends upon

Professor Robinson's treatise was highly influential in the adoption of the all-circumstances approach to implied license scope in shop rights cases. 2 WILLIAM C. ROBINSON, ROBINSON ON PATENTS § 809, at 588-89 (1890) (stating that the scope of implied license "is determined by the circumstances out of which it has arisen"). Robinson himself relied upon an early shop rights case for the rule. See Montross v. Mabie, 30 F. 234, 237 (C.C.S.D.N.Y. 1887) (reasoning that "[t]he extent of the license is a question of construction, and, as in the case of other contracts expressed or implied, is to be determined in accordance with the intention of the parties").

455. As in many other contexts, the implied license in the copyright context is an exclusion from the statute of frauds, based upon the pragmatic consideration that parties often fail to respect formalities when creating or transferring property interests. See 17 U.S.C. § 204(a) (1994) (stating that transfer of ownership in copyright "is not valid unless an instrument of conveyance, or a note or memorandum of the transfer, is in writing and signed by the owner of the rights conveyed"); 17 U.S.C. § 101 (1994) (excluding nonexclusive licenses from the "transfer of copyright ownership"); MELVILLE B. NIMMER & DAVID NIMMER, 3 NIMMER ON COPYRIGHT § 10.03[A], at 10-44 (1998) (stating that nonexclusive license may be implied from conduct). In many respects, these cases are similar to the "shop right" cases in patent law.

456. See, e.g., Lulirama Ltd. v. Axcess Broad. Servs., Inc., 128 F.3d 872, 882 (5th Cir. 1997) (stating that an implied license in advertising jingles included within its scope the rights to reproduce and make copies, prepare derivative works, distribute copies, and authorize public performance); Effects Assocs. v. Cohen, 908 F.2d 555, 559 (9th Cir. 1990) (finding that an implied license that was created when the plaintiff fulfilled a request to deliver special effects footage was sufficiently broad to cover both the defendant's use of the footage in a film and the distribution of the film); Oddo v. Ries, 743 F.2d 630, 634 (9th Cir. 1984) (holding that although an author who incorporated his preexisting articles into a manuscript as part of a partnership arrangement impliedly licensed the partnership to use the articles, the implied license did not cover the partnership's uses of the articles in works other than the manuscript).

457. Gracen v. Bradford Exch., 698 F.2d 300, 303 (7th Cir. 1983).

McKinnon Chain Co. v. American Chain Co., 259 F. 873, 878 (M.D. Pa. 1919) (quoting *Withington-Cooley* with approval), *aff'd*, 268 F. 353 (3d Cir. 1920). *See generally* 6 ERNEST BAINBRIDGE LIPSCOMB III, WALKER ON PATENTS § 20:14 (3d ed. 1987) ("The scope of an implied license depends upon the circumstances which created it, and it rests ultimately upon the intentions of the parties.").

the facts of the individual case," and, in particular, "the conduct of the parties." $^{\rm 458}$

Courts dealing with determinations of the scope of an implied license in the patent context, including the repair-reconstruction context, should remain attentive to the development of this issue in copyright cases. Implied license issues seem to be arising with increasing frequency in copyright cases,⁴⁵⁹ and the trend is very likely to continue as cases reach the courts concerning copyrightable material that has been placed on-line.⁴⁶⁰

459. See, e.g., Jacob Maxwell, Inc. v. Veeck, 110 F.3d 749, 753 (11th Cir. 1997) (concluding that the owner of a baseball team enjoyed an implied nonexclusive license to play a promotional song created at his request); I.A.E., Inc. v. Shaver, 74 F.3d 768, 778 (7th Cir. 1996) (holding that a construction company enjoyed an "implied nonexclusive license to use [an architect's] schematic design drawings" created at the company's request).

460. A number of commentators have suggested that the culture of the world wide web makes it reasonable to suppose that authors who place their copyrightable works on-line without restriction have granted an implied license to users to access their work, at least for noncommercial purposes. See Allen R. Grogan, Implied Licensing Issues in the Online World, 14 COMPUTER LAW., Aug. 1997, at 1, 2 ("Given the inherent characteristics of the World Wide Web, it could be argued that the very act of placing materials on a Web site manifests an intention that others be able, at a minimum, to access and display the work on their computer screens."); see also Martin J. Elgison & James M. Jordan III, Trademark Cases Arise from Meta-Tags, Frames, NAT'L. L.J., Oct. 20, 1997, at C6 ("Some argue that because links are such an inherent part of the Web, anyone choosing to operate a Web site has given an 'implied license' for others to link to it"); Richard S. Vermut, File Caching on the Internet: Technical Infringement or Safeguard for Efficient Network Operation?, 4 J. INTELL. PROP. L. 273, 345-49 (1997) (analyzing whether file caches may be protected by an implied license arising when an author places a copyrighted work on-line).

For additional discussion on the implied license as it may arise in the context of intellectual property rights in digital media, see BRUCE A. LEHMAN, U.S. DEP'T OF COMMERCE, INTELLECTUAL PROPERTY AND THE NATIONAL INFORMATION INFRASTRUCTURE: THE REPORT OF THE WORKING GROUP ON INTELLECTUAL PROPERTY RIGHTS 129 n.424 (1995) (suggesting that an implied license may arise when a copyrighted work is posted to a newsgroup, but might not extend to activities such as distributing copies of the work to other newsgroups); Eric Schlachter, The Intellectual Property Renaissance in Cyberspace: Why Copyright Law Could Be Unimportant on the Internet, 12 BERKELEY TECH. L.J. 15, 46 (1997) (discussing the argument that uploading a copyrighted work onto the Internet might grant an implied license to provide hypertext links to the work); John C. Yates & Michael R. Greenlee, Intellectual Property on the Internet: Balance of Interests Between The Cybernauts and the Bureaucrats, 8 J. PROPRIE-TARY RTS., July 1996, at 8, 10 (arguing that unless implied license or fair use is a defense, forwarding copyrighted works via e-mail could be copyright infringement); see also Jon Bing, Re: Re: WWW-Implied Licenset [sic] (visited Jan. 11, 1999) <http://www.cni.org/ Hforums/cni-copyright/1995-03/0260.html> (beginning a threaded discussion on the topic).

However, as Grogan points out, critical issues as to the proper scope of the implied license remain. See Grogan, supra, at 3 ("But it may be more difficult to determine whether, based on all of the facts and circumstances, a broader license should be implied, such as a license permitting permanent copies to be stored on a hard disk or distributed to third parties."). The scope issue will presumably be decided by reference to the existing

^{458.} Herbert v. United States, 36 Fed. Cl. 299, 310 (1996).

The general jurisprudence on implied license scope in patent and copyright cases provides at least two important insights for courts considering the repair-reconstruction problem. First, there is ample support for the proposition that implied license scope in general is determined by considering the reasonable expectations of the parties in view of all of the circumstances, including the parties' conduct. The repair-reconstruction problem, a type of implied license scope determination, should be analyzed in the same general way. The Federal Circuit should take the lead in pointing out this connection.

Applying a flexible, all-circumstances approach to repair-reconstruction would have important implications, not the least of which concerns the continuing viability of Aro I. An all-circumstances approach would diverge from the reasoning of Aro I, although arguably not the holding of Aro I if the case is read strictly.⁴⁶¹ Yet the Federal Circuit, as has been demonstrated, apparently considers itself free to apply such an approach notwithstanding Aro I.⁴⁶² The Federal Circuit should, at a minimum, make clear either that Aro I does not absolutely forbid the all-circumstances approach, or that after nearly forty years of experience with Aro I, in which courts have inevitably resorted to multiple-factor approaches, the Supreme Court would not be likely to follow Aro I's reasoning should the issue be presented to the Court today.

Unfortunately, the Federal Circuit has not made the connection between the general jurisprudence on implied license scope and its repair-reconstruction jurisprudence. The court missed a golden opportunity to make such a connection in the recent *Hewlett-Packard* decision.⁴⁶³ Attempting to avoid a rule whereby the patentee's unilateral intentions could dominate the repair-reconstruction analysis, the court seemed to throw away intent altogether as a consideration.⁴⁶⁴

law on implied license scope in copyright, using an all-circumstances approach. See id. at 2 (citing traditional copyright cases for the all-circumstances rule).

Notions of customary practices on the internet will unquestionably be important as courts consider implied license scope in this context. Courts might be well-advised to consider UCC concepts of trade usage in this connection. See generally infra Part IV.C.

^{461.} A strict reading of Aro I might lead one to conclude that, while the Court adopted the overall spentness standard as its holding, it limited its denigration of the multifactor approach to dicta. See supra notes 102-130 and accompanying text (discussing Aro I).

^{462.} See supra notes 122-123 and accompanying text (discussing the multiple-factor approach employed by the Federal Circuit panel in Aktiebolag).

^{463.} See Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 123 F.3d 1445 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1304 (1998); supra notes 273-278 and accompanying text (discussing this case).

^{464.} See Hewlett-Packard, 123 F.3d at 1453 (asserting that "HP's unilateral intentions" cannot control, and noting that "HP fails to recognize the distinction between what it intended to be the life of the cartridge . . . and its actual useful life").

Instead, the court could have made clear, as it had in *Carborundum*, that while the patentee's *unilateral* intentions as to implied license scope are not determinative, the balance of the parties' reasonable expectations, set in the context of all the circumstances surrounding the sales transaction, are determinative.⁴⁶⁵ Had it chosen this analysis, the court could have arrived at the same result while harmonizing its implied license and repair-reconstruction cases.

Another important insight from the implied license jurisprudence is that if an all-circumstances approach is employed to determine implied license scope, the analysis will inevitably include consideration of how the implied license was created. The implied license jurisprudence suggests that the issue of implied license scope in general cannot be entirely disentangled from the issue of implied license creation, and, unfortunately, the case law on implied license creation is in considerable ferment. Some cases apply an equitable estoppel approach (also referred to as "estoppel *in pais*") to implied license creation, based on representations by the patentee on which another relied to his or her detriment.⁴⁶⁶ Proof of reliance tends to be the major issue in these cases.⁴⁶⁷

467. See generally De Forest Radio Tel. Co. v. United States, 273 U.S. 236, 241 (1927) (stating that any language or conduct of a patent holder from which a person "may properly infer that the owner consents to his use of the patent . . . upon which the other acts, constitutes a license and a defense to an action for a tort"); Bandag, Inc. v. Al Bolser's Tire Stores, Inc., 750 F.2d 903, 925 (Fed. Cir. 1984) (determining that "[t]he reliance required to establish equitable estoppel [did not] exist"); Stickle v. Heublein, Inc., 716 F.2d 1550, 1559 (Fed. Cir. 1983) (stating that "the relatively few instances where implied licenses have been found rely on the doctrine of equitable estoppel"); St. Joseph Iron Works v. Farmers Mfg. Co., 106 F.2d 294, 298 (4th Cir. 1939) (reasoning that because plaintiff assigned his patents he "asserted them to be valid, and he is estopped to deny their validity").

In the particular case of the sale of unpatented equipment that is used to practice a patented invention, the Federal Circuit has developed a two-part test that appears to spring from equitable estoppel principles. See Met-Coil Sys. Corp. v. Korners Unlimited, Inc., 803 F.2d 684, 686-87 (Fed. Cir. 1986) ("First, the equipment involved must have no noninfringing uses... Second, the circumstances of the sale must 'plainly indicate that the grant of a license should be inferred." (citation omitted) (quoting Bandag, 750 F.2d at 925)); see also Carborundum Co. v. Molten Metal Equip. Innovations, Inc., 72 F.3d 872, 878 (Fed.

^{465.} Carborundum Co. v. Molten Metal Equip. Innovations, Inc., 72 F.3d 872, 878 (Fed. Cir. 1995) (stating that while "[0]ne party's unilateral expectations as to the scope of the implied license are irrelevant," the scope of an implied license "must be based on what the parties reasonably intended . . . based on the circumstances of the sale").

^{466.} Recently, the Federal Circuit has added an important gloss to these decisions by asserting that no "formal finding" of equitable estoppel is necessary to the creation of an implied license. See Wang Labs., Inc. v. Mitsubishi Elecs. Am., Inc., 103 F.3d 1571, 1581 (Fed. Cir. 1997) (observing that the principles of equitable estoppel should only "serve as guidelines" for the implied license analysis), cert. denied, 118 S. Ct. 69 (1997); id. at. 1582 (upholding a defense of implied license as a form of "equitable rather than legal estoppel, because the license arose from an accord implicit in the entire course of conduct between the parties").

Other cases insist that the creation of implied licenses is a matter of legal estoppel.⁴⁶⁸ Explaining the differences, the Court of Claims noted:

The essence of legal estoppel that can be found in the estoppel of the implied license doctrine involves the fact that the licensor (or assignor) has licensed (or assigned) a definable property right for valuable consideration, and then has attempted to derogate or detract from that right. The grantor is estopped from taking back in any extent that for which he has already received consideration.⁴⁶⁹

Two points are important here. First, the fact that courts have used a variety of labels to characterize the nature of the implied license need not unduly complicate the implied license model for repair-reconstruction. Indeed, as the Federal Circuit has recently recognized, "[t]hese labels describe not different kinds of licenses, but rather different categories of conduct which lead to the same conclusion: an implied license."⁴⁷⁰ Accordingly, the adoption of an implied license model for repair-reconstruction need not turn into an endless quest to characterize the inherent nature of the implied license.

Second, irrespective of whether the implied license to use and sell patented goods arising upon authorized sale is ultimately labeled legal estoppel, equitable estoppel, or some other variation, the analysis of the scope of an implied license involves an all-circumstances approach that focuses on reasonable expectations. In *Wang Laboratories*, for example, the court looked to the parties' "entire course of conduct" in determining whether an implied license had been created, and did not suggest that it would apply a more constrained standard

470. Wang Labs., 103 F.3d at 1580.

Cir. 1995) (following the *Met-Coil* test); Devices for Med., Inc. v. Boehl, 822 F.2d 1062, 1068 (Fed. Cir. 1987) (same).

^{468.} See, e.g., AMP Inc. v. United States, 389 F.2d 448, 453 (Ct. Cl. 1968) ("[T]he doctrine of implied license does not rest on a theory of estoppel in pais, but rather on a rationale of legal estoppel. This latter term is merely shorthand for saying that a grantor of a property right or interest cannot derogate from the right granted by his own subsequent acts.").

^{469.} Id. at 452; see also Wang Labs., 103 F.3d at 1581 ("Legal estoppel refers to a narrower category of conduct encompassing scenarios where a patentee has licensed or assigned a right, received consideration, and then sought to derogate from the right granted." (citing Spindelfabrik Suessen-Schurr Stahlecker & Grill GmbH v. Schubert & Salzer Maschinenfabrik Aktiengesellschaft, 829 F.2d 1075, 1080 (Fed. Cir. 1987))); Spindelfabrik, 829 F.2d at 1080 ("The rationale for [legal estoppel] is to estop the grantor from taking back that for which he received consideration." (citing AMP, 389 F.2d at 452)). "Legal estoppel" is also known as estoppel by deed, a common species of which is estoppel by warranty. See AMP, 389 F.2d at 452 n.5.

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to adjudicate scope.⁴⁷¹ Similarly, nothing in the implied license cases resting on legal estoppel suggests that courts will isolate only a single factor (such as the nature of the patented device) in order to determine the scope of the license.

B. Implied License Scope from a Property Perspective

The purchaser's implied license to use patented goods has come to serve a useful social function by formalizing, ex ante, property rights as between parties to an informal, commonplace transaction in goods. Similarly, the implied license in real property long has formalized rights connected to land arising from the most mundane of activities, where the requirements of the traditional categories of servitudes are not satisfied. Examples of the implied license in land are plentiful: implied licenses might arise from permission to the public to enter business premises,⁴⁷² informal permission to use a road over another's land,⁴⁷³ permission to use railroad rights-ofway,⁴⁷⁴ permission to cross navigable waters overlying private lands,⁴⁷⁵

473. See, e.g., Hollis v. Tomlinson, 585 So. 2d 862, 865 (Ala. 1991) (characterizing the defendant's permissive use of a road over plaintiff's land as falling short of an easement); Pettus v. Keeling, 352 S.E.2d 321, 323 (Va. 1987) (holding that the use of a road across private land "with the knowledge and acquiescence of the owners" created an easement).

474. Specifically, these cases concern the implied license to use or cross railroad rightsof-way, an issue that has arisen in cases dealing with the railroad's responsibility of due care to licensees. See, e.g., Federal Life Ins. Co. v. Zebec, 82 F.2d 961, 964 (7th Cir. 1936) (holding that "there was an implied license from the railroad company to the public and pedestrians to use the track"); Director Gen. of R.Rs. v. Reynolds, 268 F. 948, 950 (6th Cir. 1920) (stating that status as a licensee "depends upon whether there was . . . a customary and permissive use"); Hodges v. Erie R.R. Co., 257 F. 494, 496 (6th Cir. 1919) (per curiam) (reasoning that "a license to use the pathway over the tracks when not occupied by a train [did not] include[] a license to cross when the pathway was so occupied"); Erie R.R. Co. v. Burke, 214 F. 247, 251 (2d Cir. 1914) (holding railroad company liable for the injuries sustained by the plaintiff because "the public had been permitted for years with the acquiescence of the railroad company to use the tracks at the place of this accident in the manner this plaintiff used them"); Great N. R.R. Co. v. Thompson, 199 F. 395, 398 (9th Cir. 1912) (discussing the requirements to qualify as a licensee); Farley v. Cincinnati, H. & D.R. Co., 108 F. 14, 18 (6th Cir. 1901) (considering "the question of implied license, and the evidence and use essential to establish such a license").

475. See, e.g., Hilt v. Weber, 233 N.W. 159, 164 (Mich. 1930) (stating that where private lands "have been encroached upon by the navigable waters of the Great Lakes, until such owners construct dykes or levees which prevent, there is an implied license to the public to enter upon and use and navigate such water, and to exercise all the rights incident to navigation" (quoting Kavanaugh v. Baird, 217 N.W. 2 (Mich. 1928))); Brusco Towboat Co.

^{471.} Id. at 1581-82 (citing De Forest Radio Tel. Co., 273 U.S. at 241).

^{472.} See State v. Quinnel, 151 N.W.2d 598, 602 (Minn. 1967) (referring to "the implied license to enter upon the premises of another for purposes of ordinary business intercourse with the landowner"); Lloyd Corp. v. Whiffen, 773 P.2d 1294, 1314 (Or. 1989) (referring to a revocable license to enter a store or restaurant (citing Penn v. Henderson, 146 P.2d 760 (1944))).

and in other real property contexts.⁴⁷⁶ The implied license is also of interest in admiralty cases.⁴⁷⁷

In the law of real property, the license is an ancient concept that attempts to define the relationship between a landowner and another regarding the use of land.⁴⁷⁸ Thus, a discussion of licenses in land fits alongside a discussion of the law of servitudes generally, which also defines usufructuary rights in land.⁴⁷⁹

477. The implied license has routinely been used in the law of admiralty as a label for the general permission provided to ships to enter friendly ports. See, e.g., Coleman v. Tennessee, 97 U.S. 509, 516 n.1 (1878) (stating that a ship's passage is free from interference based on an implied license); La Nereyada, 21 U.S. (8 Wheat.) 108, 164 (1823) (asserting that a vessel was protected by the "implied license under which she entered our waters"); The Santissima Trinidad, 20 U.S. (7 Wheat.) 283, 354 (1822) (concluding that the implied license to use a port does not extend to protect misconduct); The Schooner Exch. v. Mc-Faddon, 11 U.S. (7 Cranch) 116, 144 (1812) (construing the "implied license . . . under which [a] vessel enters a friendly port . . . [to] contain[] an exemption from the [local] jurisdiction").

Daniel Webster argued The Santissima Trinidad, which dealt with the scope of an implied license, and, particularly, an entirely different sort of repair-reconstruction problem. The Court found that a foreign vessel, even a vessel of war, had an implied license to enter a U.S. port, but that the license was limited in scope by a repair doctrine. The Santissima Trinidad, 20 U.S. at 353. Webster argued that the "implied license may extend to a mere replacement of the original force; but it cannot extend to such an augmentation of the force as would be inconsistent with the neutral character of the power granting the license." Id. at 324. Whether this was the inspiration for Webster's repair-reconstruction arguments in Wilson v. Simpson is open to speculation.

478. 8 THOMPSON ON REAL PROPERTY § 64.02(a) (David A. Thomas ed., 1994) (defining a license as a "relationship between two or more persons with respect to the use of a tract of land in which there is nothing more than a revocable privilege by one of them to be upon the land, which presence would, in the absence of the privilege, be actionable by the other").

479. Easements, real covenants, and equitable servitudes comprise the traditional categories of servitudes. *See generally* ROGER A. CUNNINGHAM ET AL., THE LAW OF PROPERTY § 8 (2d ed. 1993).

Some surprising connections can be found between the law of servitudes and the law of intellectual property. Several scholars have drawn analogies between the law of servitudes and restrictions based on the post-sale use of subject matter protected by intellectual property rights, especially in copyright scholarship. See Thomas F. Cotter, Pragmatism, Economics, and the Droit Moral, 76 N.C. L. REV. 1, 53-54 (1997) (exploring connections between equitable servitudes on chattels and Continental concepts of moral rights in copyrighted works); Thomas M.S. Hemnes, Restraints on Alienation, Equitable Servitudes, and the Feudal Nature of Computer Software Licensing, 71 DENV. U. L. REV. 577, 593 (1994) (considering analogies between equitable servitudes and restrictive terms in software licenses); John M. Kernochan, The Distribution Right in the United States of America: Review and Reflections, 42 VAND. L. REV. 1407, 1413-15 (1989) (reviewing the notion of equitable servitudes on chattels in connection with the first sale doctrine of copyright law); Ken Lovern, Evalu-

v. State, 589 P.2d 712, 720 (Or. 1978) (in banc) (stating that the right to use riparian waters is "derived from a passive or implied license" (citation omitted)).

^{476.} For additional examples illustrating the wide array of cases in which the express or implied license in land may arise, see Jon W. BRUCE & JAMES W. ELV, JR., THE LAW OF EASEMENTS AND LICENSES IN LAND ¶ 11.01[1], at 5, 6 (rev. ed. 1995).

Characterizing the license concept rigorously enough to make it useful as an analytical tool in law has long been considered a formidable task. Hohfeld, for example, reportedly viewed the term "license" as "a word of convenient and seductive obscurity" and the law of licenses as an "intricate and confused subject."⁴⁸⁰ Perhaps attempting to sidestep the difficulties, the *Restatement* defines license largely in terms of what it is not: it is an interest relating to land, where the interest does not qualify as an easement.⁴⁸¹

More straightforwardly, a license is often defined as "permission to do an act or series of acts on another's land that, absent authorization, would constitute trespass."⁴⁸² Importantly for purposes of under-

Scholars also have examined the connections between the patent exhaustion doctrine and equitable servitudes on chattels. See Zechariah Chafee, Jr., Equitable Servitudes on Chattels, 41 HARV. L. REV. 945, 999-1005 (1928) [hereinafter Chafee, Equitable Servitudes] (considering the application of an equitable servitudes theory to patent cases, particularly those involving restrictions on the use of patented chattels); Bruce D. Gray, Note, Mallinckrodt Inc. v. Medipart Inc.: Express Limitations on the Use of a Patented Product After Sale, 13 GEO. MASON L. REV. 803, 820-21 (1991) (analyzing restrictions that impose a negative duty on the purchaser of patented goods to refrain from specified uses of the goods to equitable servitudes).

Scholars have persuasively explained in economic terms the law's reluctance to enforce equitable servitudes in chattels. See Henry Hansmann & Marina Santilli, Authors' and Artists' Moral Rights: A Comparative Legal and Economic Analysis, 26 J. LEGAL STUD. 95, 101-02 (1997) (highlighting problems of notice and impairment of alienability, and pointing out that the efficiency that may result from large-scale coordination of uses on adjoining parcels of real estate may not be achievable for chattels). The value of the equitable servitude on chattels as an analogy for repair-reconstruction is limited because cases approving of equitable servitudes in chattels are exceedingly rare. See Zechariah Chafee, Jr., The Music Goes Round and Round: Equitable Servitudes and Chattels, 69 HARV. L. REV. 1250, 1258 (1956) [hereinafter Chafee, The Music Goes Round] (noting that "it is an extraordinary thing for the law to enforce [equitable servitudes] at all").

480. Wesley Newcomb Hohfeld, Faulty Analysis in Easement and License Cases, 27 YALE L.J. 66, 92 (1917).

481. Specifically, the Restatement defines license as an interest in another's land which

(a) entitles the owner of the interest to a use of the land, and

(b) arises from the consent of the one whose interest in the land used is affected thereby, and

(c) is not incident to an estate in the land, and

(d) is not an easement.

RESTATEMENT OF PROPERTY: SERVITUDES § 512 (1944). An introductory note in the *Restate*ment explains that the license is "the residue of those privileges of use of land arising out of the consent of the possessor of the land which are not included with the definition of easements." RESTATEMENT OF PROPERTY: SERVITUDES, PT. II, INTRODUCTORY NOTE (1944).

482. BRUCE & ELY, supra note 476, ¶ 1.03[1], at 7 (citation omitted). This definition is consistent with a famous passage from an early British case:

 $A \dots$ license properly passeth no interest, nor alters or transfers property in any thing, but only makes an action lawful, which without it had been unlawful. As a

ating Resale Royalties for Used CDs, KAN. J. L. & PUB. POL'Y, Fall 1994, at 113, 116 (analyzing analogies between equitable servitudes on chattels and the notion of resale royalties on copyrighted works).

standing how the implied license model may change courts' approach to the repair-reconstruction problem, the persistent characteristic of any definition of a license is *consent*.⁴⁸³

It is, of course, the scope of the consent that is of concern for purposes of analogizing to the repair-reconstruction problem. The *Restatement of Property* sets forth a general rule for the scope of licenses in land: "The extent of a license is fixed by the terms of the consent which creates it."⁴⁸⁴ With regard to implied licenses, because there are no express terms of consent, courts must determine the scope of the license:

by holding the licensor responsible to the extent to which he might reasonably have foreseen reliance upon an appearance of consent indicated by his conduct and by limiting the privilege of the licensee to such uses as are made in reasonable reliance upon an appearance of consent by the licensor.⁴⁸⁵

This link between an implied license's scope, and the extent of the licensor's consent, is important for the repair-reconstruction problem. Courts have clearly been troubled by reliance on intent (particularly the supposed intent of the patentee) in adjudicating repairreconstruction disputes; it may simply be too easy, and too tempting, for the patentee to develop "intentions" post hoc and introduce them at trial as if they were readily apparent to the patentee and the purchaser at the time of the transaction.

While not entirely obviating the problem, the consent formulation may allow courts in repair-reconstruction cases to establish some distance from purely subjective intent, while retaining the general approach of surveying the evidence for manifestations of mutually agreed-upon expectations. For example, on the licensor's side:

The consent of a licensor may be broader than he intended because, having appeared to intend more than he did, and

license to go beyond the seas, to hunt in a mans park, to come into his house, are only actions, which without license, had been unlawful.

Thomas v. Sorrell, 124 Eng. Rep. 1098, 1109 (K.B. 1673). Professor Clark noted that the case did not deal with a license in land, but rather with "another kind of interest, namely, a dispensation or patent from the King against the operation of a statute providing a penalty for selling liquor without license." Charles E. Clark, *Licenses in Real Property Law*, 21 COLUM. L. REV. 757, 759 n.8 (1921).

^{483.} See Clark, supra note 482, at 758 (noting that the word "license" has its root in the Latin *licentia*, meaning freedom or liberty, and that this origin explains the core of the current concept—permission or consent).

^{484.} RESTATEMENT OF PROPERTY: SERVITUDES § 516 (1944). 485. *Id.* § 516 cmt. b.

having so acted that he should reasonably have foreseen the appearance resulting from his consent, he is deemed to have consented to the extent of the appearance he created.⁴⁸⁶

Likewise, where the licensee's outward manifestations of consent diverge from the licensee's "intent," the manifestations of consent control.⁴⁸⁷ Effectively, then, the approach calls for an assessment of the reasonableness of the expectations of the parties to the license transaction.⁴⁸⁸

Applying these notions to the repair-reconstruction problem, a court could eschew notions of the patentee's unilateral intent and instead analyze the reasonableness of the parties' expectations. Specifically, the court could analyze, for example, the patentee's conduct, asking whether the patentee could reasonably have foreseen that purchasers would rely upon the appearance of consent which that conduct created. Relevant conduct on the part of the patentee could include the patentee's statements (in the patent specification, in promotional literature, or elsewhere) as well as the patentee's design choices as embodied in the device at issue.⁴⁸⁹

Unfortunately, because most licenses in land are terminable at the licensor's will, the fine points of license scope rarely become the subject of litigation.⁴⁹⁰ However, cases analyzing the scope of easements do arise more frequently. An easement, of course, is a nonpossessory interest in another's land,⁴⁹¹ which may be created by express agreement complying with the local statute of frauds, by implication, or by prescription.⁴⁹² In general, easements are distinct from licenses because the latter are ordinarily terminable at the will of the licensor,⁴⁹³ while easements are not.⁴⁹⁴ In a variety of circumstances, how-

489. By considering the patentee's design choices, this Article is not, of course, suggesting a return to the use of spentness rhetoric as an end in itself. Instead, it is suggesting the use of spentness rhetoric as an indicium of intent. See generally supra Part II.

490. See BRUCE & ELY, supra note 476, ¶ 11.03, at 9, 10.

491. See Gerald Korngold, Private Land Use Arrangements: Easements, Real Cove-Nants, and Equitable Servitudes 5 (1990).

492. BRUCE & ELY, supra note 476, ¶ 1.01, at 3.

493. See RESTATEMENT OF PROPERTY: SERVITUDES § 519(1) (1944) (stating that, with some exceptions, "a license is terminable at the will of the possessor of the land subject to it"). This is not surprising because licenses are founded upon consent, which in most circumstances the licensor can simply withdraw. Viewed in this way, licenses seem quite distinct from interests in land, and in fact most authorities consider licenses not to rise to the level of an interest in land. See, e.g., BRUCE & ELY, supra note 476, ¶ 11.01, at 2.

^{486.} Id. (emphasis added).

^{487.} Id.

^{488.} See 8 THOMPSON ON REAL PROPERTY, supra note 478, § 64.04(a), at 27 (noting that, in the absence of agreement, the rights of the licensee become "a question of the reasonableness of the expectations of the parties").

ever, licenses can become "irrevocable"—meaning that they cannot simply be revoked at the licensor's whim, although they may have a limited duration.⁴⁹⁵

The implied license to use a patented item upon authorized sale has much in common with the "irrevocable" license in land.⁴⁹⁶ To be sure, the implied license to repair can be altered or conditioned by express statements from the patentee. However, where an implied license to repair springs into existence in the wake of an unconditional sale of patented goods, the patentee cannot later revoke the license at his whim. Thus, once created, the implied license to use a patented item may reasonably be analogized to the irrevocable license in land.

Because it is well established in the law of servitudes that irrevocable licenses in land are analytically indistinct, in most respects, from easements,⁴⁹⁷ guidelines concerning the scope of easements may be useful in analyzing scope questions concerning irrevocable licenses in

496. There may also be some subtle differences. For example, a license in land can become irrevocable by operation of subsequent events or through payment of consideration, whereas the implied license growing out of the unconditional sale of patented goods presumably would arise even if no consideration were paid—e.g., the gift of patented goods presumably would support an implied license to use and resell the goods.

In addition, a number of courts and commentators offer an equitable estoppel rationale as the basis for the irrevocable license. See, e.g., Camp v. Milam, 277 So. 2d 95, 99 (Ala. 1973) (stating that, when the licensee makes expenditures which were contemplated by the licensor, "for reasons founded upon the equitable principle of estoppel, [the license] becomes irrevocable and confers upon the licensee a substantive equitable right in the property"); CUNNINGHAM ET AL., supra note 479, § 8.8, at 456-57 (asserting that estoppel is one of the theories on which courts have relied in finding licenses irrevocable); 4 RICHARD R. POWELL, POWELL ON REAL PROPERTY § 34.26, at 315 (Patrick J. Rohan ed., 1998) (noting that the consent giving rise to the license relationship "becomes irrevocable in equity whenever the recipient of the consent has executed his part of the transaction by payment, by taking possession, or by making expenditures in reliance upon the consent"). Accordingly, it is conceivable that a court would rule that a license is revocable notwithstanding the payment of valuable consideration if the equities ran strongly against the licensee. By contrast, the implied license to use and resell patented goods has become so entrenched in U.S. patent jurisprudence that it would be startling for a court to refuse to imply a license on the basis of equitable considerations. However it may have been viewed by nineteenth century courts, the implied license as it is used today seems more a creature of law.

497. See 4 POWELL, supra note 496, § 34.26, at 315 (stating that events subsequent to the formation of the license may transform it into what is effectively an easement enforced in equity). The irrevocable license may differ from a true easement in its duration. While an easement may be indefinite, an irrevocable license, under the *Restatement* approach, en-

^{494.} See generally CUNNINGHAM ET AL., supra note 479, § 8.12.

^{495.} RESTATEMENT OF PROPERTY: SERVITUDES §§ 519(3), (4) (stating that a license coupled with an interest may be terminated "only to such an extent as not to prevent the license from being effective to protect the interest," and explaining that a "licensee ... who has made expenditures of capital or labor in the exercise of his license in reasonable reliance upon representations by the licensor as to the duration of the license, is privileged to continue the use permitted ... to the extent reasonably necessary to realize upon his expenditures").

land, and, by extension, the scope of an implied license in repair-reconstruction cases. In particular, the law concerning the scope of the narrow classes of implied easements⁴⁹⁸ presents an especially useful source of rules that could be applied in repair-reconstruction cases.⁴⁹⁹

499. Easements (and implied licenses) may also arise through custom, a matter of recent scholarly interest. See David J. Bederman, The Curious Resurrection of Custom: Beach Access and Judicial Takings, 96 COLUM. L. REV. 1375, 1382-1413 (1996) (discussing the application of custom in property law); Carol Rose, The Comedy of the Commons: Custom, Commerce, and Inherently Public Property, 53 U. CHI. L. REV. 711, 714 (1986) (examining "the theory of 'custom,' where the public asserts ownership of property under some claim so ancient that it antedates any memory to the contrary"). Perhaps the best example of a license implied from custom concerns the nature of ranchers' rights to graze cattle on public lands in the western United States. As the Supreme Court described it:

At common law the owner was required to confine his live stock, or else was held liable for any damage done by them upon the land of third persons. That law was not adapted to the situation of those States where there were great plains and vast tracts of uninclosed land, suitable for pasture. And so, without passing a statute, or taking any affirmative action on the subject, the United States suffered its public domain to be used for such purposes. There thus grew up a sort of implied license that these lands, thus left open, might be used so long as the Government did not cancel its tacit consent.

Light v. United States, 220 U.S. 523, 535 (1911) (citing Buford v. Houtz, 133 U.S. 326 (1890)); see also United States v. Grimaud, 220 U.S. 506 (1911). For recent examples of grazing rights cases that cite the implied license rubric, see Gardner v. Stager, 892 F. Supp. 1301, 1303 (D. Nev. 1995) (noting that the Nevada Supreme Court "has referred to grazing on public lands as something done under an 'implied license'" (citing Itcaina v. Marble, 55 P.2d 625 (Nev. 1936))), aff'd, 103 F.3d 886 (9th Cir. 1996); Hage v. United States, 35 Fed. Cl. 147, 166 (1996) (finding that "[p]laintiff's grazing permit has the traditional characteristics and language of a revokable license"); Fallini v. United States, 31 Fed. Cl. 53, 57 (1994) (noting that the practice of grazing on public land became an implied license after years of use without government objection), vacated, 56 F.3d 1378 (Fed. Cir. 1995). The implied license has also been used to justify more general claims of access to public lands, e.g., for general recreational purposes. See United States v. Curtis-Nevada Mines, Inc., 611 F.2d 1277, 1284 (9th Cir. 1980) (noting "a traditional policy for the use of public lands allowing the public to use lands within the public domain for general recreational purposes without holding a written, formal permit").

The scope of an implied license arising through custom is presumably dependent upon the scope of the custom from which the license was created, but the cases do not illuminate this point. Nonetheless, notions of custom as an interpretive device, rather than

dures only so long as is "reasonably necessary [for the licensee] to realize upon his expenditures." RESTATEMENT OF PROPERTY: SERVITUDES § 519(4) (1944).

^{498.} Specifically, easements implied from prior use may provide an analogy. Such easements, along with easements implied from necessity, and easements created by prescription, all may present difficult scope issues. See CUNNINGHAM ET AL., supra note 479, § 8.9, at 457-58 ("Prescriptive and implied servitudes are always likely to present questions of scope or location, since the events giving rise to them are not communicative acts."). It is, however, important to note that approaches to scope among this group of easements may vary slightly depending upon exactly how the easement was created. See Wright v. Horse Creek Ranches, 697 P.2d 384, 388 (Colo. 1985) (en banc) (stating that "precise delineation of the means by which a particular easement is acquired is critical to any determination of the extent to which the owner of the dominant estate is entitled to burden the servient estate").

In the case of easements created by necessity, implication, or prescription, because no express document is available for evidencing the scope of the easement, a court is left to determine the scope "by inference based primarily upon the circumstances" under which the easements were created.⁵⁰⁰ In general, courts determining the scope of these types of easements "are trying to effectuate the unexpressed intent of the parties," while also maintaining enough flexibility to accommodate reasonably foreseeable changes in the nature or intensity of the easement owner's use of the easement.⁵⁰¹

The tentative draft of the *Restatement (Third) of Property (Servitudes)* also provides a framework that could prove helpful in repair-reconstruction cases. The tentative draft establishes general rules for the interpretation of servitudes, specifying that the intentions of the parties should govern the interpretation of servitudes created by express agreement, and that the "reasonable expectations" of the parties should govern agreements created "by implication, necessity, or estoppel."⁵⁰² These reasonable expectations are inferred from the circumstances.⁵⁰³ The tentative draft also suggests that a series of default

501. 4 POWELL, supra note 496, § 34.13, at 197. To focus on a particular example, consider the easement implied from prior use, created when a use exists at a time when a single parcel is split into multiple parcels. In ascertaining the scope of an easement implied from prior use, courts will generally start from the proposition that the scope of the easement depends upon the scope of the use in existence at the time when the subject property was severed into multiple parcels. However, courts may well incorporate additional uses that were reasonably foreseeable at the time of the severance. See KORNGOLD, supra note 491, § 4.03, at 118 (stating that "if the parties could reasonably have expected further development, that expectation will define the future use of an easement implied by prior use"). Courts are willing to extend the scope of an implied easement to reasonably foreseeable uses because the law presumes that the parties would have intended the easement to evolve in accordance with changes brought about as a result of reasonable and normal development of the property and its surroundings. Id. § 4.09, at 140-41. See generally RESTATEMENT OF PROPERTY: SERVITUDES § 483 cmt. e (1944) (contrasting the interpretation of express easements and those created by implication).

502. RESTATEMENT (THIRD) OF PROPERTY: SERVITUDES § 4.1(1)(b) (Tentative Draft No. 4, 1994).

503. See id. cmt. b ("Where there is little or no evidence of the parties' intentions, their reasonable expectations, inferable from the circumstances, are a proper guide to interpretation.").

as a source of property rights, can be very effective in resolving repair-reconstruction disputes. This is best explored via the concept of trade usage or trade custom in commercial law. See *infra* Part IV.C. for a discussion.

^{500. 4} POWELL, supra note 496, § 34.13, at 196; see also KORNGOLD, supra note 491, § 4.03, at 117 n.66 (citing cases that support the general view that the scope of implied easements is determined on the basis of an all-circumstances approach).

rules should be used where a dispute remains due to conflicts in the evidence of reasonable expectations.⁵⁰⁴

In summary, an analysis of implied license scope from a real property perspective reinforces lessons from the intellectual property jurisprudence concerning the primacy of the parties' intentions. Moreover, the real property cases avoid the problem of resting implied license scope determinations on the licensor's unilateral, subjective intentions by formulating the test in terms of reasonable expectations, and by focusing on the scope of the licensor's apparent consent.

C. Implied License Scope from a Contract Perspective

Perhaps the most apparent outcome of applying an implied license model to the repair-reconstruction dichotomy is that repair-reconstruction might be transformed into a contract problem. This would produce some startling results, including the possibility of threatening patent law's hegemony over repair-reconstruction, because a contract is governed by state law. Indeed, the implied license patent case law includes some casual statements to the effect that implied licenses, like express licenses, are "governed by ordinary principles of state contract law."⁵⁰⁵

Apart from choice of law complexities, however, the analogy between the repair-reconstruction problem and implied license scope from a contract perspective is helpful in a number of ways. First, as might be expected, the contract jurisprudence can help explain the role of the parties' reasonable expectations. Second, contract law has developed a number of strategies to deal with the problem of gaps in the evidence on expectations and scope of consent. One such strategy, the resort to evidence of trade custom as developed in the Uniform Commercial Code, should prove to be especially useful in resolving repair-reconstruction disputes.

In his treatise, Professor Adelman has laid the groundwork for understanding the repair-reconstruction problem from a contract per-

^{504.} See id. The series of default rules set forth in the *Restatement* go to the particulars of traditional easements and present no particularly interesting analogies for the repair-reconstruction analysis, but the overall scheme of a general expectations-based analysis supplemented by default rules might be an appropriate one to pursue for repairreconstruction.

^{505.} McCoy v. Mitsuboshi Cutlery, Inc., 67 F.3d 917, 920 (Fed. Cir. 1995); see also Ideal Wrapping Mach. Co. & George Close Co., 23 F.2d 848, 850 (D. Mass.) ("When the owner of a patent sells a patented machine, he thereby frees it from the control of the patent law; the results which flow from the sale are dependent on the law of contracts."), aff'd, 29 F.2d 533 (1st Cir. 1928).

spective. Professor Adelman points out that the "essential economic function" of the repair-reconstruction dichotomy is to identify "what most purchasers would put into a contract if they had to formally negotiate for the purchase of the technology separate from the manufactured product."⁵⁰⁶ Such a "negotiation" might presumably revolve around the parties' expectations as to factors such as the value of the replaced components,⁵⁰⁷ the useful life of components,⁵⁰⁸ or even the expectation that the patented device will be usable only once before reconditioning will be required,⁵⁰⁹ ultimately relating, of course, to the scope of the royalty obligation.⁵¹⁰ This perspective is especially illuminating because it shows that a shift to the implied license model does not mean that the spentness analysis must be ignored; instead, it means that the spentness analysis is placed in its proper context as an indicator of the patentee's and the purchaser's probable expectations.

1. The Implied License as Implied-in-Fact Contract.—If the repair-reconstruction problem, framed as a question of implied license scope, is to be analyzed as a contract problem, a threshold question is whether the implied license is an implied-in-fact or an implied-in-law contract. Opinion is split on whether the implied license arising in various intellectual property contexts should be treated as an impliedin-fact or an implied-in-law contract. A number of recent appellate copyright decisions,⁵¹¹ and some patent cases,⁵¹² have treated implied licenses as a species of implied-in-fact contract. By contrast, some

508. Id.

^{506.} Martin J. Adelman, Patent Law Perspectives § 3.8, at 124 (1995).

^{507.} Professor Adelman suggests, for example, that the parties might bargain for a provision that establishes a definite royalty on any machine in which the total value of the replaced parts exceeded the total value of the machine. *Id.* This is a restatement of the dominance test in contract terms.

^{509.} In this situation, Professor Adelman proposes that reasonable parties would agree that reconditioning the machine would always require a royalty payment even where the reconditioning activities might seem modest. *Id.*

^{510.} Analyzed in this way, the existing law on repair-reconstruction can be understood as a rule that "require[s] a manufacturing patentee to collect up front from the purchaser for all conceivable repairs for the product, even such major ones as replacing an essential part of the combination even if that part ordinarily outlasts the other parts of the patented machine." *Id.*

^{511.} See, e.g., Lulirama, Ltd. v. Axcess Broad. Servs., Inc., 128 F.3d 872, 882 (5th Cir. 1997) (finding that "a nonexclusive license supported by consideration is a contract" (citing Jacob Maxwell, Inc. v. Veeck, 110 F.3d 749, 752-53 (11th Cir. 1997))); I.A.E., Inc. v. Shaver, 74 F.3d 768, 776 (7th Cir. 1996) (asserting that "implied licenses are like implied contracts"); Effects Assocs. v. Cohen, 908 F.2d 555, 559 n.7 (9th Cir. 1990) ("Plaintiff cites no authority for the proposition that an implied license is equitable in nature; it seems to us to be a creature of law, much like any other implied-in-fact contract."); see also 3 NIMMER & NIMMER, supra note 455, § 10.01[C][5] & n.73.1, at 20 ("A license is, in legal contemplation, merely an agreement not to sue the licensee for infringement.").

scholars considering the patent exhaustion problem have assumed that the implied license to use patented goods upon authorized sale arises as a license implied in law.⁵¹³

In traditional doctrine, implied-in-fact contracts and implied-inlaw contracts differ sharply with respect to the role played by the parties' intentions in the formation of the contract. The term "impliedin-fact" contract "refers to that class of obligations which arises from mutual agreement and intent to promise, when the agreement and promise have simply not been expressed in words."⁵¹⁴ An implied-infact contract, then, might be considered simply a contract by conduct.⁵¹⁵ However, the conduct, in the context of the surrounding facts and circumstances (including course of dealing, usage of trade, or course of performance), must evidence all of the elements of an express contract.⁵¹⁶ Thus, the facts must at least allow for an inference of mutuality of intent to contract, including an offer and acceptance, and consideration.⁵¹⁷ The distinction between express and implied-in-fact contracts involves "no difference in legal effect, but lies merely in the mode of manifesting assent."⁵¹⁸

By contrast, contracts "implied-in-law" (quasi-contracts) are obligations "imposed by the courts for the purpose of bringing about a

515. See Baltimore & Ohio R.R. v. United States, 261 U.S. 592, 597 (1923) (finding that an implied contract "is inferred, as a fact, from conduct of the parties showing, in light of the surrounding circumstances, their tacit understanding"); Prudential Ins. Co. of Am. v. United States, 801 F.2d 1295, 1297 (Fed. Cir. 1986) ("A contract implied in fact is not created or evidenced by explicit agreement of the parties, but is inferred as a matter of reason or justice from the acts or conduct of the parties."); 1 WILLISTON, supra note 514, § 1:5, at 22 ("[A] contract by conduct, that is, one inferred or implied in fact, is yet another type of contract within our general definition.").

517. See Yachts Am. Inc. v. United States, 779 F.2d 656, 661 (Fed. Cir. 1985) (asserting that for a contract to be implied-in-fact, "the legal requisites of an express contract, offer, acceptance, agreement, consideration, etc., must be provided").

518. RESTATEMENT (SECOND) OF CONTRACTS § 4, cmt. a (1979).

^{512.} See, e.g., Cardiovascular Diagnostics, Inc. v. Boehringer Manheim Corp., 985 F. Supp. 615, 621 (E.D.N.C. 1997) ("Existing predominantly in the realm of patent law, the implied license doctrine has evolved as a form of implied-in-fact contract."); Medeco Sec. Locks, Inc. v. Lock Tech. Corp., 199 U.S.P.Q. (BNA) 519, 524 (S.D.N.Y. 1976) ("Like any other implied contract, an implied license arises out of the objective conduct of the parties, which a reasonable man would regard as indicating that an agreement has been reached. It cannot arise out of the unilateral expectations of one party").

^{513.} See, e.g. Oddi, supra note 3, at 120 (stating that "an implied license is . . . implied in law and takes effect by operation of law").

^{514. 1} SAMUEL WILLISTON, A TREATISE ON THE LAW OF CONTRACTS § 1:5, at 20 (Richard A. Lord ed., 4th ed. 1990); see Teets v. Chromalloy Gas Turbine Corp., 83 F.3d 403, 409 (Fed. Cir. 1996) (concluding that "[t]he test for an implied-in-fact contract . . . focus[es] on whether . . . the employee received an assignment on this occasion to invent").

^{516.} See Restatement (Second) of Contracts § 4, cmt. a (1979).

just result without reference to the intention of the parties."⁵¹⁹ Consequently, quasi-contracts are generally portrayed in modern scholarship as being unlike true contracts in two fundamental ways: They are public arrangements, not private ones,⁵²⁰ and they are created as a remedy for unjust enrichment.⁵²¹

Plainly, the distinction between implied-in-fact contract and quasi-contract will be difficult to discern in some cases.⁵²² Conduct that to one person results in unjust enrichment, justifying imposition of a quasi-contractual obligation, may to another person partially manifest assent, justifying imposition of an implied-in-fact contract.⁵²³

It is telling that at least one scholar has recently cautioned against drawing fine distinctions between implied-in-fact and implied-in-law contracts.⁵²⁴ Reasonable arguments can be made that the implied license to use patented goods after purchase may be labeled an implied-in-fact or an implied-in-law contract, but the better view is that the implied license should be treated as one implied-in-fact, as at least one other commentator has pointed out.⁵²⁵

2. Trade Usage and Implied License Scope.—One advantage of considering the repair-reconstruction problem by analogy to implied-infact contracts is that contract jurisprudence provides a well-developed set of basic rules for filling out the unstated terms of agreements. One example particularly pertinent to the repair-reconstruction prob-

522. See RESTATEMENT (SECOND) OF CONTRACTS § 19, cmt. a (1979) (stating that "the line between a contractual claim based on agreement and a quasi-contractual claim based on unjust enrichment is often indistinct").

523. See Dalton, supra note 520, at 1022 (concluding that "[t]he uncertainty of conduct as evidence of agreement can make it unclear whether a particular relationship should be considered contractual or quasi-contractual").

524. See id. at 1014-15 (observing an "essential similarity" between the judicial choice to impose quasi-contractual obligations and the decision that circumstances evidence implied-in-fact contractual obligations).

525. See Scott A. Chambers, Exhaustion Doctrine in Biotechnology, 35 IDEA 298, 311, 322-24 (1995) (assuming that the patent exhaustion doctrine gives rise to an implied-in-law license and arguing that the license should instead be treated as one implied-in-fact). Chambers points out simply that transactions in patented goods are so variable that a factual exploration of the parties' intentions will ordinarily be justified.

^{519. 1} WILLISTON, supra note 514, § 1:6, at 25; see RESTATEMENT (SECOND) OF CONTRACTS (1979), § 4, cmt. b (1979) (discussing quasi-contracts).

^{520.} See Clare Dalton, An Essay in the Deconstruction of Contract Doctrine, 94 YALE L.J. 997, 1021 (1985) (distinguishing contracts implied-in-fact and those implied-in-law or quasicontracts, which, "in contrast, are 'public'").

^{521.} See id. (stating that quasi-contract is covered in the Restatement of Restitution, not in the Restatement of Contracts); see also Hercules Inc. v. United States, 516 U.S. 417, 424 (1996) (stating that an implied-in-law contract is a "fiction of law" where 'a promise is imputed to perform a legal duty, as to repay money obtained by fraud or duress" (quoting Baltimore & Ohio R.R. Co. v. United States, 261 U.S. 592, 597 (1922))).

lem is UCC Article 2's "usage of trade" concept.⁵²⁶ The UCC defines "usage of trade" as "any practice or method of dealing having such regularity of observance in a place, vocation or trade as to justify an expectation that it will be observed with respect to the transaction in question."⁵²⁷ The "usage of trade" provision bears directly on the repair-reconstruction problem because the provision was specifically designed to determine the scope of a contract⁵²⁸ by filling out the "terms" of a contract created through conduct.⁵²⁹

The usage of trade provision instructs us to consider the customary commercial practices prevalent in a given industry. The Official Comment to the UCC makes it clear that commercial agreements are to be interpreted with reference to the commercial context in which

Although it is a general exhaustion case rather than a repair-reconstruction case, the court's opinion in *Cream Top Bottle Corp. v. Bailes*, 62 F.2d 714 (10th Cir. 1933), provides another interesting example. The plaintiff had a patent on a milk bottle, and plaintiff's distributor had an exclusive arrangement to use the bottles for milk delivery. *Id.* at 715. Customary practice in the dairy business at the time was to deliver filled bottles to customers who would either pay a refundable deposit on the bottles, or, more commonly, would exchange empty bottles for the filled ones to avoid the need for a deposit. *Id.* Because of these exchanges, the patented bottles came into use by others besides the exclusive distributor, generating an infringement lawsuit. *Id.* at 715-16. In response to the plaintiff's argument that the trade customs could not be considered, the court stated:

[T] here is no rule of law requiring the court to close its eyes to what is known to every one else, including plaintiff, defendants, and all the witnesses, and that is that the usage of the business in Kansas City is that the housewife is not obligated to earmark and return the identical bottle; she may return any other sound bottle or pay five cents. The courts ... not only may but must ascertain how milk bottles are customarily used in Kansas City

Id. at 717-18; cf. Virginia Panel Corp. v. Mac Panel Co., 887 F. Supp. 880, 887-88 (W.D. Va. 1995) (noting that, in determining whether an implied license has been created, standard industry practice is relevant, but is overridden by parties' express statements to the contrary), aff'd, 133 F.3d 860 (Fed. Cir. 1997), cert. denied, 119 S. Ct. 52 (1998).

527. U.C.C. § 1-205(2) (1995).

528. That is, usage of trade is a matter of contract interpretation, not contract formation. See 1A RONALD A. ANDERSON, ANDERSON ON THE UNIFORM COMMERCIAL CODE § 1-205:5, at 308 (3d ed. 1996) ("Usage of trade is employed to interpret a contract but cannot be employed to show that there was a contract.").

529. See 1 James J. White & Robert S. Summers, Uniform Commercial Code 135 (3d ed. 1988).

^{526.} Some cases in the repair-reconstruction context and other related contexts make passing mention of trade custom in their analyses, but none take full advantage of trade usage principles as developed under the UCC. See, e.g., Landis Mach. Co. v. Chaso Tool Co., 141 F.2d 800, 803 (6th Cir. 1944) (considering and rejecting plaintiff's argument that the "general trade practice developed in the industry long before [plaintiff] entered the field"); Davis Elec. Works v. Edison Elec. Light Co., 60 F. 276, 281 (1st Cir. 1894) (hinting at a custom analysis by observing that through 13 years of the patente's life and after some 13 million of the patented bulbs had been manufactured by the patentee, no one until defendant had ever attempted to recondition the bulbs).

they were created.⁵³⁰ By incorporating a "usage of trade" provision, the UCC intends to "reject those cases which see evidence of 'custom' as representing an effort to displace or negate 'established rules of law.'"⁵³¹

At the same time, the UCC's "usage of trade" concept seeks to avoid some of the problems often encountered in efforts to rely upon custom as law. A trade usage is not subject to any strict requirement that it be shown to be universally followed.⁵³² Thus, for example, a new usage, if regularly observed, can be accepted as a usage of trade.⁵³³

Most importantly, trade usage evidence differs fundamentally from custom because the latter is informed by the probable intentions of the parties. As one treatise writer notes:

[A] major difference between common law custom and the Code's version of trade usage is that the former was regarded as an independent source of law, while trade usage serves only to determine the probable intent of the parties. As trade usage is evidence only of what the parties had in mind, the trier of fact may find it unpersuasive. Custom, in contrast, became a rule of law that could not be so ignored.⁵³⁴

This, of course, differs from the property conception of custom as an independent source of property rights.⁵³⁵

534. 1 WILLIAM D. HAWKLAND, UNIFORM COMMERCIAL CODE SERIES § 1-205:4 (1998) (citation omitted). But see 1A ANDERSON, supra note 528, § 1-205:40, at 324 (noting that some courts seem to treat custom and usage of trade as having the same meaning (citing Lipschutz v. Gordon Jewelry Corp., 373 F. Supp. 375 (S.D. Tex. 1974))).

535. See State ex rel. Haman v. Fox, 594 P.2d 1093, 1101 (Idaho 1979) (defining the concept of custom in property law as a usage or practice which "by common adoption and acquiescence, and by long and unvarying habit, has become compulsory, and has acquired the force of a law"); Joseph H. Levie, Trade Usage and Custom Under the Common Law and the Uniform Commercial Code, 40 N.Y.U. L. Rev. 1101, 1102 (1965) (discussing the distinction between "custom" and "trade usage"); Note, Custom and Trade Usage: Its Application to Commercial Dealings and the Common Law, 55 COLUM. L. Rev. 1192, 1194-95 (1955) (examining and defining custom and trade usage).

See generally Bederman, supra note 499 (discussing the origin and evolution of property law, particularly the notion of custom); Stephen L. Carter, Custom, Adjudication, and Petrushevsky's Watch: Some Notes from the Intellectual Property Front, 78 VA. L. REV. 129, 132 (1992) (commenting on Richard A. Epstein, International News Service v. Associated Press: Custom and Law as Sources of Property Rights in News, 78 VA. L. REV. 85 (1992)). Profes-

^{530.} U.C.C. § 1-205 cmt., purpose 1.

^{531.} U.C.C. § 1-205 cmt., purpose 4.

^{532.} See, e.g., 1A ANDERSON, supra note 528, § 1-205:43, at 325 (citing Ebasco Servs., Inc. v. Pennsylvania Power & Light Co., 460 F. Supp. 163 (E.D. Pa. 1978)).

^{533.} See U.C.C. § 1-205 cmt., purpose 5 (stating that "[u]nder the requirement of subsection (2) full recognition is thus available for new usages").

The utility of trade usage evidence is straightforward enough: If a practice is regularly observed in a particular industry, the parties can be assumed to have contracted with reference to it. Naturally, this calls for proof that the practice is sufficiently well known in the industry⁵³⁶ that the parties either knew or had reason to know of it.⁵³⁷ Importantly, it is not necessary that the parties are even conscious of the usage, so long as the usage is sufficiently widely observed to justify a conclusion that following the usage would be consistent with a reasonable party's expectations.⁵³⁸

Ordinarily, a trade usage will not be a matter for judicial notice, but will require proof.⁵³⁹ In repair-reconstruction cases, it seems likely that expert testimony will be necessary. In fact, expert testimony is often employed in defining trade usages.⁵⁴⁰

An important consideration for the application of trade usage to the repair-reconstruction problem concerns limitations on the persons chargeable with notice of particular trade usages.⁵⁴¹ In repairreconstruction cases involving, for example, specialized industrial equipment, or medical devices designed for use by trained personnel, it is likely that the purchaser of the patented goods will be a sophisticated market participant, perhaps even a fellow member of the trade. Here, of course, it will be relatively easy for a court to justify the appli-

(2) When the meaning attached by one party accorded with a relevant usage and the other knew or had reason to know of the usage, the other is treated as having

known or had reason to know the meaning attached by the first party. RESTATEMENT (SECOND) OF CONTRACTS § 220 (1979).

538. See 1 WHITE & SUMMERS, supra note 529, at 132 ("[I]t is not necessary for both parties to be consciously aware of the trade usage. It is enough if the trade usage is such as to 'justify an expectation' of its observance.").

539. See 1A ANDERSON, supra note 528, § 1-205:22, at 316.

540. See id. at 317 (citing New Hampshire Ins. Co. v. Cruise Shops, Inc., 323 N.Y.S.2d 352 (1971)); 1 WHITE & SUMMERS, supra note 529, at 140 n.39 (collecting authorities).

541. See Elizabeth Warren, Trade Usage and Parties in the Trade: An Economic Rationale for an Inflexible Rule, 42 U. PITT. L. REV. 515, 523-31 (1981) (analyzing the standards for charging parties with knowledge of a trade usage in contract cases).

sor Carter argues that the resort to custom to establish the expectations of the parties in contract cases, or to craft "local property rules" in property cases, is problematic because both require courts to undertake "anthropological explorations" for which they may not be competent. *Id.* In the context of the repair-reconstruction dichotomy, however, the analysis of trade custom (through expert testimony) seems no more elusive (and in fact is likely to be considerably less so) than the alternative—judicial application of the spentness standard.

^{536.} See 1A ANDERSON, supra note 528, § 1-205:31, at 319-20.

^{537.} The *Restatement of Contracts* lays out similar guidelines for determining how usage may affect the scope of contractual obligations:

⁽¹⁾ An agreement is interpreted in accordance with a relevant usage if each party knew or had reason to know of the usage and neither party knew or had reason to know that the meaning attached by the other was inconsistent with the usage.

cation of trade usages; both patentee and purchaser can be presumed to have been familiar with the trade custom at the time of the sale. By contrast, where the product is a consumer product, the purchaser may be relatively unsophisticated and one could legitimately question in any given case whether the purchaser should be chargeable with knowledge of the trade custom.⁵⁴²

V. Reshaping the Federal Circuit's Repair-Reconstruction Jurisprudence Using the Implied License Model

The Federal Circuit should consider using an implied license model for the repair-reconstruction problem. This Part concludes by setting forth proposals for a new repair-reconstruction standard based upon the implied license model. It also proposes that the court rethink the standard of appellate review for repair-reconstruction decisions, and discusses how selected recent repair-reconstruction decisions might be analyzed if they had been decided in accordance with the proposed model.

A. The Repair-Reconstruction Standard Restated

To summarize the major proposals set out in preceding sections, the standard for permissible repair should be reconceived along the following lines:

(1) Replacement activities should be adjudged permissible if they fall within the scope of the purchaser's implied license to use the patented goods. The scope of the implied license to use patented goods should be determined by balancing the reasonable expectations of the patentee and the purchaser as of the time of the sale, with a primary focus on determining the scope of the patentee's apparent consent. The goal is to reconstruct the bargain that the parties would have made had they formalized an agreement. The patentee's unilateral intentions might be relevant to, but by no means would be dispositive of, the scope of the patentee's apparent consent.

(2) The reasonable expectations of the parties should be determined in view of all of the circumstances surrounding the sales trans-

^{542.} See ANDERSON, supra note 528, § 1-205:14, at 314 ("In determining the sphere of operation of trade usage, a court will be influenced by the fact that a particular party is or is not a merchant who is familiar with or can be expected to be familiar with the trade usage in question."); id. §§ 1-205:48:49, at 327 (noting that "sophisticated" market participants are charged with knowledge of any usage of trade of which the party should be aware, while "unsophisticated" market participants, in a similar transaction, might not be charged with knowledge of the usage of trade).

action. Language from Aro I which appears to constrain the relevant circumstances should be repudiated.

(3) Evidence of spentness, especially evidence of the "dominance" of original over new components, and evidence as to component useful life, may be useful if it is understood as a proxy for the parties' expectations. Accordingly, evidence of spentness should be viewed as primarily functioning to fill in gaps in the evidence on expectations.

(4) Courts should encourage the parties to submit evidence of trade custom where such evidence is needed to supplement the showing on expectations. In the ordinary case, evidence of trade custom presumably would be submitted via expert testimony.

This proposal finds little support in the Aro I Court's opinion; it does, however, find some support in Justice Harlan's dissenting opinion.⁵⁴³ While it may go too far to say that adopting this proposal requires repudiation of Aro I in its entirety, it is clear that this proposal diverges from the broad reasoning of Aro I. Ideally, then, the Supreme Court would adopt these proposals to put to rest any question of the binding effect of Aro I. In the meantime, the Federal Circuit might conclude that, after nearly forty years of experience with Aro I, it is unlikely that the Supreme Court today would follow Aro I's broad reasoning, so that the Federal Circuit might consider alternatives such as the implied license model.

B. Appellate Review

If the court adopts the implied license model for repair-reconstruction analysis, the court should also revisit its statements regarding appellate review of the repair-reconstruction determination.⁵⁴⁴ Currently, the prevailing Federal Circuit view is that the repair-reconstruction determination is given plenary review.⁵⁴⁵

^{543.} See Aro Mfg. Co. v. Convertible Top Replacement Co., 365 U.S. 336, 369, 372 (1961) (Harlan, J., dissenting) (grounding the right of permissible repair in "the owner's license to use the device[, which] carries with it an implied license to keep it fit for the use for which it was intended," and endorsing an all-circumstances approach to repair-reconstruction). At least one other commentator has argued that the minority opinions in Aro I express a better view of the repair-reconstruction problem. See Hildreth, supra note 18, at 540 (contending "that the minority viewpoint states the superior measure of contributory infringement in the area of repair and reconstruction").

^{544.} See Aro I, 365 U.S. at 367 (Brennan, J., concurring) (reviewing the repair-reconstruction doctrine as "a question of law as to relieve appellate review from the restraints of Federal Rule of Civil Procedure 52(a)").

^{545.} See Aktiebolag v. E.J. Co., 121 F.3d 669, 672 (Fed. Cir. 1997) ("Whether defendant's actions constitute a permissible repair or an infringing reconstruction is a question of law which we . . . review de novo." (citing Dawson Chem. Co. v. Rohm & Haas Co., 448 U.S. 176,

While questions might be raised about the appropriateness of this designation under current standards, plenary review would be entirely inappropriate under the implied license model for several reasons. First, it should be noted that the assertion that the repair-reconstruction question is not a pure question of law, or is at least a conclusion of law resting upon important factual inquiries, enjoys at least some historical support.⁵⁴⁶

Second, the implied license model as set forth gives enhanced importance to the parties' expectations. The determination of expectations is a classic question for the fact-finder and should be subject only to deferential review by the Federal Circuit. Where an evidentiary gap as to reasonable expectations is filled by resort to supplemental evidence of trade custom, the determination of trade custom should also be treated as a question of fact, just as in the UCC context.⁵⁴⁷

Accordingly, the Federal Circuit should treat the repair-reconstruction determination as a mixed question of fact and law, as Justice Harlan suggested in his dissenting opinion in Aro $I.^{548}$ Alternatively, if the court insists on retaining *de novo* review over the ultimate conclusion as to the scope of the implied license in repair versus reconstruction questions, it should acknowledge that the underlying determinations of expectations and trade custom are questions of fact subject to limited review.⁵⁴⁹ On a related point, the court should also

548. Aro I, 365 U.S. at 380 (Harlan, J., dissenting) (stating that "the question of 'repair' or 'reconstruction' must be a mixed question of law and fact").

549. This, of course, is the approach that courts use in reviewing obviousness determinations. See, e.g., Kolmes v. World Fibers Corp., 107 F.3d 1534, 1541 (Fed. Cir. 1997) (assert-

^{217 (1980))),} cert. denied, 118 S. Ct. 1337 (1998); Sage Prods., Inc. v. Devon Indus., Inc., 45 F.3d 1575, 1577 (Fed. Cir. 1995) (reviewing *de novo* "'the question of whether the defendant's conduct constituted permissible repair'" (quoting Dana Corp. v. American Precision Co., 827 F.2d 755, 758 (Fed. Cir. 1987))).

^{546.} Early case law in the United Kingdom proposed deferential review of the repairreconstruction question. See, e.g., Sirdar Rubber Co. v. Wallington, Weston & Co., 1 Ch. 451, 452 (1905) (finding that "it is a question of fact in each case whether the work which has been done may fairly be termed a 'repair'"); Dunlop Pneumatic Tyre Co. v. Holborn Tyre Co., [1901] 18 R.P.D. & T.M. 222, 226 (1901) (same).

^{547.} See 1A ANDERSON, supra note 528, § 1-205:19, at 315. This will be particularly important if, as will likely be the case, evidence of trade custom is routinely proffered through expert testimony.

At least one court has expressed concern that if repair-reconstruction is denominated a question of fact, patent owners could more easily avoid summary judgment, and that "allowing such issues to invariably go to trial would place in the hands of the patent holders a potent weapon to use against merchants dealing in unpatented components." Porter v. Farmers Supply Serv., Inc., 617 F. Supp. 1175, 1185 n.6 (D. Del. 1985), *aff'd*, 790 F.2d 882 (Fed. Cir. 1986). Although legitimate, this concern is outweighed by the need to leave issues of expectations, and credibility determinations, to the fact finder.

seek to resolve conflicts in the case law concerning the allocation of the burden of proof on the repair-reconstruction issue.⁵⁵⁰

C. The Implied License Model Applied to Recent Repair-Reconstruction Decisions

This subpart concludes by examining the differences that the implied license model might have made had it been applied in selected Federal Circuit decisions.

1. Everpure, Inc. v. Cuno, Inc.⁵⁵¹—Like other cases in which the replacement activity affected both worn and unworn components of a patented combination, *Everpure, Inc. v. Cuno, Inc.* is particularly vexing when analyzed under the spentness standard. These cases become

550. There is support for the proposition that the patentee bears the burden of proof on repair-reconstruction as part of the plaintiff's general obligation to prove infringement. See General Elec. Co. v. United States, 572 F.2d 745, 783 n.17 (Ct. Cl. 1978) (en banc) (per curiam) (stating that the "[p]laintiff, of course, has the burden of proof on issues relating to infringement (including 'reconstruction')"). Cf. Westinghouse Elec. & Mfg. Co. v. Hesser, 131 F.2d 406, 409 (6th Cir. 1942) (discussing the possibility that where the nature of the patented combination and the circumstances of its use make it practically impossible for plaintiff to ascertain the facts concerning repair and reconstruction, the burden of proof might be shifted to the defendant); Timken-Detroit Axle Co. v. Automotive Parts Co., 93 F.2d 76, 76-77 (6th Cir. 1937) (upholding the lower court's decision to place the burden upon the defendant to prove that his intended sale of parts would not be an infringement).

On the other hand, it appears to be well established that the burden of showing the existence (and presumably the scope as well) of an implied license is on the alleged infringer. See, e.g., Carborundum Co. v. Molten Metal Equip. Innovations, Inc., 72 F.3d 872, 878 (Fed. Cir. 1995) ("As the alleged infringer, [the defendant] had the burden of establishing the existence of an implied license as an affirmative defense." (citing Bandag, 750 F.2d at 924)). Although sound arguments can be offered for either position, if an implied license model is adopted for repair-reconstruction, it seems preferable to place the burden of proof as to repair-reconstruction on the alleged infringer. In an analysis featuring the balance of expectations, neither party is necessarily in a better position than the other to have access to relevant facts. In addition, placing the burden on the defendant would appear to harmonize repair-reconstruction law with the law for implied licenses generally.

551. 875 F.2d 300 (Fed. Cir. 1989). For a synopsis, see supra notes 279-287 and accompanying text.

ing that "[t]he ultimate conclusion concerning obviousness, as a question of law, is reviewed *de novo*, the findings concerning the underlying factual inquiries are reviewed for clear error").

The Federal Circuit has also taken the position that the issue of whether or not an implied license exists is a question of law. See Met-Coil Sys. Corp. v. Korners Unlimited, Inc., 803 F.2d 684, 687 (Fed. Cir. 1986) (concluding that "the existence of an implied license[] is a question of law" (citing Bandag, Inc. v. Al Bolser's Tire Stores, Inc., 750 F.2d 903, 926 (Fed. Cir. 1984); AMP Inc. v. United States, 389 F.2d 448, 451 n.3 (Ct. Cl. 1968))). The court should revisit this issue if, in the course of restating repair-reconstruction doctrine, it decides to treat the implied license to use patented goods as an implied-in-fact contract, and to apply deferential review.

relatively easy cases under the implied license model. Rather than perplexing itself with a difficult analysis of old versus new components, the court could begin by assessing the parties' reasonable expectations, focusing particularly on the extent of replacement activities to which the patentee reasonably consented. In Everpure, the evidence that the patentee instructed users to change the cartridge⁵⁵² (with its sealed-in filter) on the device at issue evidences the patentee's reasonable consent to regular replacement of the cartridge. Moreover, there was no evidence that the patentee demanded that the purchaser buy the replacement cartridges exclusively from the patentee. A purchaser would reasonably have expected to be able to purchase the cartridges from any source, and, of course, any necessary adapter to mate the cartridge to the head. In this analysis, there is no need for the court to resort to the fiction that the entire cartridge is "effectively" spent when the filter wears out. Indeed, the physical qualities of the device are relevant only insofar as they confirm that the patentee and purchaser would reasonably have expected that the entire cartridge would be replaced when the filter wore out. That is, the physical qualities of the device are relevant only to supplement other evidence as to expectations and the scope of consent.

Kendall and Sage Products.553-Kendall, Sage Products, and 2. other cases in which the patentee applies a "single-use-only" label to the patented goods would also become easier under an implied license model. Like Everpure, these cases were difficult under the spentness standard because the replaced component was not physically worn out at the time of replacement, yet component replacement seemed prudent and deserving of protection from liability. Instead of straining to conclude that component spentness could occur when it was impractical or infeasible to continue to use a component, the court could turn instead to an analysis of the scope of the patentee's reasonable consent. Under such a regime, the patentee in Sage Products, for example, would undoubtedly have argued that the "singleuse-only" label on Sage's inner container for sharps evidenced Sage's reasonable consent exclusively to what the label says-single use of the inner container. The alleged infringer, Devon Products, could then have responded that reasonable purchasers would not under-

^{552.} See Everpure, 875 F.2d at 303.

^{553.} Kendall Co. v. Progressive Med. Tech., Inc. 85 F.3d 1570 (Fed. Cir. 1996); Sage Prods., Inc. v. Devon Indus., Inc. 45 F.3d 1575 (Fed. Cir. 1995). For a synopsis, see *supra* notes 288-296, 297-304 and accompanying text.

stand Sage's label to constitute a demand that purchasers buy replacement inner containers exclusively from Sage.

Evidence of customary practice in the medical device industry, offered to supplement the evidence on reasonable expectations, might well be useful here. Suppose, for example, that expert testimony demonstrated that it was customary practice, well-known to medical device suppliers like the patentee, for hospitals to purchase replacement components for medical devices from replacement parts suppliers. The court would be justified in concluding that when Sage sold a patented sharps disposal device, the purchase price reflected Sage's reasonable expectation that the purchaser might well go elsewhere to purchase replacement inner containers.

3. FMC.⁵⁵⁴—The implied license model does not, of course, provide a pat answer for the *FMC* case or other cases raising the issue of sequential replacement activities. Instead, its primary benefit in such cases is to avoid the riddle of the apocryphal axe. Presumably, the *FMC* opinion would look very different if an expectations analysis were the principal focus. The elaborate "economic" approaches to spentness (enunciated by the district court) would be relevant only to the extent of filling in gaps in the evidence as to reasonable expectations. Given this limited relevance, and the inevitable entanglement of the "economic approaches" with the problem of the apocryphal axe, one wonders whether courts would consider the economic approaches to be worth the effort in an implied license model.

Evidence of customary practice in the trade might be a particularly valuable tool in sequential replacement cases. For example, in *FMC*, the parties might have introduced evidence, derived from customary practices in the grape harvester industry, tending to establish a routine replacement schedule for grape harvester components. Such a schedule could be highly relevant under an implied license model to the extent that it revealed the probable understanding of seller and purchaser about which components would routinely be replaced, and how frequently, before any additional royalty obligation would be triggered.

In the end, resort to the implied license model in a case like FMC may not avoid all of the problems associated with the spentness standard, but it would establish an analytical framework that courts might

^{554.} FMC Corp. v. Up-Right Inc., 21 F.3d 1073 (Fed. Cir. 1994). For a synopsis, see supra notes 347-371 and accompanying text.

find more palatable, in which the cumbersome spentness standard would play, at most, a limited role.

Hewlett-Packard.555—The implied license model would not 4. make the Hewlett-Packard case any easier. In fact, it might demonstrate that the case was an uncomfortably close call. The record would have to be supplemented to allow for any sensible analysis of the scope of Hewlett-Packard's reasonable consent to the modification or refilling of its patented inkjet cartridges, but it seems likely that Hewlett-Packard would have been able to make a fairly persuasive case that defendant Repeat-O-Type's modifications fell outside the ambit of the reasonable expectations of Hewlett-Packard and its purchasers at the time of initial sale. While Hewlett-Packard's attempts to show its unilateral intentions as to the design of the cartridge would be given little weight under the implied license model just as they were in the actual case, Hewlett-Packard's instructions to users to discard old cartridges may at least have raised a genuine issue of material fact as to whether a purchaser would reasonably have expected to be allowed to make the modifications at issue.556

However, it is difficult to tell why this should be worrisome. If the express restrictions do no more than express the patentee's unilateral intentions, they will not weigh heavily in the expectations analysis for permissible repair and thus they will not render meaningless the repair-reconstruction distinction. The express restrictions might, of course, go further, amply demonstrating the patentee's intention that, for example, a particular component in a patented combination be used only once *and* that the purchaser deal exclusively with the patentee in purchasing replacement parts. If so, and the purchaser had notice of the restriction at the time of purchase but willingly paid the asking price anyway, then it is difficult to see why the law should have great sympathy for the purchaser. The purchaser has, perhaps, contracted away some or all of the purchaser's permissible repair right, but this should not be considered problematic, absent a violation of antitrust principles. This last qualification is a substantial one, and a full discussion of it is outside the scope of this paper. For a discussion of the antitrust aspects of *Mallinckrodt*, see Kobak, *supra*, at 559-65; Richard H. Stern, *Post-Sale Restrictions After* Mallinckrodt: An Idea in Search of Definition, 5 ALB. L.J. SCI. & TECH. 1 (1994).

^{555.} Hewlett-Packard Co. v. Repeat-O-Type Stencil Mfg. Corp., 123 F.3d 1445 (Fed. Cir. 1997), cert. denied, 118 S. Ct. 1304 (1998). For a synopsis, see supra notes 273-277 and accompanying text.

^{556.} Some would argue that elevating reasonable expectations to the fore in the repairreconstruction analysis will simply encourage patentees to contract around repair-reconstruction by attaching express conditions to the purchase of goods. Antitrust restrictionsespecially in the form of restrictions against tying as embodied in current patent misuse doctrine-will presumably be available where patentees employ anticompetitive express restrictions. See James B. Kobak, Jr., Contracting Around Exhaustion: Some Thoughts About the CAFC's Mallinckrodt Decision, 75 J. PAT. & TRADEMARK OFF. Soc'y 550, 564 (1993) (questioning whether the Mallinckrodt decision might "render almost meaningless the distinction between repair . . . and reconstruction" as patentees resort to express reuse restrictions, and worrying that the result will be a more limited right of permissible repair for purchasers).

At the very least, the implied license model would have been beneficial in *Hewlett-Packard* because it would have provided a role for evidence of expectations. It would have allowed the court to embrace an intent-oriented analysis without resting its decision solely on the patentee's unilateral intentions.

5. Conclusion.—In one sense, the implied license model for repair-reconstruction is not radical. Indeed, even if the Federal Circuit had decided every repair-reconstruction case in accordance with the implied license model as outlined, it is doubtful that there would be any dramatic shift in case outcomes.⁵⁵⁷

In another sense, however, the implied license model turns repair-reconstruction jurisprudence upside down. Instead of establishing the highly artificial notion of "spentness" or even "effective spentness" as the analytical focus, and attempting to funnel all relevant facts (i.e., those concerning the physical qualities of the device and, possibly, the intentions of the parties) towards it, an implied license model establishes the parties' expectations as the focus. Spentness is then relevant only to the extent that it bears on the ultimate goal of proving the scope of the patentee's apparent consent, defined in terms of expectations.

The implied license model is preferable because the expectations analysis is more familiar to courts, and finds antecedent in other areas of the law, providing a ready-made jurisprudence to which courts confronting repair-reconstruction problems may look. For example, courts may appropriate established notions of trade usage as developed in contract law in order to evidence probable expectations in the repair-reconstruction context. The implied license model also encourages a flexible, all-circumstances approach to resolving repair-reconstruction problems. Finally, the implied license model, by emphasizing an expectations analysis, relieves courts from resting their infringement determinations solely or even primarily on insoluble riddles like that of the apocryphal axe. With all due respect to Webster and Seward, it is time to move ahead from *Wilson v. Simpson*.

⁵⁵⁷. Perhaps this is because courts have actually been reaching for an implied license approach to repair-reconstruction, while straining under the encumbrances of the spentness rhetoric.

Session III : GPL Compliance

Software Freedom Law Center October 28, 2016

Free Software Matters: Enforcing the GPL, I

Free Software Matters: Enforcing the GPL, II

OpenChain Conformance 2016-H1 Specification

Free Software Matters: Enforcing the GPL, I

Eben Moglen*

August 12, 2001

Microsoft's anti-GPL offensive this summer has sparked renewed speculation about whether the GPL is "enforceable." This particular example of "FUD" (fear, uncertainty and doubt) is always a little amusing to me. I'm the only lawyer on earth who can say this, I suppose, but it makes me wonder what everyone's wondering about: Enforcing the GPL is something that I do all the time.

Because free software is an unorthodox concept in contemporary society, people tend to assume that such an atypical goal must be pursued using unusually ingenious, and therefore fragile, legal machinery. But the assumption is faulty. The goal of the Free Software Foundation in designing and publishing the GPL, *is* unfortunately unusual: we're reshaping how programs are made in order to give everyone the right to understand, repair, improve, and redistribute the best-quality software on earth. This is a transformative enterprise; it shows how in the new, networked society traditional ways of doing business can be displaced by completely different models of production and distribution. But the GPL, the legal device that makes everything else possible, is a very robust machine precisely because it is made of the simplest working parts.

The essence of copyright law, like other systems of property rules, is the power to exclude. The copyright holder is legally empowered to exclude all others from copying, distributing, and making derivative works.

This right to exclude implies an equally large power to license—that is, to grant permission to do what would otherwise be forbidden. Licenses are not contracts: the work's user is obliged to remain within the bounds of the

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license not because she voluntarily promised, but because she doesn't have any right to act at all except as the license permits.

But most proprietary software companies want more power than copyright alone gives them . These companies say their software is "licensed" to consumers, but the license contains obligations that copyright law knows nothing about. Software you're not allowed to understand, for example, often requires you to agree not to decompile it. Copyright law doesn't prohibit decompilation, the prohibition is just a contract term you agree to as a condition of getting the software when you buy the product under shrink wrap in a store, or accept a "clickwrap license" on line. Copyright is just leverage for taking even more away from users.

The GPL, on the other hand, subtracts from copyright rather than adding to it. The license doesn't have to be complicated, because we try to control users as little as possible. Copyright grants publishers power to forbid users to exercise rights to copy, modify, and distribute that we believe all users should have; the GPL thus relaxes almost all the restrictions of the copyright system. The only thing we absolutely require is that anyone distributing GPL'd works or works made from GPL'd works distribute in turn under GPL. That condition is a very minor restriction, from the copyright point of view. Much more restrictive licenses are routinely held enforceable: every license involved in every single copyright lawsuit is more restrictive than the GPL.

Because there's nothing complex or controversial about the license's substantive provisions, I have never even seen a serious argument that the GPL exceeds a licensor's powers. But it is sometimes said that the GPL can't be enforced because users haven't "accepted" it.

This claim is based on a misunderstanding. The license does not require anyone to accept it in order to acquire, install, use, inspect, or even experimentally modify GPL'd software. All of those activities are either forbidden or controlled by proprietary software firms, so they require you to accept a license, including contractual provisions outside the reach of copyright, before you can use their works. The free software movement thinks all those activities are rights, which all users ought to have; we don't even *want* to cover those activities by license. Almost everyone who uses GPL'd software from day to day needs no license, and accepts none. The GPL only obliges you if you distribute software made from GPL'd code, and only needs to be accepted when redistribution occurs. And because no one can ever redistribute without a license, we can safely presume that anyone redistributing GPL'd software intended to accept the GPL. After all, the GPL requires each copy of covered software to include the license text, so everyone is fully informed. Moglen / Enforcing the GPL, I

Despite the FUD, as a copyright license the GPL is absolutely solid. That's why I've been able to enforce it dozens of times over nearly ten years, without ever going to court. Next month, I'll explain how enforcement is really done.

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Free Software Matters: Enforcing the GPL, II

Eben Moglen*

September 10, 2001

Last month I described in general terms the legal theory of the GPL. This month, I'd like to explain how, contrary to the fear, uncertainty and doubt sown by Microsoft, the license is actually enforced.

Much murmuring has been going on in recent months to the supposed effect that the absence of judicial enforcement, in US or other courts, somehow demonstrates that there is something wrong with the GPL, that its unusual policy goal is implemented in a technically indefensible way, or that the Free Software Foundation, which authors the license, is afraid of testing it in court. Precisely the reverse is true. We do not find ourselves taking the GPL to court because no one has yet been willing to risk contesting it with us there.

So what happens when the GPL is violated? With software for which the Free Software Foundation holds the copyright (either because we wrote the programs in the first place, or because free software authors have assigned us the copyright, in order to take advantage of our expertise in protecting their software's freedom), the first step is a report, usually received by email to **license-violation@gnu.org**. We ask the reporters of violations to help us establish necessary facts, and then we conduct whatever further investigation is required.

We reach this stage dozens of times a year. A quiet initial contact is usually sufficient to resolve the problem. Parties thought they were complying with GPL, and are pleased to follow advice on the correction of an error. Sometimes, however, we believe that confidence-building measures will be required, because the scale of the violation or its persistence in time

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makes mere voluntary compliance insufficient. In such situations we work with organizations to establish GPL-compliance programs within their enterprises, led by senior managers who report to us, and directly to their enterprises' managing boards, regularly. In particularly complex cases, we have sometimes insisted upon measures that would make subsequent judicial enforcement simple and rapid in the event of future violation.

In approximately a decade of enforcing the GPL, I have never insisted on payment of damages to the Foundation for violation of the license, and I have rarely required public admission of wrongdoing. Our position has always been that compliance with the license, and security for future good behavior, are the most important goals. We have done everything to make it easy for violators to comply, and we have offered oblivion with respect to past faults.

In the early years of the free software movement, this was probably the only strategy available. Expensive and burdensome litigation might have destroyed the FSF, or at least prevented it from doing what we knew was necessary to make the free software movement the permanent force in reshaping the software industry that it has now become. Over time, however, we persisted in our approach to license enforcement not because we had to, but because it worked. An entire industry grew up around free software, all of whose participants understood the overwhelming importance of the GPL—no one wanted to be seen as the villain who stole free software, and no one wanted to be the customer, business partner, or even employee of such a bad actor. Faced with a choice between compliance without publicity or a campaign of bad publicity and a litigation battle they could not win, violators chose not to play it the hard way.

We have even, once or twice, faced enterprises which, under US copyright law, were engaged in deliberate, criminal copyright infringement: taking the source code of GPL'd software, recompiling it with an attempt to conceal its origin, and offering it for sale as a proprietary product. I have assisted free software developers other than the FSF to deal with such problems, which we have resolved—since the criminal infringer would not voluntarily desist and, in the cases I have in mind, legal technicalities prevented actual criminal prosecution of the violators—by talking to redistributors and potential customers. "Why would you want to pay serious money," we have asked, "for software that infringes our license and will bog you down in complex legal problems, when you can have the real thing for free?" Customers have never failed to see the pertinence of the question. The stealing of free software is one place where, indeed, crime doesn't pay. But perhaps we have succeeded too well. If I had used the courts to enforce the GPL years ago, Microsoft's whispering would now be falling on deaf ears. Just this month I have been working on a couple of moderately sticky situations. "Look," I say, "at how many people all over the world are pressuring me to enforce the GPL in court, just to prove I can. I really need to make an example of someone. Would you like to volunteer?"

Someday someone will. But that someone's customers are going to go elsewhere, talented technologists who don't want their own reputations associated with such an enterprise will quit, and bad publicity will smother them. And that's all before we even walk into court. The first person who tries it will certainly wish he hadn't. Our way of doing law has been as unusual as our way of doing software, but that's just the point. Free software matters because it turns out that the different way is the right way after all.

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OpenChain Conformance 2016-H1 Specification



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Introduction

The OpenChain Initiative began in 2013 when a group of software supply chain open source practitioners observed two emerging patterns: 1) significant process similarities existed among organizations with mature open source compliance programs; and 2) there still remained a large number of organizations exchanging software with less developed programs. The latter observation resulted in a lack of trust in the consistency and quality of the compliance artifacts accompanying the software being exchanged. As a consequence, at each tier of the supply chain, downstream organizations were frequently redoing the compliance work already performed by other upstream organizations.

A study group was formed to consider whether a standard program specification could be created that would: i) facilitate greater quality and consistency of open source compliance information being shared across the industry; and ii) decrease the high transaction costs associated with open source resulting from compliance rework. The study group evolved into a work group, and in April 2016, formally organized as a Linux Foundation collaborative project.

The Vision and Mission of the OpenChain Initiative are as follows:

- Vision: A software supply chain where free/open source software (FOSS) is delivered with trusted and consistent compliance information.
- Mission: Establish requirements to achieve effective management of free/open source software (FOSS) for software supply chain participants, such that the requirements and associated collateral are developed collaboratively and openly by representatives from the software supply chain, open source community, and academia.

In accordance with the Vision and Mission, this specification defines a set of requirements that if met, would significantly increases the probability that an open source compliance program had achieved a sufficient level of quality, consistency and completeness; although a program that satisfies all the specification requirements does not guarantee full compliance. The requirements represent a base level (minimum) set of requirements a program must satisfy to be considered OpenChain Conforming. The specification focuses on the "what" and "why" qualities of a compliance program as opposed to the "how" and "when" considerations. This ensures a practical level of flexibility that enables different organizations to tailor their policies and processes to best fit their objectives.

Section 2 introduces definitions of key terms used throughout the specification. Section 3 presents the specification requirements where each one has a list of one or more Verification Artifacts. They represent the evidence that must exist in order for a given requirement to be considered satisfied. If all the requirements have been met for a given program, it would be considered OpenChain Conforming in accordance with version 2016-H1 of the specification.

Definitions

Distributed Compliance Artifacts - the set of artifacts that an Identified License requires be provided with Supplied Software. They include (but are not limited to) the following: copyright notices, copies of licenses, modification notifications, attribution notices, source code, written offers and so forth.

FOSS (Free and Open Source Software) - software subject to one or more licenses that meet the Open Source Definition published by the Open Source Initiative (OpenSource.org) or the Free Software Definition (published by the Free Software Foundation) or similar license.

FOSS Liaison - a designated person who is assigned to receive external FOSS inquires.

Identified Licenses - a set of FOSS licenses identified as a result of following an appropriate method of identifying such licenses.

OpenChain Conforming - a program that satisfies all the requirements of this specification.

Software Staff - any employee or contractor that defines, contributes to or has responsibility for preparing Supplied Software. Depending on the organization, that may include (but is not limited to) software developers, release engineers, quality engineers, product marketing and product management.

SPDX or Software Package Data Exchange – the format standard created by the SPDX Working Group for exchanging license and copyright information for a given software package. A description of the SPDX specification can be found at ww.spdx.org.

Supplied Software – software that an organization delivers to third parties (e.g., other organizations or individuals).

Verification Artifacts - evidence that must exist in order for a given requirement to be considered satisfied.



Requirements

G1: Know Your FOSS Responsibilities

1.1 A written FOSS policy exists that governs FOSS license compliance of the Supplied Software distribution where, as a minimum, it must be internally communicated.

Verification Artifact(s):

- □ 1.1.1 A documented FOSS policy exists.
- 1.1.2 A documented procedure exists that makes all Software Staff aware of the existence of the FOSS policy (e.g., via training, internal wiki, or other practical communication method).

Rationale:

Ensure steps were taken to create, record and make Software Staff aware of the existence of a FOSS policy. Although no requirements are provided here on what should be included in the policy, other requirements in other sections may.

1.2 Mandatory FOSS training for all Software Staff exists such that:

- The training, as a minimum, covers the following topics:
 - The FOSS policy and where to find a copy;
 - Basics of IP law pertaining to FOSS and FOSS licenses;
 - FOSS licensing concepts (including the concepts of permissive and copyleft licenses);
 - FOSS project licensing models;
 - Software Staff roles and responsibilities pertaining to FOSS compliance specifically and the FOSS policy in general; and
 - Process for identifying, recording and/or tracking of FOSS components contained in Supplied Software.
- Software Staff must have completed FOSS training within the last 24 months (to be considered current). A test may be used to allow Software Staff to satisfy the training requirement.

Verification Artifact(s):

- □ 1.2.1 FOSS course materials covering the above topics exists (e.g., slide decks, online course, or other training materials).
- □ 1.2.2 Method of tracking the completion of the course for all Software Staff.
- □ 1.2.3 At least 85% of all Software Staff are current, as per definition in above section.

Rationale:

Ensure the Software Staff have recently attended FOSS training and that a core set of relevant FOSS topics are covered. The intent is to ensure a core base level set of topics are covered but a typical training program would likely be more comprehensive than what is required here.



G2: Assign Responsibility for Achieving Compliance

- 2.1 Identify FOSS Liaison Function ("FOSS Liaison").
 - Assign individual(s) responsible for receiving external FOSS inquiries;
 - FOSS Liaison must make commercially reasonable efforts to respond to FOSS compliance inquiries as appropriate; and
 - Publicly identify means of contacting the FOSS Liaison by way of electronic communication.

Verification Artifact(s):

- 2.1.1 FOSS Liaison function is publicly identified (e.g., via an email address and/or the Linux Foundation's Open Compliance Directory).
- 2.1.2 A documented procedure exists that assigns responsibility for receiving FOSS compliance inquiries.

Rationale:

Ensure there is a reasonable way for third parties to contact the organization with regard to FOSS compliance inquiries.

2.2 Identify Internal FOSS Compliance Role(s).

- Assign individual(s) responsible for managing internal FOSS compliance. The FOSS Compliance role and the FOSS Liaison can be the same individual.
- FOSS compliance management activity is sufficiently resourced:
 - Time to perform the role has been allocated; and
 - Commercially reasonable budget has been allocated.
- Assign responsibilities to develop and maintain FOSS compliance policy and processes;
- Legal expertise pertaining to FOSS compliance is accessible to the FOSS Compliance role (e.g., could be internal or external); and
- Escalation path is available for resolution of FOSS compliance issues.

Verification Artifact(s):

- □ 2.2.1 Name of persons, group or function in FOSS Compliance role(s) identified.
- □ 2.2.2 Identify source of legal expertise available to FOSS Compliance role(s).
- 2.2.3 A documented procedure exists that assigns responsibilities for FOSS compliance.
- □ 2.2.4 A documented procedure exists that identifies an escalation path for issue resolution.

Rationale:

Ensure certain FOSS responsibilities have been effectively assigned.

G3: Review and Approve FOSS Content

3.1 A process exists for identifying, tracking and archiving a list of all FOSS components (and their respective Identified Licenses) from which Supplied Software is comprised.

Verification Artifact(s):

3.1.1 A documented procedure exists used to identify, track, and archive a list of FOSS components and their Identified Licenses from which the Supplied Software is comprised.

Rationale:

To ensure a process exists for identifying and listing all FOSS components used to construct the Supplied Software. This inventory must exist to support the systematic review of each component's license terms to understand their respective distribution obligations and restrictions applicable to the Supplied Software. The recorded inventory also serves as evidence that the process was followed.

- 3.2 The FOSS program must be capable of handling typical FOSS use cases encountered by Software Staff for Supplied Software, which may include the following use cases - when parts of the Supplied Software (note that the below list is neither exhaustive, nor may all of the below use cases apply depending on the organization):
 - are distributed in binary form
 - are distributed in source form
 - are integrated with other FOSS such that it may trigger copyleft obligations
 - contains modified FOSS
 - contains FOSS or other software under an incompatible license interacting with other components within the Supplied Software
 - contains FOSS with attribution requirements

Verification Artifact(s):

3.2.1 A process has been implemented that is capable of addressing the typical FOSS use cases encountered by Software Staff for Supplied Software.

Rationale:

To cause the FOSS program to be sufficiently robust to address that organization's typical use cases as a result of that organization's business practices.

OPENCHAIN

G4: Deliver FOSS Content Documentation and Artifacts

- 4.1 Prepare the following Distributed Compliance Artifacts to accompany the Supplied Software as required by the corresponding Identified Licenses which might include (but is not limited to) the required:
 - copyright notices
 - copies of Identified Licenses
 - modification notifications
 - attribution notices
 - prominent notices
 - source code
 - required build instructions and scripts
 - written offers

Verification Artifact(s):

- 4.1.1 A documented procedure exists describing a process that ensures the Distributed Compliance Artifacts be distributed with Supplied Software as required by the Identified Licenses.
- 4.1.2 Copies of the Distributed Compliance Artifacts of the Supplied Software are archived and easily retrievable (e.g., legal notices, source code, SPDX documents), and the archive is planned to exist for at least as long as the Supplied Software is offered or as required by the Identified Licenses (whichever is longer).

Rationale:

Ensure the complete collection of compliance artifacts accompany the Supplied Software as required by the Identified Licenses that govern the Supplied Software.



G5: Understand FOSS Community Engagement

5.1 A written policy exists that governs contributions to publicly accessible FOSS projects by employees on behalf of the organization where, as a minimum, it must be internally communicated.

Verification Artifact(s):

- □ 5.1.1 A documented FOSS contribution policy exists;
- 5.1.2 A documented procedure exists that makes all Software Staff aware of the existence of the FOSS contribution policy (e.g., via training, internal wiki, or other practical communication method).

Rationale:

Ensure an organization has given reasonable consideration to developing a policy with respect to publicly contributing to FOSS. The FOSS contribution policy can be made a part of the overall FOSS policy of an organization or be its own separate policy. In the situation where contributions are not permitted at all, a policy should exist making that position clear.

- 5.2 Provided the FOSS contribution policy permits such contributions, a process exists for confirming contributions adhere to the FOSS contribution policy, which might include (but is not limited to) the following considerations:
 - legal approval for license considerations
 - business rationale or approval
 - technical review of code to be contributed
 - community engagement and interaction, including a project's Code of Conduct or equivalent
 - adherence to project-specific contribution requirements

Verification Artifact(s):

5.2.1 Provided the FOSS contribution policy permits contributions, a documented procedure exists that describes the FOSS contribution process.

Rationale:

Ensure an organization has a documented process for how the organization publicly contributes FOSS. A policy may exist such that contributions are not permitted at all. In that specific situation it is understood that no process may exist and this requirement would nevertheless be met.



G6: Certify Adherence to OpenChain Requirements

6.1 In order for an organization to be OpenChain certified, it must affirm that it has a FOSS program that meets the criteria described in this OpenChain Conformance 2016-H1 Specification.

Verification Artifact(s):

□ 6.1.1 The organization affirms that a program exists that meets all the requirements of this OpenChain Conformance 2016-H1 Specification.

Rationale:

To ensure that if an organization declares that it has a program that is OpenChain Conforming, that such program has met <u>all</u> the requirements of this specification. The mere meeting of a subset of these requirements would not be considered sufficient to warrant a program be OpenChain certified.

Session IV : What Free Software Lawyers Do

Software Freedom Law Center October 28, 2016

FOSS Compliance @ IBM

XBMC Foundation / Kodi Official: Trademark Policy

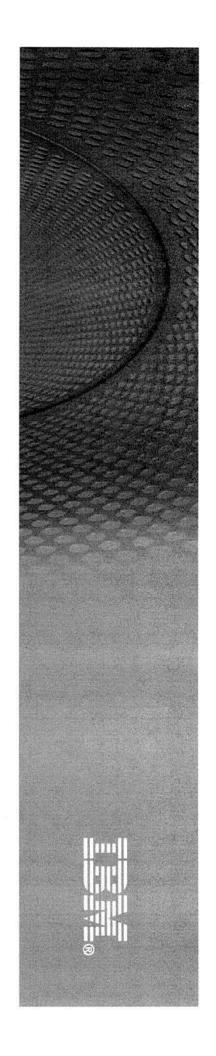
The Piracy Box Sellers and Youtube Promoters Are Killing Kodi

FIPS 140-2 : Once More Unto the Breach

OpenSSL FAQ

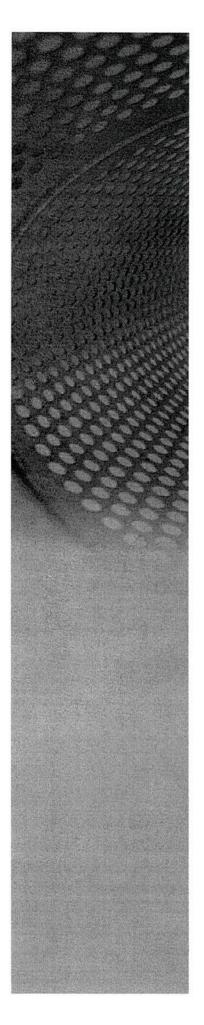
Brief Amicus Curiae Samsung v. Apple

Intellectual Ventures v. Symantec



FOSS Compliance @ IBM 15 Years (and counting)

Terry Ilardi Copyright Counsel-IBM





In the beginning...

- Each and every distribution of FOSS code, There was initial concern over use and distribution of FOSS licensed code whether written by the community or by IBM,
- was reviewed by an executive committee
- -with the assistance of an "expert team" (E-team) of attorneys and business people



What were the concerns?

- Provenance of the code
- We had little familiarity with FOSS communities or how they worked
- Infringement of third party patents
- Loss of value of our own patent portfolio
- From the very start we took license compliance very seriously

Reviews Are a Joint Effort

- Local business and legal support work with developers to perform the initial reviews
- Developers answered a series of questions that "trustworthiness" of the code established the contents, licenses and

lerry J



The Reviews

- Attorneys review the licenses
- Web searches
- Codescans using a home grown scanning tool
- Codescans were run by the developers; the reports were reviewed by attorneys
- inquiries were made If a review revealed issues, project

Terry J. Ila



The Number of Proposals Kept Increasing

- Reviews were hierarchical
- Line attorneys would make an initial review, which was presented to increasingly senior levels of attorneys and business people
- As the number of proposals increased this and then would be presented to the E-team
- system became unwieldy and was discouraging use of FOSS



We Reevaluated our Process

- Goal became to facilitate
- License compliance became key
- Proposals were sorted by their potential for "problems"
- Certain communities had their own reviews
- these became "trusted" communities
- We eliminated many multiple reviews
- And fewer proposals were deemed necessary for approval by the E-team



- We saw many licenses repeatedly; some carried fewer obligations than others
- –Lead to a list of "approved" licenses
- We also realized that certain FOSS packages were used repeatedly
- We established a database of package information for reference in subsequent reviews
- –Some packages were deemed so benign that they could be used without any additional reviews



Proposals Up-Reviews Down

Fewer reviews now come to the E-team

–Many reviews are "self certifying"

- The E-team provides review criteria
- If the facts meet that criteria the developers may selfcertify
- Most other reviews can be handled with one level of review

Terry J. Ilar



Our Process Continues to Evolve

- Trained a team of attorney supervised law school interns to perform many reviews
- -They are very eager!
- We work hard to find ways to allow use
- Focus remains on license compliance
- But, we continuously revise our process

XBMC Foundation / Kodi Official:Trademark Policy

From Kodi

Available from: http://kodi.wiki/view/Official:Trademark_Policy

► XBMC Foundation Trademarks ► Trademark Policy

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 - <u>4.2 Modifications</u>
 - 4.3 Add-ons, Skins and other extensions
 - <u>4.4 Related Software</u>
- <u>5 Domain Names</u>
- <u>6 Services Related to XBMC Foundation Software</u>
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- 8 Things You Can Do—Summary
- 9 Reporting Trademark Abuse
- <u>10 Questions</u>

1 List of XBMC Foundation Trademarks

You can see a <u>complete list</u> of the XBMC Foundation trademarks. As other trademarks are created or registered, this list will be updated. As used in this policy, "trademarks" means not just the XBMC Foundation's logos, but also the names of its various products and projects, also called word marks, (collectively "XBMC Foundation Marks").

2 Introduction

This document outlines the policy of the XBMC Foundation regarding the use of the XBMC Foundation Marks. Any use of any XBMC Foundation trademark must be in accordance with this policy. Any use that does not comply with our trademark policy or does not have written authorization from us is not authorized. Any goodwill generated by the use of any XBMC Foundation Marks inures to the benefit of XBMC Foundation.

XBMC Foundation's Trademark Policy attempts to balance two competing interests: the XBMC Foundation's need to ensure that the XBMC Foundation Marks remain reliable indicators of quality,

source, and security; and XBMC Foundation's desire to permit community members, software distributors, and others with whom XBMC Foundation works to discuss XBMC Foundation's products and to accurately describe their affiliation with us. Striking a proper balance is a tricky situation that many organizations—in particular those whose products are distributed electronically—wrestle with every day and we've attempted to balance it here.

Underlying our trademark policy is the general law of trademarks. Trademarks exist to help consumers identify, and organizations publicize, the source of products. Some organizations make better products than others; over time, consumers begin to associate those organizations (and their trademarks) with quality. When such organizations permit others to place their trademarks on goods of lesser quality, they find that consumer trust evaporates quickly. That's the precise situation that the XBMC Foundation seeks to avoid. People's trust in our name and products is crucial to us—especially, when it comes to intangible products like software, trust is all consumers have to decide on which product to choose. We also are the caretakers of the trust our community members have placed in us. We created this Trademark Policy to protect both the public's and our community's trust in the XBMC Foundation Marks.

On an all too frequent basis, we receive reports about websites selling the XBMC Foundation's Kodi, using the XBMC Foundation Marks to promote other products and services, or using modified versions of the XBMC Foundation Marks. The problem with these activities is that they may be deceptive, harm users, cause consumer confusion, and jeopardize the identity and meaning of the XBMC Foundation Marks. Such cases range from good intentions but improper use of the trademarks (e.g., overenthusiastic fans), to people intentionally trading on the brand for their own benefit and/or to distribute modified versions of the product, to a clear intent to deceive, manipulate and steal from users in a highly organized and syndicated fashion. When we are notified of such activities, or identify problematic activities, we analyze the those situations and treat each case individually based on the intent and severity of the matter.

In creating our trademark policy, we seek to clarify the uses of the XBMC Foundation Marks we consider legitimate and the uses we do not. Although XBMC Foundation's Trademark Policy is composed of a number of specific rules, some contained in companion documents, most reflect the overarching requirement that your use of the XBMC Foundation Marks be non-confusing and non-disparaging. By non-confusing, we mean that people should always know whom they are dealing with, and where the software they are downloading comes from. Websites and software that are not created or produced by XBMC Foundation should not imply, either directly or by omission, that they are. By non-disparaging, we mean that, outside the bounds of fair use, you can't use the XBMC Foundation Marks as vehicles for defaming us or sullying our reputation. These basic requirements can serve as a guide as you work your way through the policy.

Our Trademark Policy begins by outlining some overall guidelines for the use of the XBMC Foundation Marks in printed materials. It then addresses a series of more specific topics, including the use of XBMC Foundation's trademarks on distributions of XBMC Foundation's binaries, linking to XBMC Foundation's website(s), and the use of XBMC Foundation Marks in domain names. At various points, this policy links to other documents containing additional details about our policies.

We also have a **trademark policy FAQ** as a companion document to this policy.

3 Overall Guidelines for Printed Materials and Web Sites

We encourage the use of the XBMC Foundation Marks in marketing, and other publicity materials related to XBMC Foundation or the relevant XBMC Foundation product. This includes advertising stating that a person or organization is shipping XBMC Foundation products. Of course, any use of a XBMC Foundation trademark is subject to the overarching requirement that its use be non-confusing. Thus, you can't say you're raising money for XBMC Foundation when you're actually raising it for a localization project, say that you're reviewing or distributing the XBMC Foundation Kodi when you're actually reviewing or distributing a modified version of Kodi, or use the XBMC Foundation logos on the cover of your book or on your product packaging.

Although many uses of the XBMC Foundation Marks are governed by more specific rules, which appear below, the following basic guidelines apply to almost any use of the XBMC Foundation Marks in printed materials, including marketing, articles and other publicity-related materials, and websites:

- Proper Form XBMC Foundation's trademarks should be used in their exact form -- neither abbreviated nor combined with any other word or words (e.g., "Kodi" rather than "KMC" or "KEC");
- Accompanying Symbol The first or most prominent mention of a XBMC Foundation trademark should be accompanied by a symbol indicating whether the mark is a registered trademark ("®") or an unregistered trademark ("TM"). See our <u>Trademark List</u> for the correct symbol to use;
- Notice The following notice should appear somewhere nearby (at least on the same page or on the credits page) the first use of a XBMC Foundation trademark: "[TRADEMARK] is a ["registered", if applicable] trademark of the XBMC Foundation";
- Distinguishable In at least the first reference, the trademark should be set apart from surrounding text, either by capitalizing it or by italicizing, bolding or underlining it. In addition, your website may not copy the look and feel of the XBMC Foundation website, again, we do not want the visitor to your website to be confused about which company he/she is dealing with.
- Comply with Visual Guidelines any use of the XBMC Foundation Marks must comply with our Trademark and Logo Usage Policy and our Visual Identity Guidelines at:
 - Visual Guidelines: Visual Identity Guidelines
 - Kodi Logos: Media center logos
 - XBMC Foundation Logos: <u>Visual Identity Guidelines</u>

4 Software Distributions

4.1 Unaltered Binaries

You may distribute unchanged official binaries (i.e., the installer file available for download for each platform (code + config) and not the program executable) downloaded from xbmc.org to anyone in any way, subject to governing law, without receiving any further permission from XBMC Foundation. If you want to distribute the unchanged official binaries using the XBMC Foundation Marks, you may do so, without receiving any further permission from XBMC Foundation, as long as you comply with this Trademark Policy and you distribute them without charge. However, you must not remove or change any part of the official binary, including the XBMC Foundation Marks. On your website or in other materials, you may truthfully state that the software you are providing is an unmodified version of a XBMC Foundation Marks in printed materials, detailed above. We suggest that, if you choose to provide visitors to your website the opportunity to download XBMC Foundation product, you do so by means of a link to our site, to help ensure faster, more reliable downloads.

If you choose to distribute XBMC Foundation binaries yourself, you should make the latest stable version available (of course, you probably want to do so as well). If you compile XBMC Foundation unmodified source code (including code and config files in the installer) and do not charge for it, you do not need additional permission from XBMC Foundation to use the relevant XBMC Foundation Mark(s) for your compiled version. So that users get the latest code and security releases, we encourage you to always distribute the most current official release. The notification requirements of the <u>GNU</u> <u>General Public License</u> have been met for our binaries, so although it's a good idea to do so, you are not required to ship the source code along with the binaries.

In addition, if you are distributing XBMC Foundation binaries yourself, and wish to use the XBMC Foundation Mark(s), you may not (a) disable, modify or otherwise interfere with any installation mechanism contained in a XBMC Foundation product; (b) use any such installation mechanism to install any plug-ins, themes, extensions, software, or items other than the XBMC Foundation product; or (c) use or provide any program, mechanism or process (other than an installation mechanism contained in the XBMC Foundation product) to install such product. Any use of a meta-installer would require our prior written permission.

If you are using the XBMC Foundation Mark(s) for the unaltered binaries you are distributing, you may not charge for that product. By not charging, we mean the XBMC Foundation product must be without cost and its distribution (whether by download or other media) may not be subject to a fee, or tied to subscribing to or purchasing a service, or the collection of personal information. If you want to sell the product, you may do so, but you must call that product by another name—one unrelated to XBMC Foundation or any of the XBMC Foundation Marks (see the sections on "Modifications" and "Related Software" below). Remember that we do not want the public to be confused.

4.2 Modifications

If you're taking full advantage of the open-source nature of XBMC Foundation's products and making significant functional changes, you may not redistribute the fruits of your labor under any XBMC Foundation trademark, without XBMC Foundation's prior written consent. For example, if the product you've modified is Kodi, you may not use XBMC Foundation or Kodi, in whole or in part, in its name. Also, it would be inappropriate for you to say "based on Kodi". Instead, in the interest of complete accuracy, you could describe your executables as "based on Kodi technology", or "incorporating Kodi source code."

In addition, if you compile a modified version, as discussed above, you will require XBMC Foundation's prior written permission. If it's not the unmodified installer package from xbmc.org, and you want to use our trademark(s), our review and approval of your modifications is required. You also must change the name of the executable so as to reduce the chance that a user of the modified software will be misled into believing it to be a native XBMC Foundation product.

Again, any modification to the XBMC Foundation product, including adding to, modifying in any way, or deleting content from the files included with an installer, file location changes, added code, modification of any source files including additions and deletions, etc., will require our permission if you want to use the XBMC Foundation Marks. If you have any doubt, just ask us at contact@kodi.tv

4.3 Add-ons, Skins and other extensions

At the same time as we seek community involvement in the development of the XBMC Foundation products, we want to protect the reputation of these products as high-quality and lightweight, with simple, usable interfaces. If you want to ship add-ons, skins or other extensions installed by default or as part of the same installation process as the XBMC Foundation products, and you plan on distributing them under any XBMC Foundation Marks, you must first seek approval from us. What we find acceptable will depend on the effect of the add-ons, skins and other extensions on the XBMC Foundation product. To give examples, changing the skin of one product to another, equally high-quality and aesthetically pleasing skin would be considered. A combination of various add-ons with intrusive pop-up boxes, with loud and distracting UI sounds, probably wouldn't be. See our **Partners page** to find out more about contacting us to discuss your proposed changes.

4.4 Related Software

XBMC Foundation products are designed to be extended, and we recognize that community members writing add-ons and supplemental software need some way to identify the XBMC Foundation product to which their add-on/software pertain. Our main concern about add-ons and related software is that consumers not be confused as to whether they are official (meaning approved by XBMC Foundation) or not. To address that concern, we request that add-ons and supplemental software names not include, in whole or in part, the words "XBMC Foundation" or "Kodi" in a way that suggests a connection between XBMC Foundation and the add-on or software (e.g., "Frobnicator for Kodi," would be acceptable, but "Kodi Frobnicator" would not).

5 Domain Names

If you want to include all or part of a XBMC Foundation trademark in a domain name, you have to receive written permission from XBMC Foundation. People naturally associate domain names with organizations whose names sound similar. Almost any use of a XBMC Foundation trademark in a domain name is likely to confuse consumers, thus running afoul of the overarching requirement that any use of a XBMC Foundation trademark be non-confusing.

To receive written permission, please download and follow the directions as outlined in the **Domain Name License**.

6 Services Related to XBMC Foundation Software

If you offer services related to XBMC Foundation software, you may use XBMC Foundation's word marks in describing and advertising your services relating to a XBMC Foundation product, so long as you don't violate these overall guidelines for the use of XBMC Foundation's trademarks or do anything that might mislead customers into thinking that either your website, service, or product is a XBMC Foundation website, service, or product, or that XBMC Foundation has any direct relationship with your organization. For example, it's OK if your website says, "Media center customization services for Kodi available here." It's not OK, though, if it says, "Kodi media center customization services sold here," or "custom Kodi media centers available here," since the first suggests that XBMC Foundation -- performed the customization. In addition, your website may not copy the look and feel of any XBMC Foundation website. Again, we do not want the visitor to your website to be confused with whom she/he is dealing. When in doubt, err on the side of providing more, rather than less, explanation and information.

If you are offering services for XBMC Foundation software (for example, support), you may not tie the download of the XBMC Foundation product with the purchase of your service. The download of the XBMC Foundation product using the XBMC Foundation trademark may not be connected in any way to the purchase of your service. The purchase, download, or acquisition of your services must be a completely separate transaction from the download of the XBMC Foundation product. You must provide a prominent statement that (i) the XBMC Foundation product is available for free and link directly to our site; (ii) the purchase, download, or acquisition of your service is separate from the download of the XBMC Foundation product service is not affiliated with XBMC Foundation.

7 XBMC Foundation Marks and Merchandise

When it comes to the XBMC Foundation Marks, there are some cool things you can do and some cool things you can't do - at least not without asking XBMC Foundation.

You may make t-shirts, desktop wallpaper, or baseball caps with XBMC Foundation Marks on them, though only for yourself and your friends (meaning people from whom you don't receive anything of value in return). You can't put the XBMC Foundation Mark(s) on anything that you produce commercially (whether or not you make a profit) -- at least not without receiving XBMC Foundation's written permission. XBMC Foundation contracts with third party vendors that provide XBMC Foundation products for sale.

There is one additional broad category of things you can't do with XBMC Foundation's Marks.

• Produce modified versions of them. A modified mark also would raise the possibility of consumer confusion, thus violating XBMC Foundation's trademark rights (remember the overarching requirement that any use of a XBMC Foundation Mark be non-confusing?).

8 Things You Can Do—Summary

To summarize, provided that the use adheres to our trademark policy and visual guidelines, here are some of the things that you can do with the XBMC Foundation Marks that do not require our permission:

- use the XBMC Foundation Marks in marketing, and other publicity materials related to XBMC Foundation or the relevant XBMC Foundation product;
- distribute unchanged XBMC Foundation product(s) (code + config) for each platform downloaded from xbmc.org as long as you distribute them without charge;
- describe your executables as "based on XBMC Foundation technology", or "incorporating XBMC Foundation source code;"
- link to XBMC Foundation's website(s) to allow your visitors to download Kodi;
- use XBMC Foundation's word marks in describing and advertising your services or products relating to a XBMC Foundation product, so long as you don't do anything that might mislead customers. For example, it's OK if your website says, "Media center customization services for Kodi available here;" and
- make t-shirts, desktop wallpaper, or baseball caps though only for yourself and your friends (meaning people from whom you don't receive anything of value in return).

9 Reporting Trademark Abuse

We have a <u>central place</u> for everyone to report any misuse of the XBMC Foundation Marks. All you have to do is fill out the relevant information on the web form. The more information you supply when you file the report, the easier it is for us to evaluate and respond appropriately. Having the support and help of our community makes our work easier and more worthwhile.

10 Questions

We have tried to make our trademark policy as comprehensive as possible. If you're considering a use

of a XBMC Foundation trademark that's not covered by the policy, and you're unsure whether that use would run afoul of XBMC Foundation's guidelines, feel free to contact us at contact@xbmc.org and ask. Please keep in mind that XBMC Foundation receives lots and lots of similar questions, so please review all available documentation, including the **Frequently Asked Questions** (FAQ) before contacting us.

Retrieved from "http://kodi.wiki/view/Official:Trademark_Policy"

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kodi.tv

The Piracy Box Sellers and Youtube Promoters Are Killing Kodi

Nathan Betzen

14 Feb

Posted By: <u>Nathan Betzen</u> on Feb 14, 2016 in <u>Dev Journal</u>, <u>Site</u> <u>News</u>

Over the past few years it's become clear that many users have been watching pirated content using unofficial and unsupported add-ons that frequently break, and they are installing add-on repositories whose trustworthiness is questionable, leaving themselves open to numerous security exploits. Lately there's even been a move to install "builds," which intentionally break Kodi and, much like viruses, are almost impossible to uninstall, but have the benefit of adding LOTS of untrustworthy repos full of add-ons that don't work.

Team Kodi maintains an officially neutral stance on what users do with their own software. Kodi is open source software, and as long as the GPL is followed, you are welcome to do with it as you like. So while we don't love this use of Kodi, as long as you know what illegal and potentially dangerous things you are getting yourself into and accept the fact that the Team will not be providing you with any support, then you are welcome to do what you like.

The Problem

The problem is this: There have been a wave of sellers who decided to make a quick buck modifying Kodi, installing broken piracy add-ons, advertising that Kodi let's you watch free movies and TV, and then vanishing when the user buys the box and finds out that the add-on they were sold on was a crummy, constantly breaking mess. These sellers are dragging users into the world of piracy without their knowledge and at the same time convincing new users that Kodi is a buggy mess, because they never differentiate Kodi from 3rd party add-ons. Every day a new user shows up on the Kodi forum, totally unaware that the free movies they're watching have been pirated and surprised to discover that Kodi itself isn't providing those movies.

And there are even more people out there seeking to make a quick buck by selling ads on videos about getting free movies and TV while using Kodi in their channel name to make their content seem official, as if those videos are coming from us.

LATEST KODI 16.0! AMAZON TV FIRE STICK JAILBROKEN XMBC FREE MOVIES PPV XXX SPORT THS #1 RANKED POWER BUILD WILL KNOCK YOUR SOCKS OFFIL ▲ 14 solid in last 24 hours: 全自主意: 171 solid system

A Typical eBay Listing – They even spell XBMC wrong

Team Kodi is officially tired of this. We are tired of new users coming into the forum, asking why the box that "we" sold them was broken. We are tired of this endless campaign by dishonest salesmen to push a single use of Kodi that nobody on the team actually recommends. We are tired of these salesmen lying to users, claiming that pirate streams and pirate boxes are "legal" when they are absolutely not at some level or other. We are tired of being told by companies that they don't want to work with us, because we are selling pirate boxes. Being removed from an App Store this summer because of the campaigning of others was like a slap in the face. Most of all, we are tired of a thousand different salesmen and Youtubers making money off ruining our name.

It's gotten bad enough that core Kodi developers have threatened to quit in protest.

The Solution

Our solution to this problem is pretty straightforward. We now own the trademark to Kodi, and we plan to use it to finally battle the mass confusion created by those seeking to profit on unaware users.

This means we will issue trademark takedown notices anywhere we think the likelihood for confusion is high. If you are selling a box on your website designed to trick users into thinking broken add-ons come from us and work perfectly, so you can make a buck, we're going to do everything we can to stop you. If you are making a video in which you claim to be a Kodi developer or Kodi team member or you are just using the Kodi name while assuring users that some pirate add-on is totally legal and isn't going to break next week, we will do everything we can to take you down.

We Need The Community's Help

Users, you are welcome to keep doing whatever you want with Kodi. Devs of all stripes, feel free to keep developing whatever you want. This is an open, free platform, developed under the GPL, and always will be.

But we are in danger now of losing key core developers and the soul of the application to the greedy individuals who profit on

tricking users and remarketing Kodi to suit their needs. And we need the community's help to stop them.

If you see somebody selling a box that's "fully loaded" or comes with the phrase "Free movies and TV with Kodi," please, ask them to stop. And let us know. It's OK to sell a vanilla Kodi box. It's OK to sell a fully loaded box that doesn't have Kodi installed or fully rebrands Kodi to something else entirely. It is not OK to sell a fully loaded Kodi box.

If you see a Youtuber using the Kodi logo as part of his channel, constantly marketing Kodi as a source of free movies, ask him to stop pretending to be us and dragging our name through the muck. And, of course, let us know. Who knows, maybe the Youtuber has no idea that he or she is causing so many problems and a conversation might solve them.

We love making Kodi. We love working on a free, open source software that's the best media center on the planet, able to do things no other media center can do. And we want to keep making Kodi better, every single day. But every day our name gets dragged through the mud, we are in danger of losing developers and losing the freedom to make Kodi great.

We want to make Kodi for as long as there ever is a need. Help us keep going. **#KodiForever**

openssl.org

FIPS 140-2: Once More Unto the Breach

OpenSSL Foundation, Inc.

The last <u>post on this topic</u> sounded a skeptical note on the prospects for a new FIPS 140 validated module for OpenSSL 1.1 and beyond. That post noted a rather improbable set of prerequisites for a new validation attempt; ones I thought only a governmental sponsor could meet (as was the case for the five previous open source based validations).

Multiple commercial vendors have offered to fund (very generously in some cases) a new validation effort under terms that would guarantee them a proprietary validation, while not guaranteeing an open source based validation. At one point we actually came close to closing a deal that would have funded an open source based validation attempt in exchange for a limited period of exclusivity; a reasonable trade-off in my opinion. But, I eventually concluded that was too risky given an uncertain reception by the FIPS validation bureaucracy, and we decided to wait for a "white knight" sponsor that might never materialize.

I'm pleased to announce that white knight has arrived; SafeLogic has committed to sponsor a new FIPS validation on "truly open or bust" terms that address the major risks that have prevented us from proceeding to date. SafeLogic is not only providing the critical funding for this effort; they will also play a significant role. The co-founders of SafeLogic, Ray Potter and Wes Higaki, wrote a book about the FIPS 140 validation process. The SafeLogic technical lead will be Mark Minnoch, who I worked with extensively when he was director of the accredited test lab that performed the open source based validations for the OpenSSL FIPS Object Module 2.0. The test lab for this effort will be Acumen Security. While I've not worked directly with Acumen before, I have corresponded with its director and co-founder, Ashit Vora, on several occasions and I know SafeLogic has chosen carefully. With my OpenSSL colleagues doing the coding as before, in particular Steve Henson and Andy Polyakov, we have a "dream team" for this sixth validation effort.

Note that this validation sponsorship is very unusual, and something most commercial companies would be completely incapable of even considering. SafeLogic is making a bold move, trusting in us and in the sometimes fickle and unpredictable FIPS validation process. Under the terms of this sponsorship OpenSSL retains full control and ownership of the FIPS module software and the validation. This is also an all-or-nothing proposition; no one – including SafeLogic – gets to use the new FIPS module until and if a new open source based validation is available for everyone. SafeLogic is making a major contribution to the entire OpenSSL user community, for which they have my profound gratitude.

Now, why would a commercial vendor like SafeLogic agree to such an apparently one sided deal? Your typical MBA would choke at the mere thought. But, SafeLogic has thought it through carefully; they "get" open source and they are already proficient at leveraging open source. This new OpenSSL FIPS module will become the basis of many new derivative products, even more so than the wildly popular 2.0 module, and no vendor is going to be closer to the action or more familiar with the nuances than SafeLogic. As an open source product the OpenSSL FIPS module with its business-friendly license will always be available to anyone for use in pursuing their own validation actions, but few vendors have much interest in pursuing such a specialized and treacherous process when better alternatives are available. Having sponsored and actively collaborated with the validation from the starting line, SafeLogic will be in the perfect position to be that better alternative.

There are a lot of moving parts to this plan – technical details of the new module, interim licensing, schedule aspirations, etc. – that I'll try to cover in upcoming posts.

openssl.org

/docs/faq.htm

OpenSSL Foundation, Inc.

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[MISC] 1

1. Which is the current version of OpenSSL? ▲

The current version is available from https://www.openssl.org.

In addition to the current stable release, you can also access daily snapshots of the OpenSSL development version at https://www.openssl.org/source/snapshot/, or get it by anonymous Git access.

2. Where is the documentation? 1

OpenSSL is a library that provides cryptographic functionality to applications such as secure web servers. Be sure to read the documentation of the application you want to use. The INSTALL file explains how to install this library.

OpenSSL includes a command line utility that can be used to perform a variety of cryptographic functions. It is described in the openssl(1) manpage. Documentation for developers is currently being written. Many manual pages are available; overviews over libcrypto and libssl are given in the crypto(3) and ssl(3) manpages.

The OpenSSL manpages are installed in /usr/local/ssl/man/ (or a different directory if you specified one as described in INSTALL). In addition, you can read the most current versions at https://www.openssl.org/docs/. Note that the online documents refer to the very latest development versions of OpenSSL and may include features not present in released versions. If in doubt refer to the documentation that came with the version of OpenSSL you are using. The pod format documentation is included in each OpenSSL distribution under the docs directory.

3. How can I contact the OpenSSL developers? 1

The README file describes how to submit bug reports and patches to OpenSSL. Information on the OpenSSL mailing lists is available from https://www.openssl.org/community/mailinglists.html.

4. Where can I get a compiled version of OpenSSL? ▲

You can finder pointers to binary distributions in https://www.openssl.org/community/binaries.html .

Some applications that use OpenSSL are distributed in binary form. When using such an application, you don't need to install OpenSSL yourself; the application will include the required parts (e.g. DLLs).

If you want to build OpenSSL on a Windows system and you don't have a C compiler, read the "Mingw32" section of INSTALL.W32 for information on how to obtain and install the free GNU C compiler.

A number of Linux and *BSD distributions include OpenSSL.

5. Why aren't tools like 'autoconf' and 'libtool' or 'cmake' used? 1

A number of these tools are great and wonderful, but are usually centered around one or a few platforms. 'autoconf' and 'libtool' are Unix centric. 'cmake' is a bit more widely spread, but not enough to cover the platforms we support.

For OpenSSL 1.1, we decided to base our build system on perl, information files and build file (Makefile) templates, thereby covering all the systems we support. Perl was the base language of choice because we already use it in diverse scripts, and it's one of the most widely spread scripting languages.

6. What is an 'engine' version? 1

With version 0.9.6 OpenSSL was extended to interface to external crypto hardware. This was realized in a special release '0.9.6-engine'. With version 0.9.7 the changes were merged into the main development line, so that the special release is no longer necessary.

7. How do I check the authenticity of the OpenSSL distribution? 1

We provide PGP signatures and a variety of digests on each release. For example, one of the following might work on your system:

shalsum TARBALL | awk '{print \$1;}' | cmp -TARBALL.shal sha256sum TARBALL | awk '{print \$1;}' | cmp -

TARBALL.sha256

You can check authenticity using pgp or gpg. You need the OpenSSL team member public key used to sign it (download it from a key server, see a list of keys at <u>https://www.openssl.org</u> /community/team.html). Then just do:

pgp TARBALL.asc

8. How does the versioning scheme work? 1

After the release of OpenSSL 1.0.0 the versioning scheme changed. Letter releases (e.g. 1.0.1a) can only contain bug and security fixes and no new features. Minor releases change the last number (e.g. 1.0.2) and can contain new features that retain binary compatibility. Changes to the middle number are considered major releases and neither source nor binary compatibility is guaranteed.

Therefore the answer to the common question "when will feature X be backported to OpenSSL 1.0.0/0.9.8?" is "never" but it could appear in the next minor release.

9. What happens when the letter release reaches z? 1

It was decided after the release of OpenSSL 0.9.8y the next version should be 0.9.8za then 0.9.8zb and so on.

[LEGAL] 1

1. Do I need patent licenses to use OpenSSL?

For information on intellectual property rights, please consult a lawyer. The OpenSSL team does not offer legal advice.

You can configure OpenSSL so as not to use IDEA, MDC2 and RC5 by using

./config no-idea no-mdc2 no-rc5

2. Can Luse OpenSSL with GPL software? 1

On many systems including the major Linux and BSD distributions, yes (the GPL does not place restrictions on using libraries that are part of the normal operating system distribution).

On other systems, the situation is less clear. Some GPL software copyright holders claim that you infringe on their rights if you use OpenSSL with their software on operating systems that don't

normally include OpenSSL.

If you develop open source software that uses OpenSSL, you may find it useful to choose an other license than the GPL, or state explicitly that "This program is released under the GPL with the additional exemption that compiling, linking, and/or using OpenSSL is allowed." If you are using GPL software developed by others, you may want to ask the copyright holder for permission to use their software with OpenSSL.

USER] 🖻

1. Why do I get a "PRNG not seeded" error message? 1

Cryptographic software needs a source of unpredictable data to work correctly. Many open source operating systems provide a "randomness device" (/dev/urandom or /dev/random) that serves this purpose. All OpenSSL versions try to use /dev/urandom by default; starting with version 0.9.7, OpenSSL also tries /dev/random if /dev/urandom is not available.

On other systems, applications have to call the RAND_add() or RAND_seed() function with appropriate data before generating keys or performing public key encryption. (These functions initialize the pseudo-random number generator, PRNG.) Some broken applications do not do this. As of version 0.9.5, the OpenSSL functions that need randomness report an error if the random number generator has not been seeded with at least 128 bits of randomness. If this error occurs and is not discussed in the documentation of the application you are using, please contact the author of that application; it is likely that it never worked correctly. OpenSSL 0.9.5 and later make the error visible by refusing to perform potentially insecure encryption.

If you are using Solaris 8, you can add /dev/urandom and /dev/random devices by installing patch 112438 (Sparc) or 112439 (x86), which are available via the Patchfinder at <u>http://sunsolve.sun.com</u> (Solaris 9 includes these devices by default). For /dev/random support for earlier Solaris versions, see Sun's statement at <u>http://sunsolve.sun.com/pub-cgi</u> /retrieve.pl?doc=fsrdb/27606&zone_32=SUNWski (the SUNWski package is available in patch 105710).

On systems without /dev/urandom and /dev/random, it is a good idea to use the Entropy Gathering Demon (EGD); see the RAND_egd() manpage for details. Starting with version 0.9.7, OpenSSL will automatically look for an EGD socket at /var/run /egd-pool, /dev/egd-pool, /etc/egd-pool and /etc/entropy.

Most components of the openssl command line utility automatically try to seed the random number generator from a file. The name of the default seeding file is determined as follows: If environment variable RANDFILE is set, then it names the seeding file. Otherwise if environment variable HOME is set, then the seeding file is \$HOME/.rnd. If neither RANDFILE nor HOME is set, versions up to OpenSSL 0.9.6 will use file .rnd in the current directory while OpenSSL 0.9.6a uses no default seeding file at all. OpenSSL 0.9.6b and later will behave similarly to 0.9.6a, but will use a default of "C:\" for HOME on Windows systems if the environment variable has not been set.

If the default seeding file does not exist or is too short, the "PRNG not seeded" error message may occur.

The openssl command line utility will write back a new state to the default seeding file (and create this file if necessary) unless there was no sufficient seeding.

Pointing \$RANDFILE to an Entropy Gathering Daemon socket does not work. Use the "-rand" option of the OpenSSL command line tools instead. The \$RANDFILE environment variable and \$HOME/.rnd are only used by the OpenSSL command line tools. Applications using the OpenSSL library provide their own configuration options to specify the entropy source, please check out the documentation coming the with application.

2. Why do I get an "unable to write 'random state'" error message?

Sometimes the openssl command line utility does not abort with a "PRNG not seeded" error message, but complains that it is "unable to write 'random state'". This message refers to the default seeding file (see previous answer). A possible reason is that no default filename is known because neither RANDFILE nor HOME is set. (Versions up to 0.9.6 used file ".rnd" in the current directory in this case, but this has changed with 0.9.6a.)

3. How do I create certificates or certificate requests? 1

Check out the CA.pl(1) manual page. This provides a simple wrapper round the 'req', 'verify', 'ca' and 'pkcs12' utilities. For finer control check out the manual pages for the individual utilities and the certificate extensions documentation (in ca(1), req(1), $x509v3_config(5)$)

4. Why can't I create certificate requests? **1**

You typically get the error:

unable to find 'distinguished_name' in config problems making Certificate Request

This is because it can't find the configuration file. Check out the DIAGNOSTICS section of req(1) for more information.

5. Why does <SSL program> fail with a certificate verify error? 1€

This problem is usually indicated by log messages saying something like "unable to get local issuer certificate" or "self signed certificate". When a certificate is verified its root CA must be "trusted" by OpenSSL this typically means that the CA certificate must be placed in a directory or file and the relevant program configured to read it. The OpenSSL program 'verify' behaves in a similar way and issues similar error messages: check the verify(1) program manual page for more information.

6. Why can I only use weak ciphers when I connect to a server using OpenSSL?

This is almost certainly because you are using an old "export grade" browser which only supports weak encryption. Upgrade your browser to support 128 bit ciphers.

7. How can I create DSA certificates? 1

Check the CA.pl(1) manual page for a DSA certificate example.

8. Why can't I make an SSL connection to a server using a DSA certificate? •

Typically you'll see a message saying there are no shared ciphers when the same setup works fine with an RSA certificate. There are two possible causes. The client may not support connections to DSA servers most web browsers (including Netscape and MSIE) only support connections to servers supporting RSA cipher suites. The other cause is that a set of DH parameters has not been supplied to the server. DH parameters can be created with the dhparam(1) command and loaded using the SSL_CTX_set_tmp_dh() for example: check the source to s_server in apps/s_server.c for an example.

9. How can I remove the passphrase on a private key? 1

Firstly you should be really *really* sure you want to do this. Leaving a private key unencrypted is a major security risk. If you decide that you do have to do this check the EXAMPLES sections of the rsa(1) and dsa(1) manual pages. 10. Why can't Luse OpenSSL certificates with SSL client authentication?

What will typically happen is that when a server requests authentication it will either not include your certificate or tell you that you have no client certificates (Netscape) or present you with an empty list box (MSIE). The reason for this is that when a server requests a client certificate it includes a list of CAs names which it will accept. Browsers will only let you select certificates from the list on the grounds that there is little point presenting a certificate which the server will reject.

The solution is to add the relevant CA certificate to your servers "trusted CA list". How you do this depends on the server software in uses. You can print out the servers list of acceptable CAs using the OpenSSL s_client tool:

openssl s_client -connect www.some.host:443 -prexit

If your server only requests certificates on certain URLs then you may need to manually issue an HTTP GET command to get the list when s_client connects:

GET /some/page/needing/a/certificate.html

If your CA does not appear in the list then this confirms the problem.

11. Why does my browser give a warning about a mismatched hostname? •

Browsers expect the server's hostname to match the value in the commonName (CN) field of the certificate. If it does not then you get a warning.

12. How do I install a CA certificate into a browser?

The usual way is to send the DER encoded certificate to the browser as MIME type application/x-x509-ca-cert, for example by clicking on an appropriate link. On MSIE certain extensions such as .der or .cacert may also work, or you can import the certificate using the certificate import wizard.

You can convert a certificate to DER form using the command:

openssl x509 -in ca.pem -outform DER -out ca.der

Occasionally someone suggests using a command such as:

openssl pkcs12 -export -out cacert.p12 -in cacert.pem -inkey cakey.pem

DO NOT DO THIS! This command will give away your CAs private key and reduces its security to zero: allowing anyone to forge certificates in whatever name they choose.

13. Why is OpenSSL x509 DN output not conformant to RFC2253?

The ways to print out the oneline format of the DN (Distinguished Name) have been extended in version 0.9.7 of OpenSSL. Using the new X509_NAME_print_ex() interface, the "-nameopt" option could be introduced. See the manual page of the "openssl x509" command line tool for details. The old behaviour has however been left as default for the sake of compatibility.

14. What is a "128 bit certificate"? Can I create one with OpenSSL?

The term "128 bit certificate" is a highly misleading marketing term. It does *not* refer to the size of the public key in the certificate! A certificate containing a 128 bit RSA key would have negligible security.

There were various other names such as "magic certificates", "SGC certificates", "step up certificates" etc.

You can't generally create such a certificate using OpenSSL but there is no need to any more. Nowadays web browsers using unrestricted strong encryption are generally available.

When there were tight restrictions on the export of strong encryption software from the US only weak encryption algorithms could be freely exported (initially 40 bit and then 56 bit). It was widely recognised that this was inadequate. A relaxation of the rules allowed the use of strong encryption but only to an authorised server.

Two slightly different techniques were developed to support this, one used by Netscape was called "step up", the other used by MSIE was called "Server Gated Cryptography" (SGC). When a browser initially connected to a server it would check to see if the certificate contained certain extensions and was issued by an authorised authority. If these test succeeded it would reconnect using strong encryption.

Only certain (initially one) certificate authorities could issue the certificates and they generally cost more than ordinary certificates.

Although OpenSSL can create certificates containing the appropriate extensions the certificate would not come from a permitted authority and so would not be recognized.

The export laws were later changed to allow almost unrestricted use of strong encryption so these certificates are now obsolete.

It doesn't: this extension is often the cause of confusion.

Consider a certificate chain A->B->C so that A signs B and B signs C. Suppose certificate C contains AKID.

The purpose of this extension is to identify the authority certificate B. This can be done either by including the subject key identifier of B or its issuer name and serial number.

In this latter case because it is identifying certificate B it must contain the issuer name and serial number of B.

It is often wrongly assumed that it should contain the subject name of B. If it did this would be redundant information because it would duplicate the issuer name of C.

16. How can I set up a bundle of commercial root CA certificates? 1

The OpenSSL software is shipped without any root CA certificate as the OpenSSL project does not have any policy on including or excluding any specific CA and does not intend to set up such a policy. Deciding about which CAs to support is up to application developers or administrators.

Other projects do have other policies so you can for example extract the CA bundle used by Mozilla and/or modssl as described in this article: <u>https://www.mail-archive.com/modssl-</u> users@modssl.org/msg16980.html

17. Some secure servers 'hang' with OpenSSL 1.0.1, is this a bug?

OpenSSL 1.0.1 is the first release to support TLS 1.2, among other things, this increases the size of the default ClientHello message to more than 255 bytes in length. Some software cannot handle this and hangs. For more details and workarounds see: <u>https://rt.openssl.org/Ticket/Display.html?user=guest&pass=guest&id=2771</u>

BUILD 1

1. Why does Clang sanitizer give warnings?

You need to build with -DPEDANTIC to run sanitized tests, otherwise you will get optimized assembler versions of some functions.

2. Why does the linker complain about undefined symbols? 1

Maybe the compilation was interrupted, and make doesn't notice that something is missing. Run "make clean; make".

If you used ./Configure instead of ./config, make sure that you selected the right target. File formats may differ slightly between OS versions (for example sparcv8/sparcv9, or a.out/elf).

In case you get errors about the following symbols, use the config option "no-asm", as described in INSTALL:

BF_cbc_encrypt, BF_decrypt, BF_encrypt, CAST_cbc_encrypt, CAST_decrypt, CAST_encrypt, RC4, RC5_32_cbc_encrypt, RC5_32_decrypt, RC5_32_encrypt, bn_add_words, bn_div_words, bn_mul_add_words, bn_mul_comba4, bn_mul_comba8, bn_mul_words, bn_sqr_comba4, bn_sqr_comba4, bn_sqr_comba8, bn_sqr_words, bn_sub_words, des_decrypt3, des_ede3_cbc_encrypt, des_encrypt, des_encrypt2, des_encrypt3, des_ncbc_encrypt, md5_block_asm_host_order, sha1_block_asm_data_order

If none of these helps, you may want to try using the current snapshot. If the problem persists, please submit a bug report.

3. Why does the OpenSSL test fail with "bc: command not found"?

You didn't install "bc", the Unix calculator. If you want to run the tests, get GNU bc from ftp://ftp.gnu.org or from your OS distributor.

4. Why does the OpenSSL test fail with "bc: 1 no implemented"? 1

On some SCO installations or versions, bc has a bug that gets triggered when you run the test suite (using "make test"). The message returned is "bc: 1 not implemented".

The best way to deal with this is to find another implementation of bc and compile/install it. GNU bc (see <u>https://www.gnu.org/software</u> /software.html for download instructions) can be safely used, for example.

5. Why does the OpenSSL test fail with "bc: stack empty"? 1

On some DG/ux versions, bc seems to have a too small stack for calculations that the OpenSSL bntest throws at it. This gets triggered when you run the test suite (using "make test"). The message returned is "bc: stack empty".

The best way to deal with this is to find another implementation of bc and compile/install it. GNU bc (see https://www.gnu.org/software/software/software.html for download instructions) can be safely used, for example.

6. Why does the OpenSSL compilation fail on Alpha Tru64 Unix?

On some Alpha installations running Tru64 Unix and Compaq C, the compilation of crypto/sha/sha_dgst.c fails with the message 'Fatal: Insufficient virtual memory to continue compilation.' As far as the tests have shown, this may be a compiler bug. What happens is that it eats up a lot of resident memory to build something, probably a table. The problem is clearly in the optimization code, because if one eliminates optimization completely (-O0), the compilation goes through (and the compiler consumes about 2MB of resident memory instead of 240MB or whatever one's limit is currently).

There are three options to solve this problem:

1. set your current data segment size soft limit higher. Experience shows that about 241000 kbytes seems to be enough on an AlphaServer DS10. You do this with the command 'ulimit -Sd nnnnnn', where 'nnnnnn' is the number of kbytes to set the limit to.

2. If you have a hard limit that is lower than what you need and you can't get it changed, you can compile all of OpenSSL with -O0 as optimization level. This is however not a very nice thing to do for those who expect to get the best result from OpenSSL. A bit more complicated solution is the following:

```
make DIRS=crypto SDIRS=sha "`grep '^CFLAG='
Makefile.ssl | \
    sed -e 's/ -0[0-9] / -00 /'`"
rm `ls crypto/*.o crypto/sha/*.o | grep -v
'sha_dgst\.o'`
make
```

This will only compile sha_dgst.c with -O0, the rest with the optimization level chosen by the configuration process. When the above is done, do the test and installation and you're set.

 Reconfigure the toolkit with no-sha0 option to leave out SHA0. It should not be used and is not used in SSL/TLS nor any other recognized protocol in either case.

7. Why does the OpenSSL compilation fail with "ar: command not found"? 1

Getting this message is quite usual on Solaris 2, because Sun has hidden away 'ar' and other development commands in directories that aren't in \$PATH by default. One of those directories is '/usr/ccs /bin'. The quickest way to fix this is to do the following (it assumes you use sh or any sh-compatible shell):

PATH=\${PATH}:/usr/ccs/bin; export PATH

and then redo the compilation. What you should really do is make sure '/usr/ccs/bin' is permanently in your \$PATH, for example through your '.profile' (again, assuming you use a sh-compatible shell).

8. Why does the OpenSSL compilation fail on Win32 with VC++? ▶

Sometimes, you may get reports from VC++ command line (cl) that it can't find standard include files like stdio.h and other weirdnesses. One possible cause is that the environment isn't correctly set up. To solve that problem for VC++ versions up to 6, one should run VCVARS32.BAT which is found in the 'bin' subdirectory of the VC++ installation directory (somewhere under 'Program Files'). For VC++ version 7 (and up?), which is also called VS.NET, the file is called VSVARS32.BAT instead. This needs to be done prior to running NMAKE, and the changes are only valid for the current DOS session.

9. What is special about OpenSSL on Redhat? 1

Red Hat Linux (release 7.0 and later) include a preinstalled limited version of OpenSSL. Red Hat has chosen to disable support for IDEA, RC5 and MDC2 in this version. The same may apply to other Linux distributions. Users may therefore wish to install more or all of the features left out.

To do this you MUST ensure that you do not overwrite the openssl that is in /usr/bin on your Red Hat machine. Several packages depend on this file, including sendmail and ssh. /usr/local/bin is a good alternative choice. The libraries that come with Red Hat 7.0

onwards have different names and so are not affected. (eg For Red Hat 7.2 they are /lib/libssl.so.0.9.6b and /lib/libcrypto.so.0.9.6b with symlinks /lib/libssl.so.2 and /lib/libcrypto.so.2 respectively).

Please note that we have been advised by Red Hat attempting to recompile the openssl rpm with all the cryptography enabled will not work. All other packages depend on the original Red Hat supplied openssl package. It is also worth noting that due to the way Red Hat supplies its packages, updates to openssl on each distribution never change the package version, only the build number. For example, on Red Hat 7.1, the latest openssl package has version number 0.9.6 and build number 9 even though it contains all the relevant updates in packages up to and including 0.9.6b.

A possible way around this is to persuade Red Hat to produce a non-US version of Red Hat Linux.

10. Why does the OpenSSL compilation fail on MacOS X? ₫

If the failure happens when trying to build the "openssl" binary, with a large number of undefined symbols, it's very probable that you have OpenSSL 0.9.6b delivered with the operating system (you can find out by running '/usr/bin/openssl version') and that you were trying to build OpenSSL 0.9.7 or newer. The problem is that the loader ('ld') in MacOS X has a misfeature that's quite difficult to go around. Look in the file PROBLEMS for a more detailed explanation and for possible solutions.

11. Why does the OpenSSL test suite fail on MacOS X? 1

If the failure happens when running 'make test' and the RC4 test fails, it's very probable that you have OpenSSL 0.9.6b delivered with the operating system (you can find out by running '/usr/bin /openssl version') and that you were trying to build OpenSSL 0.9.6d. The problem is that the loader ('ld') in MacOS X has a misfeature that's quite difficult to go around and has linked the programs "openssl" and the test programs with /usr/lib /libcrypto.dylib and /usr/lib/libssl.dylib instead of the libraries you just built. Look in the file PROBLEMS for a more detailed explanation and for possible solutions.

12. Why does the OpenSSL test suite fail in BN sqr test [on a 64-bit platform]? 🗗

Failure in BN_sqr test is most likely caused by a failure to configure the toolkit for current platform or lack of support for the platform in question. Run './config -t' and './apps/openssl version -p'. Do these platform identifiers match? If they don't, then you most likely failed to run ./config and you're hereby advised to do so before filing a bug report. If ./config itself fails to run, then it's most likely problem with your local environment and you should turn to your system administrator (or similar). If identifiers match (and/or no alternative identifier is suggested by ./config script), then the platform is unsupported. There might or might not be a workaround. Most notably on SPARC64 platforms with GNU C compiler you should be able to produce a working build by running './config -m32'. I understand that -m32 might not be what you want/need, but the build should be operational. For further details turn to <openssldev@openssl.org>.

13. Why does OpenBSD-i386 build fail on des-586.s with "Unimplemented segment type"?

As of 0.9.7 assembler routines were overhauled for position independence of the machine code, which is essential for shared library support. For some reason OpenBSD is equipped with an out-of-date GNU assembler which finds the new code offensive. To work around the problem, configure with no-asm (and sacrifice a great deal of performance) or patch your assembler according to https://www.openssl.org/~appro/gas-1.92.3.OpenBSD.patch. For your convenience a pre-compiled replacement binary is provided at https://www.openssl.org/~appro/gas-1.92.3.static.aout.bin. Reportedly elder *BSD a.out platforms also suffer from this problem and remedy should be same. Provided binary is statically linked and should be working across wider range of *BSD branches, not just OpenBSD.

14. Why does the OpenSSL test suite fail in sha512t on x86 CPU?

If the test program in question fails withs SIGILL, Illegal Instruction exception, then you more than likely to run SSE2-capable CPU, such as Intel P4, under control of kernel which does not support SSE2 instruction extensions. See accompanying INSTALL file and OPENSSL_ia32cap(3) documentation page for further information.

15. Why does compiler fail to compile sha512.c? ▲

OpenSSL SHA-512 implementation depends on compiler support for 64-bit integer type. Few elder compilers [ULTRIX cc, SCO compiler to mention a couple] lack support for this and therefore are incapable of compiling the module in question. The recommendation is to disable SHA-512 by adding no-sha512 to ./config [or ./Configure] command line. Another possible alternative might be to switch to GCC.

16. Test suite still fails, what to do? 1

Another common reason for test failures is bugs in the toolchain or run-time environment. Known cases of this are documented in the PROBLEMS file, please review it before you beat the drum. Even if you don't find anything in that file, please do consider the possibility of a compiler bug. Compiler bugs often appear in rather bizarre ways, they never make sense, and tend to emerge when you least expect them. One thing to try is to reduce the level of optimization (such as by editing the CFLAG variable line in the top-level Makefile), and then recompile and re-run the test.

17. I think I've found a bug, what should I do? 1

If you are a new user then it is quite likely you haven't found a bug and something is happening you aren't familiar with. Check this FAQ, the associated documentation and the mailing lists for similar queries. If you are still unsure whether it is a bug or not submit a query to the openssl-users mailing list.

If you think you have found a bug based on the output of static analysis tools then please manually check the issue is genuine. Such tools can produce a LOT of false positives.

18. I'm SURE I've found a bug, how do I report it? 1

To avoid duplicated reports check the mailing lists and release notes for the relevant version of OpenSSL to see if the problem has been reported already.

Bug reports with no security implications should be sent to the request tracker. This can be done by mailing the report to <rt@openssl.org> (or its alias <openssl-bugs@openssl.org>), please note that messages sent to the request tracker also appear in the public openssl-dev mailing list.

The report should be in plain text. Any patches should be sent as plain text attachments because some mailers corrupt patches sent inline. If your issue affects multiple versions of OpenSSL check any patches apply cleanly and, if possible include patches to each affected version.

The report should be given a meaningful subject line briefly summarising the issue. Just "bug in OpenSSL" or "bug in OpenSSL 0.9.8n" is not very helpful.

By sending reports to the request tracker the bug can then be given a priority and assigned to the appropriate maintainer. The history of discussions can be accessed and if the issue has been addressed or a reason why not. If patches are only sent to openssl-dev they can be mislaid if a team member has to wade through months of old messages to review the discussion.

See also https://www.openssl.org/community

19. I've found a security issue, how do I report it? 1

If you think your bug has security implications then please send it to openssl-security@openssl.org if you don't get a prompt reply at least acknowledging receipt then resend or mail it directly to one of the more active team members (e.g. Steve). If you wish to use PGP to send in a report please use one or more of the keys of the team members listed at https://www.openssl.org

Note that bugs only present in the openssl utility are not in general considered to be security issues.

[PROG] 1

1. Is OpenSSL thread-safe? €

Provided an application sets up the thread callback functions, the answer is yes. There are limitations; for example, an SSL connection cannot be used concurrently by multiple threads. This is true for most OpenSSL objects.

To do this, your application must call CRYPTO_set_locking_callback() and one of the CRYPTO_THREADID_set...() API's. See the OpenSSL threads manpage for details and "note on multi-threading" in the INSTALL file in the source distribution.

2. I've compiled a program under Windows and it crashes: why?

This is usually because you've missed the comment in INSTALL.W32. Your application must link against the same version of the Win32 C-Runtime against which your openssl libraries were linked. The default version for OpenSSL is /MD - "Multithreaded DLL".

If you are using Microsoft Visual C++'s IDE (Visual Studio), in many cases, your new project most likely defaulted to "Debug Singlethreaded" - /ML. This is NOT interchangeable with /MD and your program will crash, typically on the first BIO related read or write operation.

For each of the six possible link stage configurations within Win32, your application must link against the same by which OpenSSL was built. If you are using MS Visual C++ (Studio) this can be changed

by:

1. Select Settings... from the Project Menu. 2. Select the C/C++ Tab. 3. Select "Code Generation from the "Category" drop down list box 4. Select the Appropriate library (see table below) from the "Use run-time library" drop down list box. Perform this step for both your debug and release versions of your application (look at the top left of the settings panel to change between the two) Single Threaded /ML MS VC++ often defaults to this for the release version of a new project. Debug Single Threaded /MLd MS VC++ often defaults to this for the debug version of a new project. /MT Multithreaded Debug Multithreaded /MTd Multithreaded DLL /MD OpenSSL defaults to this. /MDd Debug Multithreaded DLL

Note that debug and release libraries are NOT interchangeable. If you built OpenSSL with /MD your application must use /MD and cannot use /MDd.

As per 0.9.8 the above limitation is eliminated for .DLLs. OpenSSL .DLLs compiled with some specific run-time option [we insist on the default /MD] can be deployed with application compiled with different option or even different compiler. But there is a catch! Instead of re-compiling OpenSSL toolkit, as you would have to with prior versions, you have to compile small C snippet with compiler and/or options of your choice. The snippet gets installed as <installroot>/include/openssl/applink.c and should be either added to your application project or simply #include-d in one [and only one] of your application manifests itself as fatal "no OPENSSL_Applink"

run-time error. An explicit reminder is due that in this situation [mixing compiler options] it is as important to add CRYPTO_malloc_init prior first call to OpenSSL.

3. How do I read or write a DER encoded buffer using the ASN1 functions? 1

You have two options. You can either use a memory BIO in conjunction with the i2d_*_bio() or d2i_*_bio() functions or you can use the i2d_*(), d2i_*() functions directly. Since these are often the cause of grief here are some code fragments using PKCS7 as an example:

```
unsigned char *buf, *p;
int len = i2d_PKCS7(p7, NULL);
```

buf = OPENSSL_malloc(len); /* error checking omitted */ p = buf; i2d_PKCS7(p7, &p);

At this point buf contains the len bytes of the DER encoding of p7.

The opposite assumes we already have len bytes in buf:

unsigned char *p = buf;

p7 = d2i_PKCS7(NULL, &p, len);

At this point p7 contains a valid PKCS7 structure or NULL if an error occurred. If an error occurred ERR_print_errors(bio) should give more information.

The reason for the temporary variable 'p' is that the ASN1 functions increment the passed pointer so it is ready to read or write the next structure. This is often a cause of problems: without the temporary variable the buffer pointer is changed to point just after the data that has been read or written. This may well be uninitialized data and attempts to free the buffer will have unpredictable results because it no longer points to the same address.

Memory allocation and encoding can also be combined in a single operation by the ASN1 routines:

unsigned char *buf = NULL; int len = i2d_PKCS7(p7, &buf);

if (len < 0) {

```
/* Error */
}
/* Do some things with 'buf' */
/* Finished with buf: free it */
OPENSSL_free(buf);
```

In this special case the "buf" parameter is *not* incremented, it points to the start of the encoding.

4. OpenSSL uses DER but I need BER format: does OpenSSL support BER?

The short answer is yes, because DER is a special case of BER and OpenSSL ASN1 decoders can process BER.

The longer answer is that ASN1 structures can be encoded in a number of different ways. One set of ways is the Basic Encoding Rules (BER) with various permissible encodings. A restriction of BER is the Distinguished Encoding Rules (DER): these uniquely specify how a given structure is encoded.

Therefore, because DER is a special case of BER, DER is an acceptable encoding for BER.

5. I've tried using <M some evil pkcs12 macro> and I get errors why? 1

This usually happens when you try compiling something using the PKCS#12 macros with a C++ compiler. There is hardly ever any need to use the PKCS#12 macros in a program, it is much easier to parse and create PKCS#12 files using the PKCS12_parse() and PKCS12_create() functions documented in doc/openssl.txt and with examples in demos/pkcs12. The 'pkcs12' application has to use the macros because it prints out debugging information.

6. I've called <some function> and it fails, why? 1

Before submitting a report or asking in one of the mailing lists, you should try to determine the cause. In particular, you should call ERR_print_errors() or ERR_print_errors_fp() after the failed call and see if the message helps. Note that the problem may occur earlier than you think -- you should check for errors after every call where it is possible, otherwise the actual problem may be hidden because some OpenSSL functions clear the error state.

7. I just get a load of numbers for the error output, what do they mean?

The actual format is described in the ERR_print_errors() manual

page. You should call the function ERR_load_crypto_strings() before hand and the message will be output in text form. If you can't do this (for example it is a pre-compiled binary) you can use the errstr utility on the error code itself (the hex digits after the second colon).

8. Why do I get errors about unknown algorithms? 1

The cause is forgetting to load OpenSSL's table of algorithms with OpenSSL_add_all_algorithms(). See the manual page for more information. This can cause several problems such as being unable to read in an encrypted PEM file, unable to decrypt a PKCS#12 file or signature failure when verifying certificates.

9. Why can't the OpenSSH configure script detect OpenSSL? 1

Several reasons for problems with the automatic detection exist. OpenSSH requires at least version 0.9.5a of the OpenSSL libraries. Sometimes the distribution has installed an older version in the system locations that is detected instead of a new one installed. The OpenSSL library might have been compiled for another CPU or another mode (32/64 bits). Permissions might be wrong.

The general answer is to check the config.log file generated when running the OpenSSH configure script. It should contain the detailed information on why the OpenSSL library was not detected or considered incompatible.

10. Can I use OpenSSL's SSL library with non-blocking I/O?

Yes; make sure to read the SSL_get_error(3) manual page!

A pitfall to avoid: Don't assume that SSL_read() will just read from the underlying transport or that SSL_write() will just write to it -- it is also possible that SSL_write() cannot do any useful work until there is data to read, or that SSL_read() cannot do anything until it is possible to send data. One reason for this is that the peer may request a new TLS/SSL handshake at any time during the protocol, requiring a bi-directional message exchange; both SSL_read() and SSL_write() will try to continue any pending handshake.

11. Why doesn't my server application receive a client certificate? 1

Due to the TLS protocol definition, a client will only send a certificate, if explicitly asked by the server. Use the SSL_VERIFY_PEER flag of the SSL_CTX_set_verify() function to enable the use of client certificates.

12. Why does compilation fail due to an undefined symbol

NID uniqueIdentifier? 1

For OpenSSL 0.9.7 the OID table was extended and corrected. In earlier versions, uniqueldentifier was incorrectly used for X.509 certificates. The correct name according to RFC2256 (LDAP) is x500Uniqueldentifier. Change your code to use the new name when compiling against OpenSSL 0.9.7.

13. I think I've detected a memory leak, is this a bug?

In most cases the cause of an apparent memory leak is an OpenSSL internal table that is allocated when an application starts up. Since such tables do not grow in size over time they are harmless.

These internal tables can be freed up when an application closes using various functions. Currently these include following:

Thread-local cleanup functions:

ERR_remove_state()

Application-global cleanup functions that are aware of usage (and therefore thread-safe):

ENGINE_cleanup() and CONF_modules_unload()

"Brutal" (thread-unsafe) Application-global cleanup functions:

ERR_free_strings(), EVP_cleanup() and CRYPT0_cleanup_all_ex_data().

14. Why does Valgrind complain about the use of uninitialized data?

When OpenSSL's PRNG routines are called to generate random numbers the supplied buffer contents are mixed into the entropy pool: so it technically does not matter whether the buffer is initialized at this point or not. Valgrind (and other test tools) will complain about this. When using Valgrind, make sure the OpenSSL library has been compiled with the PURIFY macro defined (-DPURIFY) to get rid of these warnings.

15. Why doesn't a memory BIO work when a file does? 1

This can occur in several cases for example reading an S/MIME email message. The reason is that a memory BIO can do one of two things when all the data has been read from it. The default behaviour is to indicate that no more data is available and that the call should be retried, this is to allow the application to fill up the BIO again if necessary.

Alternatively it can indicate that no more data is available and that EOF has been reached.

If a memory BIO is to behave in the same way as a file this second behaviour is needed. This must be done by calling:

BI0_set_mem_eof_return(bio, 0);

See the manual pages for more details.

16. Where are the declarations and implementations of d2i X509() etc?

These are defined and implemented by macros of the form:

DECLARE_ASN1_FUNCTIONS(X509) and IMPLEMENT_ASN1_FUNCTIONS(X509)

The implementation passes an ASN1 "template" defining the structure into an ASN1 interpreter using generalised functions such as ASN1_item_d2i().

<u>17. When debugging I observe SIGILL during OpenSSL</u> initialization: why? **■**

OpenSSL adapts to processor it executes on and for this reason has to query its capabilities. Unfortunately on some processors the only way to achieve this for non-privileged code is to attempt instructions that can cause Illegal Instruction exceptions. The initialization procedure is coded to handle these exceptions to manipulate corresponding bits in capabilities vector. This normally appears transparent, except when you execute it under debugger, which stops prior delivering signal to handler. Simply resuming execution does the trick, but when debugging a lot it might feel counterproductive. Two options. Either set explicit capability environment variable in order to bypass the capability query (see corresponding crypto/*cap.c for details). Or configure debugger not to stop upon SIGILL exception, e.g. in gdb case add 'handle SIGILL nostop' to your .gdbinit. No. 15-777

IN THE Supreme Court of the United States

SAMSUNG ELECTRONICS CO., et al., Petitioners,

v.

APPLE INC.,

Respondent.

On Writ of Certiorari to the United States Court of Appeals for the Federal Circuit

Brief Amicus Curiae of the Software Freedom Law Center in Support of Petitioners

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QUESTION PRESENTED

1. Can Congress constitutionally award "total profits" damages for infringement of design patents, where 35 U.S.C. §171 contains none of the constitutionally required safeguards for First Amendment protected speech this Court has held are required for constitutional exercise of the Article I, §8 power?

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Ralph D. Clifford & Richard J. Peltz-Steele, *The Constitutionality of Design Patents*, 14:2 CHI.-KENT J. INTELL. PROP. 553 (2015)2

U.S. Design Patent No. 618,6777

INTEREST OF Amicus Curiae

The Software Freedom Law Center is a not-for-profit legal services organization that provides legal representation and other law-related services to protect and advance free software.¹ SFLC provides pro bono legal services to non-profit free software developers and also helps the general public better understand the legal aspects of free software. SFLC has an interest in this matter because the decision of this Court will have a significant effect on the rights of the free software developers and users SFLC represents. More specifically, SFLC has an interest in ensuring that limits are maintained on the reach of patent law so that Free and Open Source software development is not unreasonably and unnecessarily impeded.

¹Pursuant to Sup. Ct. R. 37.6, amicus notes that no counsel for a party authored this brief in whole or in part, and no counsel or party made a monetary contribution intended to fund the preparation or submission of this brief. No person other than amicus curiae and its counsel made a monetary contribution to its preparation or submission. Petitioners have consented to the filing of this brief through a blanket consent letter filed with the Clerk's Office. Respondent has consented to the filing of this brief through a consent letter filed with the Clerk's Office.

SUMMARY OF ARGUMENT

This Court has not considered a patent on ornamental design for more than a century. But in cases over the last twenty-five years, from Feist Publications, Inc. v. Rural Telephone Service Co., Inc., 499 U.S. 340 (1991) to Eldred v. Ashcroft, 537 U.S. 186, 219 (2003) to Alice Corp. Pty. Ltd v. CLS Bank Int'l 134 S. Ct. 2347 (2014), this Court has repeatedly reinforced the role of the First Amendment in limiting the effect of patent and copyright rules on freedom of protected speech and the communication of ideas. Patent monopolies on "ornamental design" have not been subjected to the same constituional scrutiny that this Court has given to doctrines concerning copyright and utility patents. The rule of patentability established by 35 U.S.C. §171, which makes patentable any "new" or "original" "ornamental design," overlaps with copyright protection for the same expressions, but without the constitutionally-required distinction between idea and expression, or the availability of fair use defenses. that this Court has said, see Eldred, supra, 537 U.S., at 219, the First Amendment requires. See Ralph D. Clifford & Richard J. Peltz-Steele, The Constitutionality of Design Patents, 14:2 CHI.-KENT J. INTELL. PROP. 553 (2015)

As the Court below read 35 U.S.C. §289, this constitutionally dubious state-granted monopoly is enforced by a damages rule allowing the patent holder to recover the total profit earned by the sale of any "article of manufacture," no matter how complex or valuable to its purchasers for other reasons, if it contains a "colorable imitation" of a patented design. Such a punitive measure of damages renders the design patent a particularly powerful weapon for the prohibition of innovation, whether in the hands of incumbent manufacturers or "patent trolls." This is also, with respect to protected speech, the very definition of the chilling effect the First Amendment requires that we avoid. This Court has recognized that even speech at the very margins of First Amendment protection, such as defamatory falsehood, cannot be subject to punitive damages without a showing of "constitutional malice," that is, intentional publication of falsehood or reckless disregard of truth. See Gertz v. Robert Welch, Inc., 418 U.S. 323, 349 (1974). Liability for patent infringement requires not even a showing of intent, let alone a level of intent sufficient to meet First Amendment requirements. The reading given to §289 by the Court of Appeals below therefore raises serious constitutional questions.

ARGUMENT

I. Award of Design Patents Under 35 U.S.C. §171 Violates the First Amendment

A. THIS COURT HELD IN Feist AND Eldred THAT THE IDEA/EXPRESSION DISTINCTION AND FAIR USE DOCTRINE ARE CONSTITU-TIONALLY REQUIRED TO MAKE COPYRIGHT CONSISTENT WITH THE FIRST AMENDMENT

This Court recognized in *Feist Publications, Inc.* v. *Rural Telephone Service Co., Inc.*, 499 U.S. 340 (1991), that copyright's dichotomy between unprotected ideas and protected expression is not "some unforeseen byproduct of a statutory scheme."

It is, rather, "the essence of copyright," and a constitutional requirement. The primary objective of copyright is not to reward the labor of authors, but "to promote the Progress of Science and useful Arts." U.S. Const. Art. I, §8, cl. 8. Accord *Twentieth Century Music Corp.* v. *Aiken*, 422 U.S. 151, 156 (1975). To this end, copyright assures authors the right to their original expression, but encourages others to build freely upon the ideas and information conveyed by a work. This principle, known as the idea/expression or fact/expression dichotomy, applies to all works of authorship."

Feist, supra, 499 U.S. at 349-350 (citations omitted).

This Court held in *Eldred v. Ashcroft*, 537 U.S. 186, 219 (2003), that the First Amendment precludes the

extension of statutory monopolies to abstract ideas. As you there said, the near-simultaneous adoption of the Patent and Copyright Clause and the First Amendment indicates that these laws are fundamentally compatible. This compatibility, however, depends on a construction of the patent and copyright laws that preserves First Amendment principles, including the freedom to communicate any "idea, theory, and fact." *Id.*

Eldred, supra, identified two mechanisms in copyright law that are necessary to accommodate this principle. First, the idea/expression dichotomy limits copyright's monopoly to an author's expression, leaving ideas "instantly available for public exploitation." *Id.* Second, the fair use doctrine allows the public to use even copyrighted expression for some purposes, "such as criticism, comment, news reporting, teaching..., scholarship, or research" *Id.* at 220.

Patent statutes, which depend on the same constitutional grant of authority as copyright statutes, are similarly limited by the First Amendment. See Eldred, 537 U.S. at 201 ("Because the Clause empowering Congress to confer copyrights also authorizes patents, congressional practice with respect to patents informs our inquiry.") The presence of an unwavering exemption for abstract ideas reconciles patent law with the First Amendment in a fashion similar to the idea/expression dichotomy's crucial role in reconciling copyright and freedom of speech with respect to utility patents. The presence of some limiting principle is even more necessary with respect to patent law than with respect to copyright, because, as you observed in *Eldred*, "the grant of a patent... prevent[s] full use by others of the inventor's knowledge." 537 U.S. at 217 (citation omitted). Patents can and do limit the application of knowledge to produce a new machine or to transform an article into a different state or thing, but they cannot constitutionally limit the communication of knowledge or ideas. *Eldred* teaches that, without this limitation, determining the scope of patent eligibility in each individual case would raise First Amendment questions of great difficulty.

But the present case sets before this Court, for the first time in more than a century, a patent not on a useful invention, but on a design. What the Court has recognized as a limitation harmonizing utility patents with the First Amendment, namely the prohibition on the patenting of abstract ideas, such as mathematics, algorithms, or facts of nature, see Diamond v. Diehr, 450 U.S. 175 (1981); Parker v. Flook, 437 U.S. 584 (1978); Bilski v. Kappos, 561 U.S. 593 (2010); Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 134 S. Ct. 2347 (2014), has no purchase with respect to patents on "ornamental design." Unless some other constitutional limitation is present, this Court's decisions over the course of the last 120 years force the conclusion that Congress cannot offer patent protection to such designs at all.

Patent law also recognizes no analogue to fair use, previously described by this Court as the second bulkwark of constitutional harmony between copyright and free expression. *See Eldred*, 537 U.S., at 219-220. The absence of any provision for fair use substantially increases the constitutional difficulty when patents are sought and granted for "ornamental design." B. "ORNAMENTAL DESIGN" IS SPEECH PRO-TECTED UNDER THE FIRST AMENDMENT, WHOSE REQUIREMENTS DO NOT VARY WHETHER THE SPEECH IS PATENTED OR COPYRIGHTED

One patent at issue in the present case claims an "ornamental design" for any object (media player, mobile phone, personal digital assistant, "novelty item" or "toy") shaped as indicated in the drawings accompanying the application, which depicts a roughly rectangular slab with rounded corners and some additional decorative features on the front, sides, and back of the slab. U.S. Design Patent No. 618,677.

Any such design, or set of drawings embodying the design, are speech protected by the First Amendment. just as much as a political cartoon, see Hustler Magazine v. Falwell, 485 U.S. 46 (1988), or an advertisement for a casino, see Posadas de Puerto Rico Assocs. v. Tourism Co., 478 U.S. 328 (1986). If Congress criminally prohibited or imposed prior restraint on such speech, the particular doctrinal label under which it did so would be irrelevant to the statute's evident unconstitutionality. A statute conveying a monopoly lasting decades over any use of the design, the cartoon or the advertisement must also meet First Amendment requirements somehow, because it prohibits everyone not having permission from the monopoly holder from using the design. Calling the relevant grant of monopoly "patent" rather than "copyright" in no way alters the degree to which the subject is protected speech. If in the present instance the design were treated under copyright law, Congress would be constitutionally required, under this Court's holdings, to differentiate between the expression of the design and

any idea (having, e.g. rounded corners) it contained, and to provide for a defense of fair use, rather than liability for "colorable imitation." *See* 35 U.S.C. §289. Those constitutional constraints cannot be lifted by calling the statutory monopoly a "patent," rather than a "copyright."

C. STATE-GRANTED MONOPOLIES OVER SPEECH PROTECTED BY THE FIRST AMEND-MENT MUST BE LIMITED

Because the subject matter of design patents is speech protected by the First Amendment, any statute purporting to convey a long-term monopoly to a single "owner" must be limited in some fashion in order to conform to First Amendment requirements. No less than in the case of words, suppression of particular designs runs "a substantial risk of suppressing ideas in the process." Cohen v. California, 403 U.S. 15, 26 (1971). By way of comparison, the limitations imposed on the ability to grant trademark monopolies are the previous accumulation of market value in the word or mark "as the result of organization and the expenditure of labor, skill, and money," International News Service v. Associated Press, 248 U.S. 215, 239 (1918), and the fact that the breadth of the monopoly is only over uses of the mark necessary to avoid confusion. This Court has held that Congress can establish a monopoly right in a particular word or symbol without limitation to the property right necessasry for the avoidance of confusion, see San Francisco Arts & Athletics v. United States Olympic Committee, 483 U.S. 522 (1987), but only in the case where the word or mark had acquired "commercial and promotional value" as "the end result of much time, effort, and expense." Id. at 532-533, (quoting Zacchini v. Scripps-Howard Broadcasting Co., 433 U.S. 562, 575 (1977)).

But 35 U.S.C. §171 states baldly, without any qualification or limitation that "[w]hoever invents any new, original and ornamental design for an article of manufacture may obtain a patent therefor." The only requirement of patentability for the design is originality. also the basic requirement for copyrightability. There is no doubt that the drawings or other materials fixing the supposedly patentable design in a tangible medium of expression are also subject to copyright. But where such copyrightable works must, as this Court has repeatedly made clear, be subject to limitation to the protection of expressions rather than ideas, and to broad, equitable defenses of fair use, §171-on no further predicate than originality alone-purports to grant rights untrammeled by these or equivalent limitations. Even if the burdens on First Amendment rights created here were merely incidental, the absence from patent doctrine of limitations present in copyright would be sufficient to show that the restrictions are greater than necessary in order to serve the government interest at stake. See United States v. O'Brien, 391 U.S. 367, 377 (1968).

The entire modern history of the First Amendment has transpired since this Court last considered a design patent. See Smith v. Whitman Saddle Co., 148 U.S. 674 (1893). It is apparent that long absence of constitutional scrutiny by no means implies constitutional propriety. In a proper case, this Court should hold 35 U.S.C. §171 invalid, leaving Congress to enact such additional measures of restriction on the scope and such additional defenses for fair use as would bring design patents within the constitutional ambit, or to remit the function performed by such patents to be performed instead by the Copyright and Lanham Acts.

II. To Avoid Constitutional Infirmity, This Court Must Reject the Reading Below of 35 U.S.C. §289

Petitioners did not raise below the issue of §171's constitutionality, nor did the Court of Appeals consider and decide the question. Amicus concedes that it is not therefore properly before this Court for decision in the instant case. But the apparent constitutional infirmity of §171 is determinative of the question presented here, because a rule confiscating all profits gained by the seller of an article infringing a monopoly that overbroadly burdens First Amendment rights is in itself constitutionally offensive.

A. ALLOWING THE CONFISCATION OF ALL PROFITS FOR THE INFRINGEMENT OF AN UNCONSTITUTIONAL STATE-GRANTED MONOPOLY OVER PROTECTED SPEECH VIOLATES THE FIRST AMENDMENT

The "total profits" rule for measuring damages for the infringement of design patents contained in 35 U.S.C. §289, as read by the court below, affords the holder of patents on ornamental designs an essentially punitive power, unrelated to the proportionality principle of adequate compensation not less than "a reasonable royalty" established as the measure of damages for useful inventions involving novel and unobvious technical learning valuably disclosed to the public through a utility patent application. See 35 U.S.C. §284. The "total profits" rule of §289 also exceeds the standard applicable in copyright, where the infringing defendant is entitled to prove the portion of its profit "attributable to factors other than the copyrighted work [infringed]." See 17 U.S.C. §504(b).

Damages awarded without proportionality to the plaintiff's loss or the defendant's independent contribution to its profit are intentionally confiscatory. The imposition of such damages amounts to Congressional authorization of a punitive exaction for "colorable imitation" of "ornamental design," which is speech protected by the First Amendment. See 35 U.S.C. §289. This Court has held that punitive damages cannot constitutionally be awarded for defamatory falsehood. even with respect to private figures, absent a finding of constitutional malice. See Gertz v. Robert Welch, Inc., 418 U.S. 323, 349 (1974). The State's interest in preventing defamation, this Court held, is not sufficient to justify a damages rule that "unnecessarily exacerbates the danger of ... self-censorship." Id. at 350. No showing of any intention to infringe is necessary in order to take all profits, whether or not related to the infringement, under §289 as read by the Court below. There can be no doubt that such a damages rule risks precisely the "chilling effect" on protected speech that this Court has shown repeatedly it is the purpose of First Amendment doctrine to avoid. If the Federal Circuit's reading of §289 is correct, liability without fault can in patent law lead to damages unrelated to compensation for "colorable imitation" of a state-granted monopoly on protected speech.

CONCLUSION

The provision for patents on "ornamental design" in 35 U.S.C. §171 is incompatible with the requirements the First Amendment imposes on any statute passed by Congress under the power delegated by Article I, §8. In an appropriate case, this Court should invalidate the provision or impose upon it the doctrinal limitations appropriate, parallel to those recognized by this Court's cases concerning copyright. The interpretation below of the "total profits" rule of 35 U.S.C. §289, which authorizes essentially punitive damages for protected speech absent showing of fault or constitutional malice, raises constitutional questions. Either §289 must be interpreted to avoid these infirmities, or it cannot stand. Accordingly the decision below should be reversed.

Respectfully submitted.

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United States Court of Appeals for the Federal Circuit

INTELLECTUAL VENTURES I LLC, Plaintiff-Appellant

v.

SYMANTEC CORP., Defendant-Cross-Appellant

TREND MICRO INCORPORATED, TREND MICRO, INC. (USA),

Defendants-Appellees

2015-1769, 2015-1770, 2015-1771

Appeals from the United States District Court for the District of Delaware in Nos. 1:10-cv-01067-LPS, 1:12-cv-01581-LPS, Chief Judge Leonard P. Stark.

MAYER, Circuit Judge, concurring.

I agree that all claims on appeal fall outside of 35 U.S.C. § 101. I write separately, however, to make two points: (1) patents constricting the essential channels of online communication run afoul of the First Amendment; and (2) claims directed to software implemented on a generic computer are categorically not eligible for patent. 2

I.

"[T]he Constitution protects the right to receive information and ideas.... This right to receive information and ideas, regardless of their social worth, is fundamental to our free society." Stanley v. Georgia, 394 U.S. 557, 564 (1969) (citations omitted). Patents, which function as government-sanctioned monopolies, invade core First Amendment rights when they are allowed to obstruct the essential channels of scientific, economic, and political discourse. See United States v. Playboy Entm't Grp., Inc., 529 U.S. 803, 812 (2000) ("The distinction between laws burdening and laws banning speech is but a matter of degree."); see also In re Tam, 808 F.3d 1321, 1340 (Fed. Cir. 2015) (en banc) (explaining that the government may impermissibly burden speech "even when it does so indirectly").

Although the claims at issue here disclose no new technology, they have the potential to disrupt, or even derail, large swaths of online communication. U.S. Patent No. 6,460,050 (the "050 patent") purports to cover methods of "identifying characteristics of data files," '050 patent, col. 81. 13, whereas U.S. Patent No. 6,073,142 (the "142 patent") broadly claims systems and methods which allow an organization to control internal email distribution, '142 patent, col. 1 ll. 15-34. U.S. Patent No. 5,987,610 (the "610 patent") describes, in sweeping terms, screening a communication for viruses or other harmful content at an intermediary location before delivering it to an addressee. See '610 patent, col. 14 ll. 34-47. The asserted claims speak in vague, functional language, giving them the elasticity to reach a significant slice of all email traffic. See Gottschalk v. Benson, 409 U.S. 63, 69 (1972) ("Benson") (explaining that claims are patent eligible only if they contain limitations "sufficiently definite to confine the patent monopoly within rather definite Indeed, the claims of the '610 patent could bounds"). reasonably be read to cover most methods of screening for

harmful content while data is being transmitted over a network. See '610 patent, col. 1 ll. 59–61 (describing "screen[ing] computer data for viruses within a telephone network before communicating the computer data to an end user").

Suppression of free speech is no less pernicious because it occurs in the digital, rather than the physical, realm. "[W]hatever the challenges of applying the Constitution to ever-advancing technology, the basic principles of freedom of speech and the press, like the First Amendment's command, do not vary when a new and different medium for communication appears." Brown v. Entm't Merchs. Ass'n, 564 U.S. 786, 790 (2011) (citations and internal quotation marks omitted). Essential First Amendment freedoms are abridged when the Patent and Trademark Office ("PTO") is permitted to balkanize the Internet, granting patent owners the right to exact heavy taxes on widely-used conduits for online expression.

Like all congressional powers, the power to issue patents and copyrights is circumscribed by the First Amendment. See Golan v. Holder, 132 S. Ct. 873, 889-93 (2012); Eldred v. Ashcroft, 537 U.S. 186, 219-21 (2003). In the copyright context, the law has developed "built-in First Amendment accommodations." Eldred, 537 U.S. at 219; see also Park 'N Fly, Inc. v. Dollar Park & Fly, Inc., 469 U.S. 189, 201 (1985) (noting that the Lanham Act contains safeguards to prevent trademark protection from "tak[ing] from the public domain language that is merely descriptive"). Specifically, copyright law "distinguishes between ideas and expression and makes only the latter eligible for copyright protection." Eldred, 537 U.S. at 219; see also Harper & Row Publishers, Inc. v. Nation Enters. 471 U.S. 539, 556 (1985) (explaining that "copyright's idea/expression dichotomy" supplies "a definitional balance between the First Amendment and the Copyright Act by permitting free communication of facts while still protecting an author's expression" (citations and internal

quotation marks omitted)). It also applies a "fair use" defense, permitting members of "the public to use not only facts and ideas contained in a copyrighted work, but also expression itself in certain circumstances." *Eldred*, 537 U.S. at 219; *see* 17 U.S.C. § 107 ("[T]he fair use of a copyrighted work, including such use by reproduction in copies ... for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright.").

Just as the idea/expression dichotomy and the fair use defense serve to keep copyright protection from abridging free speech rights, restrictions on subject matter eligibility can be used to keep patent protection within constitutional bounds. Section 101 creates a "patent-free zone" and places within it the indispensable instruments of social, economic, and scientific endeavor. See Alice Corp. v. CLS Bank Int'l, 134 S. Ct. 2347, 2354 (2014) (emphasizing that the "building blocks of human ingenuity" are patent ineligible); Benson, 409 U.S. at 67 (stating that "mental processes . . . and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work"). Online communication has become a "basic tool," Benson, 409 U.S. at 67, of modern life, driving innovation and supplying a widely-used platform for political dialogue. See Ultramercial. Inc. v. Hulu, LLC, 772 F.3d 709, 716 (Fed. Cir. 2014) (noting that the Internet "is a ubiquitous informationtransmitting medium"); see also U.S. Telecom Ass'n v. Fed. Commc'n Comm'n, 825 F.3d 674, 698 (D.C. Cir. 2016) (explaining that online communication "has transformed nearly every aspect of our lives, from profound actions like choosing a leader, building a career, and falling in love to more quotidian ones like hailing a cab and watching a movie"). Section 101, if properly applied, can preserve the Internet's open architecture and weed out those

patents that chill political expression and impermissibly obstruct the marketplace of ideas.

As both the Supreme Court and this court have recognized, section 101 imposes "a threshold test," Bilski v. Kappos, 561 U.S. 593, 602 (2010), one that must be satisfied before a court can proceed to consider subordinate validity issues such as non-obviousness under 35 U.S.C. § 103 or adequate written description under 35 U.S.C. § 112. See Parker v. Flook, 437 U.S. 584, 593 (1978) ("Flook") ("The obligation to determine what type of discovery is sought to be patented" so as to determine whether it falls within the ambit of section 101 "must precede the determination of whether that discovery is, in fact, new or obvious."); In re Comiskey, 554 F.3d 967, 973 (Fed. Cir. 2009) ("Only if the requirements of § 101 are satisfied is the inventor allowed to pass through to the other requirements for patentability, such as novelty under § 102 and . . . non-obviousness under § 103." (citations and internal quotation marks omitted)); State St. Bank & Trust Co. v. Signature Fin. Grp., Inc., 149 F.3d 1368, 1372 n.2 (Fed. Cir. 1998) (explaining that section 101 is "[t]he first door which must be opened on the difficult path to patentability" (citations and internal quotation marks omitted)). Indeed, if claimed subject matter is not even eligible for patent protection, any pronouncement on whether it is novel or adequately supported by the written description constitutes an impermissible advisory opinion. See, e.g., Golden v. Zwickler, 394 U.S. 103, 108 (1969) (emphasizing that Article III courts "do not render advisory opinions" (citations and internal quotation marks omitted)).

The public has a "paramount interest in seeing that patent monopolies . . . are kept within their legitimate scope." *Cuozzo Speed Techs.*, *LLC v. Lee*, 136 S. Ct. 2131, 2144 (2016) (citations and internal quotation marks omitted); see also Medtronic, Inc. v. Mirowski Family Ventures, *LLC*, 134 S. Ct. 843, 851 (2014). Nowhere is that interest more compelling than in the context of claims that threaten fundamental First Amendment freedoms. See Palko v. Connecticut, 302 U.S. 319, 326–27 (1937) ("[F]reedom of thought and speech . . . is the matrix, the indispensable condition, of nearly every other form of freedom."). "As the most participatory form of mass speech yet developed, the Internet deserves the highest protection from governmental intrusion." ACLU v. Reno, 929 F. Supp. 824, 883 (E.D. Pa. 1996), aff'd, 521 U.S. 844 (1997). A robust application of section 101 at the outset of litigation will ensure that the essential channels of online communication remain "free to all men and reserved exclusively to none," Funk Brothers Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 130 (1948).

II.

Most of the First Amendment concerns associated with patent protection could be avoided if this court were willing to acknowledge that Alice sounded the death knell for software patents. The claims at issue in Alice were directed to a computer-implemented system for mitigating settlement risk. 134 S. Ct. at 2352-53. Although the petitioners argued that their claims were patent eligible because they were tied to a computer and a computer is a tangible object, the Supreme Court unanimously and emphatically rejected this argument. Id. at 2358–60. The Court explained that the "mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention." Id. at 2358. Accordingly, "[t]he fact that a computer necessarily exist[s] in the physical, rather than purely conceptual, realm is beside the point" in the section 101 calculus. Id. (citations and internal quotation marks omitted).

Software is a form of language—in essence, a set of instructions. See Microsoft Corp. v. AT&T Corp., 550 U.S. 437, 447 (2007) (explaining that "software" is "the set of instructions, known as code, that directs a computer to

perform specified functions or operations" (citations and internal quotation marks omitted)); see also 17 U.S.C. § 101 (defining a "computer program," for purposes of the Copyright Act, as "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result"). It is inherently abstract because it is merely "an *idea* without physical embodiment," *Microsoft*, 550 U.S. at 449 (emphasis added). Given that an "idea" is not patentable, *see*, *e.g.*, *Benson*, 409 U.S. at 67, and a generic computer is "beside the point" in the eligibility analysis, *Alice*, 134 S. Ct. at 2358, all software implemented on a standard computer should be deemed categorically outside the bounds of section 101.

The central problem with affording patent protection to generically-implemented software is that standard computers have long been ceded to the public domain. See Flook, 437 U.S. at 593 n.15 ("[I]n granting patent rights, the public must not be deprived of any rights that it theretofore freely enjoyed" (citations and internal quotation marks omitted)). Because generic computers are ubiquitous and indispensable, in effect the "basic tool[]," Benson, 409 U.S. at 67, of modern life, they are not subject to the patent monopoly. In the section 101 calculus, adding software (which is as abstract as language) to a conventional computer (which rightfully resides in the public domain) results in a patent eligibility score of zero. See Alice, 134 S. Ct. at 2358 ("Stating an abstract idea while adding the words 'apply it with a computer' simply combines those two steps, with the same deficient result.").

Software lies in the antechamber of patentable invention. Because generically-implemented software is an "idea" insufficiently linked to any defining physical structure other than a standard computer, it is a precursor to technology rather than technology itself. See Mackay Radio & Tel. Co. v. Radio Corp., 306 U.S. 86, 94 (1939) ("While a scientific truth, or the mathematical expression

of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be."). It is well past time to return software to its historical dwelling place in the domain of copyright. See Benson, 409 U.S. at 72 (citing a report from a presidential commission explaining that copyright is available to protect software and that software development had "undergone substantial and satisfactory growth" even without patent protection (citations and internal quotation marks omitted)); Oracle Am., Inc. v. Google Inc., 750 F.3d 1339, 1380 (Fed. Cir. 2014) (noting that "several commentators" have "argue[d] that the complex and expensive patent system is a terrible fit for the fastmoving software industry" and that copyright provides "[a] perfectly adequate means of protecting and rewarding software developers for their ingenuity" (citations and internal quotation marks omitted)); Peter S. Menell, An Analysis of the Scope of Copyright Protection for Application Programs, 41 Stan. L. Rev. 1045, 1076 (1989) (explaining that patents were historically "not seen as a viable option for the protection of most application program code" and that many software programs "simply do not manifest sufficient novelty or nonobviousness to merit patent protection").

Software development has flourished despite—not because of—the availability of expansive patent protection. See Brief of Amicus Curiae Elec. Frontier Found. in Support of Respondents, Alice, 134 S. Ct. 2347 (No. 13-298), 2014 WL 828047, at *6-7 ("EFF Brief") ("The software market began its rapid increase in the early 1980s ... more than a decade before the Federal Circuit concocted widespread software patents in 1994. ... Obviously, no patents were needed for software to become a \$60 billion/year industry by 1994."); Mark A. Lemley, Software Patents and the Return of Functional Claiming, 2013 Wis. L. Rev. 905, 935 (2013) ("Software patents ... have created a large number of problems for the industry, particularly for the most innovative and productive companies. . . . [T]he existence of a vibrant open source community suggests that innovation can flourish in software absent patent protection." (footnote omitted)); Wendy Seltzer, Software Patents and/or Software Development, 78 Brook. L. Rev. 929, 930 (2013) ("Seltzer") ("Present knowledge and experience now offer sufficient evidence that patents disserve software innovation."); Arti K. Rai, John R. Allison, & Bhaven N. Sampat, University Software Ownership and Litigation: A First Examination, 87 N.C. L. Rev. 1519, 1555–56 (2009) ("While most small biotechnology firms that receive venture financing have patents, the available empirical evidence indicates that most software start-ups that receive venture financing, particularly in the first round, do not have patents.").

From an eligibility perspective, software claims suffer from at least four insurmountable problems. First, their scope is generally vastly disproportionate to their technological disclosure. In assessing patent eligibility, "the underlying functional concern . . . is a *relative* one: how much future innovation is foreclosed relative to the contribution of the inventor." Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1303 (2012); see also Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 513 (1917) ("[T]he inventor [is entitled to] the exclusive use of just what his inventive genius has discovered. It is all that the statute provides shall be given to him and it is all that he should receive, for it is the fair as well as the statutory measure of his reward for his contribution to the public stock of knowledge."). Software patents typically do not include any actual code developed by the patentee, but instead describe, in intentionally vague and broad language, a particular goal or objective. See Dan L. Burk & Mark A. Lemley. Is Patent Law Technology-Specific?, 17 Berkeley Tech. L. J. 1155, 1164-65 (2002) ("Unfortunately, the Federal Circuit's peculiar direction in the software enablement cases has

effectively nullified the disclosure requirement for software patents. And since source code is normally kept secret, software patentees generally disclose little or no detail about their programs to the public." (footnote omitted)). Here, for example, the '610 patent discusses the objective of "screen[ing] computer data for viruses . . . before communicating the computer data to an end user," '610 patent, col. 1 ll. 59–61, but fails to disclose any specific, inventive guidance for achieving that goal. In effect, the '610 patent, like most software patents, describes a desirable destination but neglects to provide any intelligible roadmap for getting there.

A second, and related, problem with software patents is that they provide incentives at the wrong time. Because they are typically obtained at the "idea" stage, before any real inventive work has been done, such patents are incapable of effectively incentivizing meaningful advances in science and technology. "A player focused on patenting can obtain numerous patents without developing any of the technologies to useful levels of deployment or disclosure, leaving a minefield of abstract patent claims for others who actually deploy software." Seltzer, 78 Brook. L. Rev. at 931. Here, for example, it took no significant inventive effort to recognize that communications should be screened for harmful content before delivery. The hard work came later, when software developers created screening systems capable of preventing our email boxes from being overrun with spam or disabled by viruses. Granting patents on software "ideas"-before they have been actually reduced to practice-has created a perverse incentive scheme. Under our current regime, those who scamper to the PTO early, often equipped with little more than vague notions about using computers to automate well-known business and social practices, can reap hefty financial dividends. By contrast, those who actually create and deploy useful computer-centric products are "rewarded" with mammoth potential infringement liability. See id. at 972 ("In software . . . the long road from idea to implementation often snags on patents early in the course. Engineers can describe what they want software to do—in terms that have been sufficient for the PTO—well before they have made it work. Pressures to patent early produce a thicket of preimplementation claims."); EFF Brief, 2014 WL 828047, at *23 (describing a study which "found that between 2007 and 2011, 46 percent of patent lawsuits involved software patents, accounting for 89 percent of the increase in the number of patent defendants during this timeframe").

Yet another intractable problem with software patents is their sheer number. See Brief Of Amici Curiae Checkpoint Software, Inc. et al. in Support of Respondents, Alice, 134 S. Ct. 2347 (No. 13-298), 2014 WL 828039, at *8 ("[B]ecause computer products-as opposed to patents-inevitably integrate complex, multicomponent technology, any given product is potentially subject to a large number of patents.... Some industry experts have estimated that 250,000 patents go into a modern smartphone." (citations omitted)). Given the vast number of software patents-most of which are replete with broad, functional claims-it is virtually impossible to innovate in any technological field without being ensnared by the patent thicket. See id. (describing the "overwhelming set of overlapping patent rights that impede innovation"). Software patents impose a deadweight loss on the nation's economy, erecting often insurmountable barriers to innovation and forcing companies to expend exorbitant sums defending against meritless infringement suits. See Shawn P. Miller, "Fuzzy" Software Patent Boundaries and High Claim Construction Reversal Rates, 17 Stan. Tech. L. Rev. 809, 810 (2014) ("Patent litigation is so expensive it has been described as the sport of kings. . . . These expenses, however, may be dwarfed by the social cost of patent litigation in reducing incentives for producers to bring

innovative products to market." (footnote and internal quotation marks omitted)).

Fourth. and most fundamentally, genericallyimplemented software invariably lacks the concrete borders the patent law demands. See, e.g., Digital Equip. Corp. v. AltaVista Tech., Inc., 960 F. Supp. 456, 462 (D. Mass. 1997) ("The Internet has no territorial boundaries. To paraphrase Gertrude Stein, as far as the Internet is concerned, not only is there perhaps 'no there there,' the 'there' is everywhere where there is Internet access."). Patent protection is all about boundaries. An applicant has the right to obtain a patent only if he can describe, with reasonable clarity, the metes and bounds of his See Festo Corp. v. Shoketsu Kinzoku Kogyo invention. Kabushiki Co., 535 U.S. 722, 730 (2002) (explaining that the patent "monopoly is a property right and like any property right, its boundaries should be clear"). A properly issued patent claim represents a line of demarcation, defining the territory over which the patentee can exercise the right to exclude. See Nautilus, Inc. v. Biosig Instruments, Inc., 134 S. Ct. 2120, 2129 (2014) (emphasizing that "a patent must be precise enough to afford clear notice of what is claimed, thereby appris[ing] the public of what is still open to them" (citations and internal quotation marks omitted)).

Software, however, is akin to a work of literature or a piece of music, undeniably important, but too unbounded, i.e., too "abstract," to qualify as a patent-eligible invention. See Microsoft, 550 U.S. at 447–48 (explaining that software "instructions... detached from any medium" are analogous to "[t]he notes of Beethoven's Ninth Symphony"). And, as discussed previously, given that generic computers are both omnipresent and indispensable, they are incapable of providing structure "sufficiently definite to confine the patent monopoly within rather definite bounds," Benson, 409 U.S. at 69. In short, because directing that software should be applied via standard computer elements is little different than stating that it should be written down using pen and paper, genericallyimplemented software lacks the concrete contours required by section 101. See Alice, 134 S. Ct. at 2352 (emphasizing that "merely requiring generic computer implementation" does not remove claims from the realm of the abstract).

Declaring that software implemented on a generic computer falls outside of section 101 would provide muchneeded clarity and consistency in our approach to patent eligibility. It would end the semantic gymnastics of trying to bootstrap software into the patent system by alleging it offers a "specific method of filtering Internet content," see BASCOM Global Internet Servs., Inc. v. AT&T Mobility LLC, 827 F.3d 1341, 1350 (Fed. Cir. 2016), makes the computer faster, see Enfish, LLC v. Microsoft Corp., 822 F.3d 1327, 1337-39 (Fed. Cir. 2016), or the Internet better, see DDR Holdings, LLC v. Hotels.com, L.P., 773 F.3d 1245, 1257 (Fed. Cir. 2014), just to snuggle up to a casual bit of dictum in Alice, 134 S. Ct. at 2359. Software runs computers and the Internet; improving them up to the current limits of technology is merely more of the same. The claims at issue in BASCOM, Enfish, and DDR, like those found patent ineligible in Alice, do "no more than require a generic computer to perform generic computer functions," Alice, 134 S. Ct. at 2359. Eliminating generically-implemented software patents would clear the patent thicket, ensuring that patent protection promotes, rather than impedes, "the onward march of science," O'Reilly v. Morse, 56 U.S. (15 How.) 62, 113 (1853), and allowing technological innovation to proceed apace.

United States Court of Appeals for the Federal Circuit

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TREND MICRO INCORPORATED, TREND MICRO, INC. (USA),

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2015-1769, 2015-1770, 2015-1771

Appeals from the United States District Court for the District of Delaware in Nos. 1:10-cv-01067-LPS, 1:12-cv-01581-LPS, Chief Judge Leonard P. Stark.

Decided: September 30, 2016

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Before DYK, MAYER, and STOLL, Circuit Judges.

Opinion for the court filed by Circuit Judge DYK.

Concurring opinion filed by Circuit Judge MAYER.

Opinion dissenting-in-part filed by Circuit Judge STOLL.

DYK, Circuit Judge.

Intellectual Ventures I LLC ("IV") sued Symantec Corp. and Trend Micro¹ (together, "appellees" or "defendants") for infringement of various claims of U.S. Patent Nos. 6,460,050 ("the '050 patent"), 6,073,142 ("the '142 patent"), and 5,987,610 ("the '610 patent"). The district court held the asserted claims of the '050 patent and the '142 patent to be ineligible under § 101, and the asserted claim of the '610 patent to be eligible. We affirm as to the

¹ We refer to Trend Micro Incorporated and Trend Micro, Inc. (USA) together as a singular defendant "Trend Micro."

asserted claims of the '050 patent and '142 patent, and reverse as to the asserted claim of the '610 patent.

BACKGROUND

Ι

IV owns the three patents at issue: the '050 patent, the '142 patent, and the '610 patent. IV sued Symantec and Trend Micro, two developers of anti-malware and anti-spam software, for infringement of various claims of those patents. Against Symantec, IV asserted claims 9, 16, and 22 of the '050 patent; claims 1, 7, 21, and 22 of the '142 patent; and claim 7 of the '610 patent. Against Trend Micro, IV asserted claims 9, 13, 16, 22, and 24 of the '050 patent; and claims 1, 7, 17, 21, 22, 24, and 26 of the '142 patent.

With respect to the two defendants, a § 101 patent eligibility issue arose at different stages of the proceedings. The case against Symantec went to trial. The jury found that Symantec had not proven by clear and convincing evidence that any asserted claims were invalid under §§ 102 and 103. The jury found Symantec had infringed the asserted claims of the '142 patent and '610 patent, and had not infringed any asserted claims of the '050 patent.² After trial, Symantec brought a motion under Fed. R. Civ. P. 52(c) for a judgment that all the asserted claims of the three patents-in-suit are unpatentable under 35 U.S.C. § 101, an issue not addressed in the jury verdict.

The case against Trend Micro did not go to trial. Trend Micro brought a motion for summary judgment of

² The jury awarded \$9 million for infringement of the '142 patent and \$8 million for infringement of the '610 patent.

invalidity under § 101 for all of the asserted claims.³ After Trend Motion had submitted its motion, IV withdrew its assertion of claim 7 of the '610 patent against Trend Micro, the only claim of the '610 patent asserted against Trend Micro. Thus the motions raised issues of patent eligibility as to the '050 and '142 patents with respect to both defendants, and as to the '610 patent only with respect to Symantec.

Π

The '050 patent is entitled, "Distributed Content Identification System." The patent application was filed on December 22, 1999, and the '050 patent issued on October 1, 2002. The patent is directed to methods of screening emails and other data files for unwanted content.

The '142 patent is entitled, "Automated Post Office Based Rule Analysis of E-Mail Messages and Other Data Objects for Controlled Distribution in Network Environments." The patent application was filed on June 23, 1997, and the '142 patent issued on June 6, 2000. The patent is directed to methods of routing e-mail messages based on specified criteria (i.e., rules).

The '610 patent is entitled, "Computer Virus Screening Methods and Systems." The patent application was filed on February 12, 1998, and the patent issued on November 16, 1999. The patent is directed to using computer virus screening in the telephone network.

In both cases the district court determined that the asserted claims of the '050 patent and '142 patent claimed

³ While Trend Motion did not state under which rule it brought its motion, the district court applied the Fed. R. Civ. P. 56 summary judgment standard, and the parties did not dispute the application of that standard.

ineligible subject matter under 35 U.S.C. § 101, and granted appellees' motions with respect to those patents. The district court held, however, that Symantec had failed to establish that the asserted claim of the '610 patent is patent-ineligible under § 101, and denied Symantec's motion with respect to that patent.

Final judgment was entered in favor of Symantec and Trend Micro that the asserted claims of the '050 and '142 patents are patent-ineligible under 35 U.S.C. § 101. Id. See Final Judgment Following Jury Trial ("Symantec Final Judgment"), Intellectual Ventures I LLC v. Symantec Corp., No. 10-cv-1067-LPS (D. Del. March 24, 2016). ECF No. 770 at 2;4 Judgment, Intellectual Ventures I LLC v. Trend Micro Inc., No. 12-cv-1581-LPS (D. Del. June 17, 2015), ECF No. 234 at 2. This resolved all claims against Trend Micro. With respect to Symantec, the district court entered final judgment in favor of IV that Symantec infringed claim 7 of the '610 patent with damages in the amount of \$8 million, and that claim 7 was also not proved invalid by Symantec under 35 U.S.C. §§ 102 or 103, or patent-ineligible under § 101. See Symantec Final Judgment at 2.

IV now appeals the district court's ineligibility determinations with respect to the '050 patent and '142 patent as to Symantec and Trend Micro, and Symantec crossappeals the determination of eligibility for the '610 patent. We have jurisdiction under 28 U.S.C. § 1295(a)(1).

⁴ The entry of final judgment ripened Symantec's cross-appeal. See Pause Tech. LLC v. TiVo Inc., 401 F.3d 1290, 1295 (Fed. Cir. 2005).

DISCUSSION

Ι

We review the grant or denial of summary judgment de novo. See Nicini v. Morra, 212 F.3d 798, 805 (3d Cir. 2000) (en banc). For the district court's entry of judgment under Rule 52(c), we review the district court's factual findings for clear error and its legal conclusions de novo. See EBC, Inc. v. Clark Bldg. Sys., Inc., 618 F.3d 253, 273 (3d Cir. 2010). Patent eligibility under § 101 is an issue of law which we review de novo. See OIP Techs., Inc. v. Amazon.com, Inc., 788 F.3d 1359, 1362 (Fed. Cir. 2015).

Π

Section 101 of title 35 defines patent-eligible subject matter. It provides, "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor" 35 U.S.C. § 101. For over 150 years, the Supreme Court has recognized an implicit exception to these broad categories encompassing "[I]aws of nature, natural phenomena, and abstract ideas[, which] are not patentable." *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1293 (2012) (citation and internal quotation marks omitted); see also Bilski v. Kappos, 561 U.S. 593, 601-02 (2010).

In Mayo and in Alice, the Court set forth a framework for "distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." Alice Corp. Pty. Ltd. v. CLS Bank Int'l, 134 S. Ct. 2347, 2355 (2014). At Mayo/Alice step one, a court must "determine whether the claims at issue are directed to one of those patent-ineligible concepts." Id. The category of abstract ideas embraces "fundamental economic practice[s] long prevalent in our system of commerce," id. at 2356 (quoting *Bilski*, 561 U.S. at 611), including "longstanding commercial practice[s]" and "method[s] of organizing human activity," *id*. But the category of abstract ideas is not limited to economic or commercial practices or methods of organizing human activity. *See infra* note 5.

If a claim is directed to a patent-ineligible concept, the court must proceed to Mayo/Alice step two, and ask, "what else is there in the claims before us?" Alice, 134 S. Ct. at 2355 (citation and internal quotation citation omitted). Step two is "a search for an inventive concept—*i.e.*, an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the ineligible concept itself." Id. (citation and internal quotation marks omitted).

At *Mayo/Alice* step two, the search is for "an inventive concept sufficient to transform the claimed abstract idea into a patent-eligible application." *Id.* at 2357 (citation and internal quotation marks omitted). And "[s]imply appending conventional steps, specified at a high level of generality," which are "well known in the art" and consist of "well-understood, routine, conventional activit[ies]" previously engaged in by workers in the field, is not sufficient to supply the inventive concept. *Id.* at 2357, 2359 (citations and internal quotation marks omitted).

1. THE '050 PATENT

The district court held patent-ineligible the asserted claims of the '050 patent—claims 9, 13, 16, 22, and 24 directed to filtering e-mails that have unwanted content. We agree with the district court. The parties agree that independent claim 9 is representative. It recites:

9. A method for identifying characteristics of data files, comprising:

receiving, on a processing system, file content identifiers for data files from a plurality of file content identifier generator agents, each agent provided on a source system and creating file content IDs using a mathematical algorithm, via a network;

determining, on the processing system, whether each received content identifier matches a characteristic of other identifiers; and

outputting, to at least one of the source systems responsive to a request from said source system, an indication of the characteristic of the data file based on said step of determining.

'050 patent, col. 8, ll. 13–26. According to IV, this method of filtering emails is used to address the problems of spam e-mail and the use of e-mail to deliver computer viruses.

We agree with the district court that receiving e-mail (and other data file) identifiers, characterizing e-mail based on the identifiers, and communicating the characterization—in other words, filtering files/e-mail—is an abstract idea.

The Supreme Court has held that "fundamental ... practice[s] long prevalent" are abstract ideas. *Alice*, 134 S. Ct. at 2356. The Supreme Court and we have held that a wide variety of well-known and other activities constitute abstract ideas.⁵

⁵ See, e.g., Bilski, 561 U.S. at 611 (claims directed to risk hedging); Alice, 134 S. Ct. at 2356 (claims directed to idea of intermediated settlement); In re *TLI Commc'ns LLC Patent Litig.*, 823 F.3d 607, 611 (Fed. Cir. 2016) (claims directed to classifying a digital image and storing the image based on its classification); Mortg. Grader, Inc.

v. First Choice Loan Servs. Inc., 811 F.3d 1314, 1324 (Fed. Cir. 2016) (claims drawn to well-known idea of anonymous loan shopping); Versata Dev. Grp., Inc. v. SAP Am., Inc., 793 F.3d 1306, 1333 (Fed. Cir. 2015) (claims directed to idea of determining a price using organizational and product group hierarchies); Internet Patents Corp. v. Active Network, Inc., 790 F.3d 1343, 1348 (Fed. Cir. 2015) (claims directed to idea of retaining information in the navigation of online forms); OIP Techs., 788 F.3d at 1362-63 (claims directed to offer-based price optimization); Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat'l Ass'n, 776 F.3d 1343, 1347 (Fed. Cir. 2014) (claims directed to the idea of collecting data, recognizing certain data within the collected data set, and storing that recognized data in a memory); Ultramercial, Inc. v. Hulu LLC, 772 F.3d 709, 714-15 (Fed. Cir. 2014) (claims directed to displaying an advertisement in exchange for access to copyrighted media); buySAFE, Inc. v. Google, Inc., 765 F.3d 1350, 1355 (Fed. Cir. 2014) (claim directed toward guaranteeing a party's performance in a transaction); Accenture Global Servs., GmbH v. Guidewire Software, Inc., 728 F.3d 1336, 1342 (Fed. Cir. 2013) (claims directed to automated methods for generating task lists); Dealertrack, Inc. v. Huber, 674 F.3d 1315, 1333 (Fed. Cir. 2012) (claims directed to processing information through a clearinghouse); CyberSource Corp. v. Retail Decisions, Inc., 654 F.3d 1366.1373(Fed. Cir. 2011) (claims directed to a method for verifying the validity of a credit card transaction). See also McRO, Inc. v. Bandai Namco Games Am. Inc., No. 2015-1080, 2016 WL 4896481, at *8-10 (claims "focused on a specific asserted improvement in computer animation, i.e., the automatic use of rules of a particular type" held not to be directed to ineligible subject matter).

Here, it was long-prevalent practice for people receiving paper mail to look at an envelope and discard certain letters, without opening them, from sources from which they did not wish to receive mail based on characteristics of the mail.⁶ The list of relevant characteristics could be kept in a person's head. Characterizing e-mail based on a known list of identifiers is no less abstract. The patent merely applies a well-known idea using generic computers "to the particular technological environment of the Internet." *DDR Holdings, LLC v. Hotels.com, L.P.*, 773 F.3d 1245, 1259 (Fed. Cir. 2014).

The asserted claims of the '050 patent also resemble claims we have held were directed to an abstract idea. Recently, in BASCOM Global Internet Services, Inc. v. AT&T Mobility LLC, we held that a claim to a "content filtering system for filtering content retrieved from an Internet computer network[, e.g., to prevent users from accessing certain websites] . . . is [directed to] an abstract idea." 827 F.3d 1341, 1348 (Fed. Cir. 2016).⁷ And in Content Extraction, 776 F.3d at 1347, cert. denied, 136 S. Ct. 119 (2015), we found that the asserted patents were "drawn to the abstract idea of 1) collecting data, 2) recog-

⁶ For example, it is common for "an occupant who receives generically addressed mail [to] discard it as junk mail." *Jones v. Flowers*, 547 U.S. 220, 248 (2006) (Thomas, J., dissenting).

⁷ In *BASCOM*, we found the claims patent-eligible because, at step two, the patent claimed "a technologybased solution (not an abstract-idea-based solution implemented with generic technical components in a conventional way) to filter content on the Internet that overcomes existing problems with other Internet filtering systems." 827 F.3d at 1351.

nizing certain data within the collected data set, and 3) storing that recognized data in a memory."

Because we hold the asserted claims of the '050 patent are directed to an abstract idea, we proceed to Mayo/Alice step two to determine whether the claims contain an "inventive concept" that renders them patent-eligible. Claims that "amount to nothing significantly more than an instruction to apply [an] abstract idea ... using some unspecified, generic computer" and in which "each step does no more than require a generic computer to perform generic computer functions" do not make an abstract idea patent-eligible, Alice, 134 S. Ct. at 2359-60 (citations and internal quotation marks omitted), because "claiming the improved speed or efficiency inherent with applying the abstract idea on a computer" does not "provide a sufficient inventive concept." Intellectual Ventures I LLC v. Capital One Bank (USA) ("Intellectual Ventures v. Capital One Bank"), 792 F.3d 1363, 1367 (Fed. Cir. 2015).

IV argues that the jury verdict determined that Symantec's proffered prior art did not anticipate or render obvious the asserted claims of the '050 patent, and that the jury's anticipation and obviousness determination is inconsistent with a determination that the claims are patent-ineligible. While the claims may not have been anticipated or obvious because the prior art did not disclose "determining ... whether each received content identifier matches a characteristic" or "outputting ... an indication of the characteristic of the data file," that does not suggest that the idea of "determining" and "outputting" is not abstract, much less that its implementation is not routine and conventional.

Indeed, "[t]he 'novelty' of any element or steps in a process, or even of the process itself, is of *no relevance* in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter." *Diamond v. Diehr*, 450 U.S. 175, 188–89 (1981) (emphasis added); see also Mayo, 132 S. Ct. at 1303–04 (rejecting "the Government's invitation to substitute §§ 102, 103, and 112 inquiries for the better established inquiry under § 101").⁸ Here, the jury's general finding that Symantec did not prove by clear and convincing evidence that three particular prior art references do not disclose all the limitations of or render obvious the asserted claims does not resolve the question of whether the claims embody an inventive concept at the second step of Mayo/Alice.

The steps of the asserted claims of the '050 patent do not "improve the functioning of the computer itself," *Alice*, 134 S. Ct. at 2359, for example by disclosing an "improved, particularized method of digital data compression," *DDR Holdings*, 773 F.3d at 1259, or by improving "the way a computer stores and retrieves data in memory," *Enfish*, *LLC v. Microsoft Corp.*, 822 F.3d 1327, 1339 (Fed. Cir. 2016). Rather, these claims use generic computers to perform generic computer functions.

In Intellectual Ventures v. Capital One Bank, we found abstract an Internet-based method for "tracking financial transactions to determine whether they exceed a pre-set spending limit (i.e., budgeting)." 792 F.3d at 1367. The fact that "the claims recite[d] budgeting using a 'communication medium' (broadly including the Internet and telephone networks), ... [did] not render the claims any less abstract." Id. We also found abstract claims

⁸ See also Parker v. Flook, 437 U.S. 584, 588 (1978) ("This case turns entirely on the proper construction of § 101.... It does not involve the familiar issues of novelty and obviousness that routinely arise under §§ 102 and 103 when the validity of a patent is challenged. For the purpose of our analysis, we assume that respondent's formula is novel and useful and that he discovered it.").

related to "customizing [website] information based on (1) information known about the user and (2) navigation data," and similarly held that "a generic web server with attendant software ... 'tasked with tailoring information and providing it to the user' provides no additional limitation beyond applying an abstract idea, restricted to the Internet, on a generic computer." *Id.* at 1370–71.

The claims here are also distinguishable from those in BASCOM, which allegedly improved an existing technological process by describing "how [a] particular arrangement of elements is a technical improvement over prior art ways of filtering [Internet] content," i.e., "a filter implementation versatile enough that it could be adapted to many different users' preferences while also installed remotely in a single location." 827 F.3d at 1350. There is not, in the '050 patent, any "specific or limiting recitation of ... improved computer technology," CLS Bank Int'l v. Alice Corp. Pty. Ltd., 717 F.3d 1269, 1286 (Fed. Cir. 2013) (en banc) (Lourie, J., concurring), as the asserted claims describe only generic computer elements.

Finally, IV argues that the '050 patent "shrink[s] the protection gap and moot[s] the volume problem." IV's Opening Br. at 14. According to IV, the protection gap is "the period of time between identification of a computer virus by an anti-malware provider and distribution of that knowledge to its users." Id. at 10. The volume problem is the "exponential growth in malware and spam," increasing the amount of antivirus signatures to be downloaded. Id. at 12–13. However, the asserted claims do not contain any limitations that address the protection gap or volume problem, e.g., by requiring automatic updates to the antivirus or antispam software or the ability to deal with a large volume of such software. We have explained that, "for a perceived abstract idea, if the claim 'contains an "inventive concept" sufficient to "transform" the claimed abstract idea into a patent-eligible application,' then the claims pass the test of eligibility under section 101."

Internet Patents Corp., 790 F.3d at 1347 (emphasis added) (quoting Alice, 134 S. Ct. at 2357). But when a claim directed to an abstract idea "contains no restriction on how the result is accomplished . . . [and] [t]he mechanism . . . is not described, although this is stated to be the essential innovation[,]" *id.* at 1348, then the claim is not patent-eligible.

The asserted claims of the '050 patent are not patenteligible under § 101.

2. THE '142 PATENT

The district court held ineligible claims 1, 7, 17, 22, 24, and 26 of the '142 patent, which relate to systems and methods for receiving, screening, and distributing e-mail, and we agree. According to IV, claim 1 is representative of how the '142 patent screens e-mail,⁹ and recites:

1. A post office for receiving and redistributing email messages on a computer network, the post office comprising:

a receipt mechanism that receives an e-mail message from a sender, the e-mail message having at least one specified recipient;

⁹ Defendants agree, and IV does not dispute, that "[a]ll of the claims are substantially similar and no party claims that they differ in any manner relevant" to the § 101 analysis. Opening Br. of Cross-Appellant Symantec Corp. at 10. We focus on claim 1 of the '142 patent, which IV states is representative. Addressing each of the asserted claims is unnecessary when "all the claims are substantially similar and linked to the same abstract idea." *Content Extraction*, 776 F.3d at 1348 (internal quotation marks and citation omitted).

a database of business rules, each business rule specifying an action for controlling the delivery of an e-mail message as a function of an attribute of the e-mail message;

a rule engine coupled to receive an e-mail message from the receipt mechanism and coupled to the database to selectively apply the business rules to the e-mail message to determine from selected ones of the business rules a set of actions to be applied to the e-mail message; and

a distribution mechanism coupled to receive the set of actions from the rule engine and apply at least one action thereof to the e-mail message to control delivery of the e-mail message and which in response to the rule engine applying an action of deferring delivery of the e-mail message, the distribution engine automatically combines the email message with a new distribution list specifying at least one destination post office for receiving the e-mail message for review by an administrator associated with the destination post office, and a rule history specifying the business rules that were determined to be applicable to the e-mail message by at least one rule engine, and automatically delivers the e-mail message to a first destination post office on the distribution list instead of a specified recipient of the e-mail message.

'142 patent, col. 27, ll. 2–32.

The written description is particularly useful in determining what is well-known or conventional. See, e.g., Internet Patents Corp., 790 F.3d at 1348. The '142 patent's abstract describes the invention as "[a] system, method and various software products ... for automatic deferral and review of e-mail messages and other data objects in a networked computer system, by applying business rules to the messages as they are processed by post offices." '142 patent, Abstract. Claim 1 also describes the patented system as a "post office"—albeit an electronic one. '142 patent, col. 27, ll. 2. The district court held that "the asserted claims of the '142 patent are directed to humanpracticable concepts, which could be implemented in, for example, a brick-and-mortar post office." J.A. 35.

We agree, and think the district court's analogy to a corporate mailroom is also useful. Such mailrooms receive correspondence, keep business rules defining actions to be taken regarding correspondence based on attributes of the correspondence, apply those business rules to correspondence, and take certain actions based on the application of business rules. Those actions include gating the message for further review,¹⁰ as in claim 1, and also releasing, deleting, returning, or forwarding the message, as described elsewhere in the '142 patent, *see, e.g.*, col. 3, ll. 30–39.

Indeed, in recounting the background of the invention, the patent states,

[m]any corporate organizations have elaborate methods to control the flow of memorandum, publications, notices, and other printed information within the organization. An organization may limit the types of documents employees can distribute at work, and in some cases, control which persons within an organization communicate with each other... These various rules are typically docu-

¹⁰ The specification states, "[f]or example, a business rule to gate an e-mail for further review may be triggered for any e-mail message that is addressed to the president of the company." '142 patent, col. 3, 45–48.

mented as part of the organization's business communication policies.

Id. at col. 1, ll. 15–33. Thus, the '142 patent itself demonstrates that the claimed systems and methods of screening messages are abstract ideas, "fundamental ... practice[s] long prevalent in our system" and "method[s] of organizing human activity." Alice, 134 S. Ct. at 2356 (citations and internal quotation marks omitted); see also Intellectual Ventures v. Capital One Bank, 792 F.3d at 1369.

And IV itself informed the district court, in its technology tutorial, "[i]n the typical environment, the post office resides on a mail server, where the company's emails are received, processed, and routed to recipients. Conceptually, this post office is not much different than a United States Postal Service office that processes letters and packages, except that the process is all computerimplemented and done electronically in a matter of seconds." J.A. 40.

This demonstrates that the concept is well-known and abstract. Furthermore, with the exception of generic computer-implemented steps, there is nothing in the claims themselves that foreclose them from being performed by a human, mentally or with pen and paper. See CyberSource, 654 F.3d at 1371-72. Indeed, the specification expressly states that one type of post office, the gatekeeping post office, which "provides for administrative review and processing of gated messages ... provides for both manual review by a gatekeeper—a person designated to review gated messages-and automatic review and processing." '142 patent, col. 7, ll. 31-35; see also id. at col. 11, ll. 7-10. The '142 patent is directed to a conventional business practice-the screening of messages by corporate organizations-in the context of electronic communications.

Since the claims are directed to an abstract idea, we proceed to Mayo/Alice step two. According to the specification, the claims can "operate] on a conventional communications network." Id. at col. 5, 1. 46. The post offices are "[c]ommunicatively coupled to the network through conventional e-mail protocols," and "conventional mail servers and conventional post office/mail server combinations may be present." Id. at col. 5, ll. 48-49, 55-57. The patent discloses only generic computers performing generic functions: "[t]he [Rule Enforcing Post Offices] and [Gatekeeping Post Offices] are preferably implemented as software products executing on conventional server-class computers, such as ... IBM compatible computers based on Intel Inc.'s Pentium[™] processors. The servers operate in conjunction with conventional operating systems, such as UNIX™, or Microsoft Corp.'s Windows95™ or WindowNTTM." Id. at col. 9, ll. 51-58. The specification thus confirms that the implementation of the abstract idea is routine and conventional. The '142 patent does not "improve the functioning of the computer itself." Alice, 134 S. Ct. at 2359 (citation omitted). Nor does it solve a "challenge particular to the Internet." DDR Holdings, 773 F.3d at 1257.

IV argues that the claims do not merely require routine and conventional use of computers and the Internet because "applying business rules to email is not what computers and the Internet do in the absence of this claim limitation" and "because computers and the Internet do not have 'rule engines' as a matter of course." IV's Opening Br. at 54. But the inquiry is not whether conventional computers already apply, for example, well-known business concepts like hedging or intermediated settlement. Rather, we determine whether "each step does no more than require a generic computer to perform generic computer functions." Alice, 134 S. Ct. at 2359 (emphasis added). Here that is the case. The asserted claims of the '142 patent are not patenteligible under § 101.

3. The '610 Patent

Claim 7 is the only asserted claim of the '610 patent. The district court held eligible claim 7 of the '610 patent. Claim 7 depends from claim 1, which provides:

1. A virus screening method comprising the steps of:

routing a call between a calling party and a called party of a telephone network;

receiving, within the telephone network, computer data from a first party selected from the group consisting of the calling party and the called party;

detecting, within the telephone network, a virus in the computer data; and

in response to detecting the virus, inhibiting communication of at least a portion of the computer data from the telephone network to a second party selected from the group consisting of the calling party and the called party.

'610 patent, col. 14, ll. 34-47. Claim 7 recites:

7. The virus screening method of claim 1 further comprising the step of determining that virus screening is to be applied to the call based upon at least one of an identification code of the calling party and an identification code of the called party.

Id. at col. 14, l. 66–col. 15 l. 3.

Unlike the asserted claims of the '050 and '142 patents, claim 7 involves an idea that originated in the computer era—computer virus screening. But the idea of virus screening was nonetheless well known when the '610 patent was filed. Performing virus screening was a long prevalent practice in the field of computers, and, as the patent admits, performed by many computer users. The patent acknowledges that, prior to the invention, "[m]any computer users [had] virus screening and detection software installed on their computers." *Id.* at col. 1, 11. 10–11. Claim 7 of the '610 patent, however, does not claim a new method of virus screening or improvements thereto—in fact, it requires only "detecting . . . a virus in the computer data." *Id.* at col. 14, 11. 40–41. The specification recites conventional "virus screening software." *See, e.g.*, '610 patent, col. 3, 11. 35–39. By itself, virus screening is well-known and constitutes an abstract idea.

At step two of *Mayo/Alice*, there is no other aspect of the claim that is anything but conventional.

The '610 patent is directed to the use of well-known virus screening software within the telephone network¹¹ or the Internet. We have previously determined that performing otherwise abstract activity on the Internet does not save the idea from being patent-ineligible. As we said in *Intellectual Ventures v. Capitol One Bank*, "[a]n abstract idea does not become nonabstract by limiting the invention to a particular ... technological environment, such as the Internet... [W]hile the claims recite budgeting using a 'communication medium' (broadly including the Internet and telephone networks), that limitation does not render the claims any less abstract." 792 F.3d at 1366–67. *See also Ultramercial*, 772 F.3d at 716 (Fed. Cir.

¹¹ The district court construed "within the telephone network" to mean "in the voice or data network connecting the calling party and called party, exclusive of the networks and gateway nodes of the called party and calling party." J.A. 276.

2014) ("The claims' invocation of the Internet also adds no inventive concept. As we have held, the use of the Internet is not sufficient to save otherwise abstract claims from ineligibility under § 101.").¹²

Just as performance of an abstract idea on the Internet is abstract, so too the performance of an abstract concept in the environment of the telephone network is abstract, as Intellectual Ventures v. Capitol One Bank recognized. Our recent decision in TLI Communications involved a similar situation. There, we held that a challenged claim was "drawn to the concept of classifying an image and storing the image based on its classification." 823 F.3d at 611. This was abstract because "[w]hile the [asserted claim] requires concrete, tangible components such as 'a telephone unit' and a 'server,' the specification makes clear that the recited physical components merely provide a generic environment in which to carry out the abstract idea of classifying and storing digital images in an organized manner." Id. Here, the recitation of a "telephone network," like the telephone unit and server in TLI Communications, merely provides a "generic environment" in which to carry out the well-known and abstract idea of virus screening.

Nor does the asserted claim improve or change the way a computer functions. Claim 7 recites no more than generic computers that use generic virus screening technology. But the "mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention." *Alice*, 134 S. Ct. at 2358. "For

¹² See also, e.g., buySAFE, 765 F.3d at 1355 ("The computers in *Alice* were receiving and sending information over networks connecting the intermediary to the other institutions involved, and the Court found the claimed role of the computers insufficient.").

the role of a computer in a computer-implemented invention to be deemed meaningful in the context of this analysis, it must involve more than performance of 'wellunderstood, routine, [and] conventional activities previously known to the industry." *Content Extraction*, 776 F.3d at 1347-48 (quoting *Alice*, 134 S. Ct. at 2359).

As the district court determined, claim 7 calls for at least three computers: the computer of the first party or sending party, the virus screening computer, and the computer of the second or receiving party. The sending and receiving computers can be generic-they perform only sending and receiving functions. See buySAFE, 765 F.3d at 1352, 1355. The virus screening computer fares no better. According to the specification, "[v]irus screening can be facilitated in the telephone network using either a conventional telephone network processor adapted to run associated virus screening software or an additional processor which runs virus screening software.... The processor can augment conventional circuit-switched network elements" '610 patent, col. 3, ll. 35-39, 49-50 (emphasis added). "As is well known, each of the virusscreening processors can have one or more associated modems to modulate computer data for transmission, and to demodulate received computer data." Id. at col. 4, ll. 58–61. There is no indication that the virus screening software installed on a conventional telephone network processor is any different than the virus screening software "[m]any computer users have ... installed on their computers." Id. at col. 1, ll. 10-11. These "generic computer components [are] insufficient to add an inventive concept to an otherwise abstract idea." TLI Commc'ns. 823 F.3d at 614.

IV argues that "[t]he claims of the '610 Patent include meaningful limitations that narrow the claimed invention to a specific way of screening for computer viruses *within the telephone network*... and does not preempt all virus detection." IV's Response and Reply Br. at 55. A narrow claim directed to an abstract idea, however, is not necessarily patent-eligible, for "[w]hile preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility." *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed. Cir. 2015); *see also OIP Techs.*, 788 F.3d at 1362-63 ("[T]hat the claims do not preempt all price optimization or may be limited to price optimization in the e-commerce setting do not make them any less abstract.").

In summary, unlike the claims at issue in *Enfish*, which involved a "specific type of data structure designed to improve the way a computer stores and retrieves data in memory," 822 F.3d at 1339, claim 7 of the '610 patent does not improve or change the way a computer functions. Nor does claim 7 overcome a problem unique to the Internet as was the case in *DDR Holdings*. 773 F.3d at 1258–59.

Citing BASCOM, the dissent argues that "claim 7 constitutes an improvement of the network itself and. thus, focuses on improving computers as tools." Dissenting Op. at 5. Contrary to the dissent, this case is unlike BASCOM, where, "[o]n [a] limited record" and when viewed in favor of the patentee, the claims alleged a "technical improvement over prior art ways of filtering [Internet] content." 827 F.3d at 1350. The patent in BASCOM did not merely move existing content filtering technology from local computers to the Internet, 13 which "would contain not an inventive concept," but "overc[a]me[] existing problems with other Internet

¹³ Indeed, in *BASCOM*, the patent specification acknowledged that several prior art systems already performed content filtering at either local or remote servers. *See* 827 F.3d at 1344.

filtering systems"—*i.e.*, it solved the problem of "inflexible one-size-fits-all" remote filtering schemes (caused by simply moving filtering technology to the Internet) by enabling individualized filtering at the ISP server. *Id* at 1350-51. In other words, the patent in *BASCOM* did not purport to improve the Internet itself by introducing prior art filtering technology to the Internet. Rather, the *BASCOM* patent fixed a problem presented by combining the two. Here the record does not indicate that claim 7 recites any improvement to conventional virus screening software, nor does claim 7 solve any problem associated with situating such virus screening on the telephone network.

The dissent nonetheless urges that there are two advantages to using virus screening on the telephone network that qualify as inventive concepts: (1) shifting virus detection away from the networks of the sender and recipient, which allows users to communicate over a network without concern of receiving computer viruses; and (2) closing the "protection gap," *i.e.*, the problem of individual computer users having to periodically update their virus screening software. Dissenting Op. at 2.

Regarding shifting virus detection to the telephone network, the claimed inventive solution of claim 7 is to utilize an intermediary computer in forwarding information. But that solution is perfectly conventional and is applied any time an e-mail recipient performs virus screening and, acting as an intermediary, forwards the email to another recipient. As discussed above, there is no claim here describing a particular method of incorporating virus screening into the Internet.¹⁴ To be sure, it may

¹⁴ See Affinity Labs of Tex., LLC v. DirecTV, LLC, No. 2015-1845 (Fed. Cir. Sept. 23, 2016), slip op. at 16 (holding patent ineligible where it "d[id] not provide an

be that other claims that recite particular features of intermediate computers (e.g., modeling to match the recipient's computer architecture) incorporate an inventive concept, but those claims are not before us.

As to the protection gap, claim 7 of the '610 patent does not describe or require a solution to the protection gap. See supra at 13–14 (explaining that the language of the challenged claims of the '050 patent do not address the protection gap). The district court erred in relying on technological details set forth in the patent's specification and not set forth in the claims to find an inventive concept. See Accenture, 728 F.3d at 1345 ("[T]he complexity of the implementing software or the level of detail in the specification does not transform a claim reciting only an abstract concept into a patent-eligible system or method."); Content Extraction, 776 F.3d at 1346 ("We focus here on whether the claims of the asserted patents fall within the excluded category of abstract ideas.") (emphasis added).

As we explained in *TLI Communications*, the claim here is "not directed to a specific improvement to computer functionality. Rather, [it is] directed to the use of conventional or generic technology in a nascent but wellknown environment, without any claim that the invention reflects an inventive solution to any problem presented by combining the two." 823 F.3d at 612

Claim 7 of the '610 patent is not patent-eligible under § 101.

inventive solution to a problem in implementing the idea of remote delivery of regional broadcasting; it simply recite[d] that the abstract idea of remote delivery will be implemented using the conventional components and functions generic to cellular telephones.").

AFFIRMED-IN-PART AND REVERSED-IN-PART

Costs

Costs to defendants.

United States Court of Appeals for the Federal Circuit

INTELLECTUAL VENTURES I LLC, Plaintiff-Appellant

v.

SYMANTEC CORP., Defendant-Cross-Appellant

TREND MICRO INCORPORATED, TREND MICRO, INC. (USA),

Defendants-Appellees

2015-1769, 2015-1770, 2015-1771

Appeals from the United States District Court for the District of Delaware in Nos. 1:10-cv-01067-LPS, 1:12-cv-01581-LPS, Chief Judge Leonard P. Stark.

MAYER, Circuit Judge, concurring.

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I agree that all claims on appeal fall outside of 35 U.S.C. § 101. I write separately, however, to make two points: (1) patents constricting the essential channels of online communication run afoul of the First Amendment; and (2) claims directed to software implemented on a generic computer are categorically not eligible for patent. I.

"[T]he Constitution protects the right to receive information and ideas.... This right to receive information and ideas, regardless of their social worth, is fundamental to our free society." Stanley v. Georgia, 394 U.S. 557, 564 (1969) (citations omitted). Patents, which function as government-sanctioned monopolies, invade core First Amendment rights when they are allowed to obstruct the essential channels of scientific, economic, and political discourse. See United States v. Playboy Entm't Grp., Inc., 529 U.S. 803, 812 (2000) ("The distinction between laws burdening and laws banning speech is but a matter of degree."); see also In re Tam, 808 F.3d 1321, 1340 (Fed. Cir. 2015) (en banc) (explaining that the government may impermissibly burden speech "even when it does so indirectly").

Although the claims at issue here disclose no new technology, they have the potential to disrupt, or even derail, large swaths of online communication. U.S. Patent No. 6,460,050 (the "050 patent") purports to cover methods of "identifying characteristics of data files," '050 patent, col. 8 l. 13, whereas U.S. Patent No. 6,073,142 (the "142 patent") broadly claims systems and methods which allow an organization to control internal email distribution, '142 patent, col. 1 ll. 15-34. U.S. Patent No. 5,987,610 (the "610 patent") describes, in sweeping terms, screening a communication for viruses or other harmful content at an intermediary location before delivering it to an addressee. See '610 patent, col. 14 ll. 34–47. The asserted claims speak in vague, functional language, giving them the elasticity to reach a significant slice of all email traffic. See Gottschalk v. Benson, 409 U.S. 63, 69 (1972) ("Benson") (explaining that claims are patent eligible only if they contain limitations "sufficiently definite to confine the patent monopoly within rather definite bounds"). Indeed, the claims of the '610 patent could reasonably be read to cover most methods of screening for harmful content while data is being transmitted over a network. See '610 patent, col. 1 ll. 59–61 (describing "screen[ing] computer data for viruses within a telephone network before communicating the computer data to an end user").

Suppression of free speech is no less pernicious because it occurs in the digital, rather than the physical, realm. "[W]hatever the challenges of applying the Constitution to ever-advancing technology, the basic principles of freedom of speech and the press, like the First Amendment's command, do not vary when a new and different medium for communication appears." Brown v. Entm't Merchs. Ass'n, 564 U.S. 786, 790 (2011) (citations and internal quotation marks omitted). Essential First Amendment freedoms are abridged when the Patent and Trademark Office ("PTO") is permitted to balkanize the Internet, granting patent owners the right to exact heavy taxes on widely-used conduits for online expression.

Like all congressional powers, the power to issue patents and copyrights is circumscribed by the First Amendment. See Golan v. Holder, 132 S. Ct. 873, 889-93 (2012); Eldred v. Ashcroft, 537 U.S. 186, 219-21 (2003). In the copyright context, the law has developed "built-in First Amendment accommodations." Eldred, 537 U.S. at 219; see also Park 'N Fly, Inc. v. Dollar Park & Fly, Inc., 469 U.S. 189, 201 (1985) (noting that the Lanham Act contains safeguards to prevent trademark protection from "tak[ing] from the public domain language that is merely Specifically, copyright law "distinguishes descriptive"). between ideas and expression and makes only the latter eligible for copyright protection." *Eldred*, 537 U.S. at 219; see also Harper & Row Publishers, Inc. v. Nation Enters., 471 U.S. 539, 556 (1985) (explaining that "copyright's idea/expression dichotomy" supplies "a definitional balance between the First Amendment and the Copyright Act by permitting free communication of facts while still protecting an author's expression" (citations and internal

quotation marks omitted)). It also applies a "fair use" defense, permitting members of "the public to use not only facts and ideas contained in a copyrighted work, but also expression itself in certain circumstances." *Eldred*, 537 U.S. at 219; *see* 17 U.S.C. § 107 ("[T]he fair use of a copyrighted work, including such use by reproduction in copies ... for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright.").

Just as the idea/expression dichotomy and the fair use defense serve to keep copyright protection from abridging free speech rights, restrictions on subject matter eligibility can be used to keep patent protection within constitutional bounds. Section 101 creates a "patent-free zone" and places within it the indispensable instruments of social, economic, and scientific endeavor. See Alice Corp. v. CLS Bank Int'l, 134 S. Ct. 2347, 2354 (2014) (emphasizing that the "building blocks of human ingenuity" are patent ineligible); Benson, 409 U.S. at 67 (stating that "mental processes . . . and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work"). Online communication has become a "basic tool]," Benson, 409 U.S. at 67, of modern life, driving innovation and supplying a widely-used platform for political dialogue. See Ultramercial, Inc. v. Hulu, LLC, 772 F.3d 709, 716 (Fed. Cir. 2014) (noting that the "is Internet a ubiquitous informationtransmitting medium"): see also U.S. Telecom Ass'n v. Fed. Commc'n Comm'n, 825 F.3d 674, 698 (D.C. Cir. 2016) (explaining that online communication "has transformed nearly every aspect of our lives, from profound actions like choosing a leader, building a career, and falling in love to more quotidian ones like hailing a cab and watching a movie"). Section 101, if properly applied, can preserve the Internet's open architecture and weed out those

patents that chill political expression and impermissibly obstruct the marketplace of ideas.

As both the Supreme Court and this court have recognized, section 101 imposes "a threshold test," Bilski v. Kappos, 561 U.S. 593, 602 (2010), one that must be satisfied before a court can proceed to consider subordinate validity issues such as non-obviousness under 35 U.S.C. § 103 or adequate written description under 35 U.S.C. § 112. See Parker v. Flook, 437 U.S. 584, 593 (1978) ("Flook") ("The obligation to determine what type of discovery is sought to be patented" so as to determine whether it falls within the ambit of section 101 "must precede the determination of whether that discovery is, in fact, new or obvious."); In re Comiskey, 554 F.3d 967, 973 (Fed. Cir. 2009) ("Only if the requirements of § 101 are satisfied is the inventor allowed to pass through to the other requirements for patentability, such as novelty under § 102 and . . . non-obviousness under § 103." (citations and internal quotation marks omitted)); State St. Bank & Trust Co. v. Signature Fin. Grp., Inc., 149 F.3d 1368, 1372 n.2 (Fed. Cir. 1998) (explaining that section 101 is "[t]he first door which must be opened on the difficult path to patentability" (citations and internal quotation marks omitted)). Indeed, if claimed subject matter is not even eligible for patent protection, any pronouncement on whether it is novel or adequately supported by the written description constitutes an impermissible advisory opinion. See, e.g., Golden v. Zwick*ler*, 394 U.S. 103, 108 (1969) (emphasizing that Article III courts "do not render advisory opinions" (citations and internal quotation marks omitted)).

The public has a "paramount interest in seeing that patent monopolies . . . are kept within their legitimate scope." Cuozzo Speed Techs., LLC v. Lee, 136 S. Ct. 2131, 2144 (2016) (citations and internal quotation marks omitted); see also Medtronic, Inc. v. Mirowski Family Ventures, LLC, 134 S. Ct. 843, 851 (2014). Nowhere is that interest more compelling than in the context of claims that threaten fundamental First Amendment freedoms. See Palko v. Connecticut, 302 U.S. 319, 326–27 (1937) ("[F]reedom of thought and speech . . . is the matrix, the indispensable condition, of nearly every other form of freedom."). "As the most participatory form of mass speech yet developed, the Internet deserves the highest protection from governmental intrusion." ACLU v. Reno, 929 F. Supp. 824, 883 (E.D. Pa. 1996), aff'd, 521 U.S. 844 (1997). A robust application of section 101 at the outset of litigation will ensure that the essential channels of online communication remain "free to all men and reserved exclusively to none," Funk Brothers Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 130 (1948).

II.

Most of the First Amendment concerns associated with patent protection could be avoided if this court were willing to acknowledge that Alice sounded the death knell for software patents. The claims at issue in Alice were directed to a computer-implemented system for mitigating settlement risk. 134 S. Ct. at 2352–53. Although the petitioners argued that their claims were patent eligible because they were tied to a computer and a computer is a tangible object, the Supreme Court unanimously and emphatically rejected this argument. Id. at 2358–60. The Court explained that the "mere recitation of a generic computer cannot transform a patent-ineligible abstract idea into a patent-eligible invention." Id. at 2358. Accordingly, "[t]he fact that a computer necessarily exist[s] in the physical, rather than purely conceptual, realm is beside the point" in the section 101 calculus. Id. (citations and internal quotation marks omitted).

Software is a form of language—in essence, a set of instructions. See Microsoft Corp. v. AT&T Corp., 550 U.S. 437, 447 (2007) (explaining that "software" is "the set of instructions, known as code, that directs a computer to

perform specified functions or operations" (citations and internal quotation marks omitted)); see also 17 U.S.C. § 101 (defining a "computer program," for purposes of the Copyright Act, as "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result"). It is inherently abstract because it is merely "an *idea* without physical embodiment," *Microsoft*, 550 U.S. at 449 (emphasis added). Given that an "idea" is not patentable, *see, e.g., Benson*, 409 U.S. at 67, and a generic computer is "beside the point" in the eligibility analysis, *Alice*, 134 S. Ct. at 2358, all software implemented on a standard computer should be deemed categorically outside the bounds of section 101.

The central problem with affording patent protection to generically-implemented software is that standard computers have long been ceded to the public domain. See Flook, 437 U.S. at 593 n.15 ("[I]n granting patent rights, the public must not be deprived of any rights that it theretofore freely enjoyed" (citations and internal quotation marks omitted)). Because generic computers are ubiquitous and indispensable, in effect the "basic tool[]," Benson, 409 U.S. at 67, of modern life, they are not subject to the patent monopoly. In the section 101 calculus, adding software (which is as abstract as language) to a conventional computer (which rightfully resides in the public domain) results in a patent eligibility score of zero. See Alice, 134 S. Ct. at 2358 ("Stating an abstract idea while adding the words 'apply it with a computer' simply combines those two steps, with the same deficient result.").

Software lies in the antechamber of patentable invention. Because generically-implemented software is an "idea" insufficiently linked to any defining physical structure other than a standard computer, it is a precursor to technology rather than technology itself. See Mackay Radio & Tel. Co. v. Radio Corp., 306 U.S. 86, 94 (1939) ("While a scientific truth, or the mathematical expression

of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be."). It is well past time to return software to its historical dwelling place in the domain of copyright. See Benson, 409 U.S. at 72 (citing a report from a presidential commission explaining that copyright is available to protect software and that software development had "undergone substantial and satisfactory growth" even without patent protection (citations and internal quotation marks omitted)); Oracle Am., Inc. v. Google Inc., 750 F.3d 1339, 1380 (Fed. Cir. 2014) (noting that "several commentators" have "argue[d] that the complex and expensive patent system is a terrible fit for the fastmoving software industry" and that copyright provides "[a] perfectly adequate means of protecting and rewarding software developers for their ingenuity" (citations and internal quotation marks omitted)); Peter S. Menell, An Analysis of the Scope of Copyright Protection for Application Programs, 41 Stan. L. Rev. 1045, 1076 (1989) (explaining that patents were historically "not seen as a viable option for the protection of most application program code" and that many software programs "simply do not manifest sufficient novelty or nonobviousness to merit patent protection").

Software development has flourished despite—not because of—the availability of expansive patent protection. See Brief of Amicus Curiae Elec. Frontier Found. in Support of Respondents, Alice, 134 S. Ct. 2347 (No. 13-298), 2014 WL 828047, at *6-7 ("EFF Brief") ("The software market began its rapid increase in the early 1980s ... more than a decade before the Federal Circuit concocted widespread software patents in 1994. ... Obviously, no patents were needed for software to become a \$60 billion/year industry by 1994."); Mark A. Lemley, Software Patents and the Return of Functional Claiming, 2013 Wis. L. Rev. 905, 935 (2013) ("Software patents ... have created a large number of problems for the industry, particularly for the most innovative and productive companies. . . . [T]he existence of a vibrant open source community suggests that innovation can flourish in software absent patent protection." (footnote omitted)); Wendy Seltzer, Software Patents and/or Software Development, 78 Brook. L. Rev. 929, 930 (2013) ("Seltzer") ("Present knowledge and experience now offer sufficient evidence that patents disserve software innovation."); Arti K. Rai, John R. Allison, & Bhaven N. Sampat, University Software Ownership and Litigation: A First Examination, 87 N.C. L. Rev. 1519, 1555–56 (2009) ("While most small biotechnology firms that receive venture financing have patents, the available empirical evidence indicates that most software start-ups that receive venture financing, particularly in the first round, do not have patents.").

From an eligibility perspective, software claims suffer from at least four insurmountable problems. First, their scope is generally vastly disproportionate to their technological disclosure. In assessing patent eligibility, "the underlying functional concern . . . is a *relative* one: how much future innovation is foreclosed relative to the contribution of the inventor." Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1303 (2012); see also Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 513 (1917) ("[T]he inventor [is entitled to] the exclusive use of just what his inventive genius has discovered. It is all that the statute provides shall be given to him and it is all that he should receive, for it is the fair as well as the statutory measure of his reward for his contribution to the public stock of knowledge."). Software patents typically do not include any actual code developed by the patentee, but instead describe, in intentionally vague and broad language, a particular goal or objective. See Dan L. Burk & Mark A. Lemley, Is Patent Law Technology-Specific?, 17 Berkeley Tech. L. J. 1155. 1164-65 (2002) ("Unfortunately, the Federal Circuit's peculiar direction in the software enablement cases has

effectively nullified the disclosure requirement for software patents. And since source code is normally kept secret, software patentees generally disclose little or no detail about their programs to the public." (footnote omitted)). Here, for example, the '610 patent discusses the objective of "screen[ing] computer data for viruses . . . before communicating the computer data to an end user," '610 patent, col. 1 ll. 59–61, but fails to disclose any specific, inventive guidance for achieving that goal. In effect, the '610 patent, like most software patents, describes a desirable destination but neglects to provide any intelligible roadmap for getting there.

A second, and related, problem with software patents is that they provide incentives at the wrong time. Because they are typically obtained at the "idea" stage, before any real inventive work has been done, such patents are incapable of effectively incentivizing meaningful advances in science and technology. "A player focused on patenting can obtain numerous patents without developing any of the technologies to useful levels of deployment or disclosure, leaving a minefield of abstract patent claims for others who actually deploy software." Seltzer, 78 Brook. L. Rev. at 931. Here, for example, it took no significant inventive effort to recognize that communications should be screened for harmful content before delivery. The hard work came later, when software developers created screening systems capable of preventing our email boxes from being overrun with spam or disabled by viruses. Granting patents on software "ideas"-before they have been actually reduced to practice-has created a perverse incentive scheme. Under our current regime, those who scamper to the PTO early, often equipped with little more than vague notions about using computers to automate well-known business and social practices, can reap hefty financial dividends. By contrast, those who actually create and deploy useful computer-centric products are "rewarded" with mammoth potential infringement liability. See id. at 972 ("In software . . . the long road from idea to implementation often snags on patents early in the course. Engineers can describe what they want software to do—in terms that have been sufficient for the PTO—well before they have made it work. Pressures to patent early produce a thicket of preimplementation claims."); EFF Brief, 2014 WL 828047, at *23 (describing a study which "found that between 2007 and 2011, 46 percent of patent lawsuits involved software patents, accounting for 89 percent of the increase in the number of patent defendants during this timeframe").

Yet another intractable problem with software patents is their sheer number. See Brief Of Amici Curiae Checkpoint Software, Inc. et al. in Support of Respondents, Alice, 134 S. Ct. 2347 (No. 13-298), 2014 WL 828039, at *8 ("[B]ecause computer products-as opposed to patents-inevitably integrate complex, multicomponent technology, any given product is potentially subject to a large number of patents.... Some industry experts have estimated that 250,000 patents go into a modern smartphone." (citations omitted)). Given the vast number of software patents-most of which are replete with broad, functional claims—it is virtually impossible to innovate in any technological field without being ensnared by the patent thicket. See id. (describing the "overwhelming set of overlapping patent rights that impede innovation"). Software patents impose a deadweight loss on the nation's economy, erecting often insurmountable barriers to innovation and forcing companies to expend exorbitant sums defending against meritless infringement suits. See Shawn P. Miller, "Fuzzy" Software Patent Boundaries and High Claim Construction Reversal Rates, 17 Stan. Tech. L. Rev. 809, 810 (2014) ("Patent litigation is so expensive it has been described as the sport of kings. . . . These expenses, however, may be dwarfed by the social cost of patent litigation in reducing incentives for producers to bring

innovative products to market." (footnote and internal quotation marks omitted)).

Fourth. fundamentally, and most genericallyimplemented software invariably lacks the concrete borders the patent law demands. See, e.g., Digital Equip. Corp. v. AltaVista Tech., Inc., 960 F. Supp. 456, 462 (D. Mass. 1997) ("The Internet has no territorial boundaries. To paraphrase Gertrude Stein, as far as the Internet is concerned, not only is there perhaps 'no there there,' the 'there' is everywhere where there is Internet access."). Patent protection is all about boundaries. An applicant has the right to obtain a patent only if he can describe, with reasonable clarity, the metes and bounds of his See Festo Corp. v. Shoketsu Kinzoku Kogyo invention. Kabushiki Co., 535 U.S. 722, 730 (2002) (explaining that the patent "monopoly is a property right and like any property right, its boundaries should be clear"). A properly issued patent claim represents a line of demarcation, defining the territory over which the patentee can exercise the right to exclude. See Nautilus, Inc. v. Biosig Instruments, Inc., 134 S. Ct. 2120, 2129 (2014) (emphasizing that "a patent must be precise enough to afford clear notice of what is claimed, thereby apprising the public of what is still open to them" (citations and internal quotation marks omitted)).

Software, however, is akin to a work of literature or a piece of music, undeniably important, but too unbounded, i.e., too "abstract," to qualify as a patent-eligible invention. See Microsoft, 550 U.S. at 447–48 (explaining that software "instructions... detached from any medium" are analogous to "[t]he notes of Beethoven's Ninth Symphony"). And, as discussed previously, given that generic computers are both omnipresent and indispensable, they are incapable of providing structure "sufficiently definite to confine the patent monopoly within rather definite bounds," Benson, 409 U.S. at 69. In short, because directing that software should be applied via standard computer elements is little different than stating that it should be written down using pen and paper, genericallyimplemented software lacks the concrete contours required by section 101. See Alice, 134 S. Ct. at 2352 (emphasizing that "merely requiring generic computer implementation" does not remove claims from the realm of the abstract).

Declaring that software implemented on a generic computer falls outside of section 101 would provide muchneeded clarity and consistency in our approach to patent eligibility. It would end the semantic gymnastics of trying to bootstrap software into the patent system by alleging it offers a "specific method of filtering Internet content," see BASCOM Global Internet Servs., Inc. v. AT&T Mobility LLC, 827 F.3d 1341, 1350 (Fed. Cir. 2016), makes the computer faster, see Enfish, LLC v. Microsoft Corp., 822 F.3d 1327, 1337-39 (Fed. Cir. 2016), or the Internet better, see DDR Holdings, LLC v. Hotels.com, L.P., 773 F.3d 1245, 1257 (Fed. Cir. 2014), just to snuggle up to a casual bit of dictum in Alice, 134 S. Ct. at 2359. Software runs computers and the Internet; improving them up to the current limits of technology is merely more of the same. The claims at issue in BASCOM, Enfish, and DDR, like those found patent ineligible in Alice, do "no more than require a generic computer to perform generic computer functions," Alice, 134 S. Ct. at 2359. Eliminating generically-implemented software patents would clear the patent thicket, ensuring that patent protection promotes, rather than impedes, "the onward march of science," O'Reilly v. Morse, 56 U.S. (15 How.) 62, 113 (1853), and allowing technological innovation to proceed apace.

United States Court of Appeals for the Federal Circuit

INTELLECTUAL VENTURES I LLC, Plaintiff-Appellant

v.

SYMANTEC CORP., Defendant-Cross-Appellant

TREND MICRO INCORPORATED, TREND MICRO, INC. (USA),

Defendants-Appellees

2015-1769, 2015-1770, 2015-1771

Appeals from the United States District Court for the District of Delaware in Nos. 1:10-cv-01067-LPS, 1:12-cv-01581-LPS, Chief Judge Leonard P. Stark.

STOLL, Circuit Judge, dissenting in part.

I concur in the result reached by the majority except with respect to the '610 patent. I would affirm the judgment of the district court that asserted claim 7 of the '610 patent is eligible under § 101.

The '610 patent confirms that the claimed invention "advantageously screen[s] computer data for viruses within a telephone network before communicating the computer data to an end user." '610 patent col. 1 ll. 59– 61. The patent explains that this was a fundamental

architectural shift from prior-art virus screening, which occurred locally on an end user's computer rather than centrally as in the invention. Id. col. 1 ll. 10-11. This shift improved the overall security of telecommunication networks by thwarting the ability of viruses to reach and exploit end users. Using the patented invention, end users could communicate over a network "without concern of receiving various predetermined computer viruses." Id. col. 1 ll. 63-64; see also Intellectual Ventures I LLC v. Symantec Corp. (Dist. Ct. Op.), 100 F. Supp. 3d 371, 400 (D. Del. 2015). As IV's expert, Dr. McDaniel, testified at trial, "the key about the '610∏ is because it's actually on a network, ... it's out on the cloud. So that's a big advantage, because all of the dangerous code goes out there" and it becomes "somebody else's problem to deal with it," not the end users'. J.A. 800 (Trial Tr. 518 ll. 9-16). Additionally, as the district court noted, the patent helped solve "the problem of individual computer users having periodically to update their virus screening software locally on their computers in order to ensure adequate protection from computer viruses." Dist. Ct. Op., 100 F. Supp. 3d at 400; see also '610 patent col. 1 ll. 20-23 (explaining that in prior art configurations "each computer user has to repeatedly upgrade the virus screening software installed on his/her computer to ensure protection from recently-discovered viruses"). Dr. McDaniel described this improvement as closing the virus "protection gap" that existed in computer networks before the '610 patent because "as soon as Symantec knows about a virus, you have got protection in your e-mail immediately." J.A. 808 (Trial Tr. 526 ll. 2-7); see also id. 800 (Trial Tr. 518 ll. 2-6).

I agree with the district court that the claimed invention is eligible under § 101. *Dist. Ct. Op.*, 100 F. Supp. 3d at 396-400. Analyzing claim 7 under the *Mayo/Alice* framework, I accept the majority's step-one determination that the patent is directed to the abstract idea of "virus

screening." Maj. Op. 20. But I depart from the majority's analysis at step two-the "search for an 'inventive concept" that "transform[s]' the claimed abstract idea into a patent-eligible application." Alice, 134 S. Ct. at 2355, 2357 (quoting Mayo Collaborative Servs. v. Prometheus Labs., Inc., 132 S. Ct. 1289, 1294, 1298 (2012)). The majority gives short shrift to the Supreme Court's instruction that in step two we must "consider the elements of each claim both individually and 'as an ordered combination." Alice, 134 S. Ct. at 2355 (emphasis added) (quoting Mayo, 132 S. Ct. at 1297). The Supreme Court explained that this approach "is consistent with the general rule that patent claims 'must be considered as a whole." Alice, 134 S. Ct. at 2355 n.3 (quoting Diamond v. Diehr, 450 U.S. 175, 188 (1981)) (citing Parker v. Flook, 437 U.S. 584, 594 (1978)).

Claim 7 is eligible as an ordered combination. While the network components and virus screening software recited by the claim may themselves be conventional, "an inventive concept can be found in the non-conventional and non-generic arrangement of known, conventional pieces." BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC, 827 F.3d 1341, 1350 (Fed. Cir. 2016). As described above, claim 7's inventive concept is moving virus screening software from its typical location on end users' computers and deploying it instead "within the telephone network" itself. '610 patent col. 14 l. 37. Thus, the invention harnesses network architecture and exploits it by utilizing a non-conventional and non-generic arrangement of virus screening components, which improves overall network security and usability. As to this arrangement being non-conventional and non-generic, the district court had before it IV's expert testimony that the invention provided a novel solution to the protection gap problem and greatly reduced the likelihood of an end user receiving a virus when it held claim 7 eligible. I also note that the jury verdict in the Symantec case-the only one

of the consolidated cases that went to trial—found the '610 patent not invalid over the asserted prior art. While I recognize that validity under §§ 102 and 103 is a distinct inquiry from eligibility under § 101, and may not be dispositive of § 101, the jury verdict nonetheless supports the notion that this particular ordering of the components in claim 7 was not conventional at the time. See Internet Patents Corp. v. Active Network, Inc., 790 F.3d 1343, 1347 (Fed. Cir. 2015) ("[P]ragmatic analysis of § 101 is facilitated by considerations analogous to those of §§ 102 and 103 as applied to the particular case.").

The claimed invention is also markedly similar to that in BASCOM, where we vacated the district court's ineligibility determination on the basis of a step-two ordered combination. Compare '610 patent col. 1 ll. 59-61 ("Embodiments of the present invention advantageously screen computer data for viruses within a telephone network before communicating the computer data to an end user."), with BASCOM, 827 F.3d at 1348 ("The claims of the '606 patent are directed to filtering content on the Internet," i.e., not on a user's local computer). We found the abstract idea in BASCOM to be "filtering content," BASCOM, 827 F.3d at 1348-49, similar to the abstract idea of "virus screening" in this case, Maj. Op. 20. Unlike the majority here, this court in BASCOM recognized that although "the limitations of the claims, taken individually, recite generic computer, network and Internet components," the patent's "particular arrangement of elements is a technical improvement over prior art ways of filtering such content." BASCOM, 827 F.3d at 1349, 1350. The court in BASCOM identified several concrete problems that the patent in that case addressed, much like how the patent before us addressed specific technological issues with virus screening, such as the protection gap. Thus, the court found the claims of the BASCOM patent to be "more than a drafting effort designed to monopolize the [abstract idea]," id. at 1350-51 (quoting Alice, 134 S. Ct.

at 2357), because they "may be read to 'improve an existing technological process," id. at 1351 (quoting Alice, 134 S. Ct. at 2358 (discussing claims in Diehr, 450 U.S. 175)). There is no meaningful difference between BASCOM and this case in terms of eligibility because claim 7 also "purport[s] to improve the functioning of the computer itself," or, at the very least, the functioning of the network. Dist. Ct. Op., 100 F. Supp. 3d at 400 (quoting Alice, 134 S. Ct. at 2359); see also Oral Argument at 25:30-26:17, available athttp://oralarguments.cafc.uscourts.gov/default. aspx?fl=2015-1769.mp3 (counsel for Symantec acknowledging that, under Alice, a patent that improves the functioning of a network may be patent eligible under § 101).

I disagree with the majority's characterization of this case as fitting within our line of cases rendering ineligible patents that merely "perform [] otherwise abstract activity on the Internet." Maj. Op. 20. The claims at issue in those cases, like the claims at issue in Alice, simply invoked the Internet as a means to an end; they did not improve the security and functioning of the Internet itself. Patents that fall within that paradigm are ineligible because "the focus of the[ir] claims is not on such an improvement in computers as tools, but on certain independently abstract ideas that use computers as tools." Elec. Power Grp., LLC v. Alstom S.A., No. 2015-1778, 2016 WL 4073318, at *4 (Fed. Cir. Aug. 1, 2016). In contrast, claim 7 constitutes an improvement of the network itself and, thus, focuses on improving computers See BASCOM, 827 F.3d at 1351 (describing as tools. similar patent as "not claiming the idea of filtering content simply applied to the Internet" but rather "a technology-based solution ... to filter content on the Internet that overcomes existing problems with other Internet filtering systems"). Describing claimed inventions similar to the one at issue here, we have said that we "are not persuaded that the invention's ability to run on a generalpurpose computer dooms the claims" if the claims "are directed to an improvement in the functioning of a computer." *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1338-39 (Fed. Cir. 2016) (distinguishing collection of cases involving claims which "simply add[] conventional computer components to well-known business practices").

For these reasons, I respectfully dissent from the majority opinion regarding the '610 patent and would affirm the judgment of the district court holding that asserted claim 7 of the '610 patent is eligible under § 101.