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# SMARTER CITIES, SMARTER REGULATIONS: A CASE FOR THE ALGORITHMIC REGULATION OF PLATFORM-BASED SHARING ECONOMY FIRMS

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## Abstract:

*Regulations ought to be as efficient as the technologies they govern – or at least they can be. This has been the primary motivation for writing this article – designing regulations to fit the technologies they are intended to govern. This paper seeks to come up with common sense ways of regulating these technologies, by 1) understanding the theory of computer ethics and how it applies to platform-based sharing economies, 2) identifying what aspects of platform-based sharing economies are in need of regulation by way of analogy, 3) surveying the regulations that are out there for these different behaviors – regulatory components, and 4) figuring out how to package all of these behaviors together in a way that improves the efficiency and efficacy of existing regulations. The conclusion of this paper is that platform-based sharing economies and the data that they produced can be regulated algorithmically through a set of system rules in a way that achieves policy goals with a greater level of precision.\*\*\**

Cities – from companies to individual citizens to local governments – have shown that they are capable of operating more efficiently by incorporating, what were at one point, technological disruptions and leveraging them to achieve efficiency. Typically, these moves toward efficiency start with companies and individuals. Local governments usually are the last to the table. Such has been the case with the adoption and incorporation of most major disruptions – from automobiles to the television to the Internet. It has been shown, historically, that the full benefits of disruptive technologies are only achieved once a certain environment exists.<sup>1</sup>

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<sup>1</sup> Carlota Perez, *The Advance of Technology and Major Bubble Collapses: Historical Regularities and Lessons for Today*, ENGELSBERG SEMINAR ON “THE FUTURE OF CAPITALISM,” AX:SON FOUNDATION, 1, 2

The creation of distributed networks and the looming rise of the Internet of Things have already created a new set of challenges for regulators.<sup>2</sup> As devices that leverage the Internet (such as personal computers, smart phones, and wearable devices) continue to be used in order to execute seemingly impossible tasks, signs that another such disruption, demanding new, clearer regulations become more apparent. Another issue that is becoming clearer is the heightened importance of information sharing required in order for such tasks to take place. In the financial industry, high frequency trading<sup>3</sup> and unfettered algorithmic arbitrage has already led to record profits for banks, followed directly by the crash of 2007.<sup>4</sup> In response to these developments, some financial institutions have started to leverage the collective computing power of their users in order to combat these asymmetries, improve safety of their assets, and reduce incidence of fraudulent manipulation of records by spreading the burden of security among the many users of the network and compensating them for their efforts.<sup>5</sup> In the aftermath of the financial crisis, however, these networks have gained more

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(June 2010), <http://www.carlotaperez.org/downloads/media/PEREZTechnologyandbubblesforEngelsbergseminar.pdf>.

<sup>2</sup> See, e.g., Eric Barbry, *The Internet of Things, Legal Aspects: What Will Change (Everything)*. . . , Communications & Strategies (Sept. 21, 2012), <https://poseidon01.ssrn.com/delivery.php?ID=446005007069125126120109023094119093121054088068002056077030103087123113088064083110030012116061009062052102001116091000099084039039001011046070121002114078083094019053037089093001110001088075121099090088084089105097112120065030000072029069021001078&EXT=pdf>; *Distributed Network*, TECHOPEDIA, <https://www.techopedia.com/definition/27788/distributed-network> (last visited Feb. 20, 2017) (“A distributed network is a type of computer network that is spread over different networks. This provides a single data communication network, which can be managed jointly or separately by each network. Besides shared communication within the network, a distributed network often also distributes processing. Distributed networks are part of distributed computing architecture, in which enterprise IT infrastructure resources are divided over a number of networks, processors and intermediary devices. A distributed network is powered by network management software, which manages and monitors data routing, combining and allocating network bandwidth, access control and other core networking processes. Distributed networks and processing work together to deliver specialized applications to different remote users. This means that an application may be hosted and executed from a single machine but accessed by many others. A client/server computing architecture is an example of a distributed network where the server is the producer of a resource and many interconnected remote users are the consumers who access the application from different networks.”).

<sup>3</sup> *High-Frequency Trading – HFT*, INVESTOPEDIA, <http://www.investopedia.com/terms/h/high-frequency-trading.asp> (last visited Feb. 20, 2017) (“[High Frequency Trading] uses mathematical models and algorithms to make decisions, taking human decision and interaction out of the equation. Decisions happen in milliseconds, and this could result in big market moves without reason . . . . An additional critique of [High Frequency Trading] is that it allows large companies to profit at the expense of the ‘little guys,’ or the institutional and retail investors.”).

<sup>4</sup> DOUGLAS RUSHKOFF, *THROWING ROCKS AT THE GOOGLE BUS 99* (2016).

<sup>5</sup> See Jonathan Chester, *Why Innovative Companies Are Using the Blockchain*, FORBES (Jan. 11, 2016, 1:07 PM), <http://www.forbes.com/sites/jonathanchester/2016/01/11/why-innovative-companies-are-using-the-blockchain/#1d5ad0e2d939> (“JP Morgan recently announced an aggressive move to Blockchain Technology, dedicating a significant portion of a \$9 billion technology investment.”).

notoriety in other areas. Sharing economy firms like Uber and Airbnb became some of the first companies to reconfigure their operations to better leverage the Internet to harness the aggregate power of the network's users to earn money more efficiently than even the largest taxi services and hotel chains.<sup>6</sup> Governments are even starting to get in on the action, largely at the suggestion of telecomm giants, by building out the Internet of Things and implementing big data analytics programs that will help cities achieve greater operating efficiency.<sup>7</sup>

As society continues to leverage technology to execute and manage increasingly complex tasks, regulations and processes that were crafted years ago to address simpler issues become less fit to regulate digital, more technologically advanced behaviors. This should not be a cause for panic, though, since it is something that has happened before.<sup>8</sup> Although the use of distributed networks has all the characteristics of a major disruption, one that would require a new type of regulations, policymakers appear intent on continuing with a business as usual attitude when attempting to regulate the sharing economy.

Much of the dialogue about these programs has been limited to a focus on the shared characteristics between sharing economy firms and their incumbent equivalent industries. With ridesharing firms like Uber, Zipcar, and Lyft, this focus is typically on the legal requirements of the taxi industry or other transportation industries. With homesharing firms like Airbnb, VRBO, and

<sup>6</sup> Biz Carson, *Report: Uber was on Track to do \$1.5 Billion in Revenue Last Year*, BUSINESS INSIDER (Jan. 11, 2016, 8:34 PM), <http://www.businessinsider.com/report-uber-15-billion-revenue-in-2015-2016-1> ("Here's a recap of the financials: Gross bookings: For FY 2014, Uber booked \$2.932 billion. In Q1 2015, it booked \$1.499 billion. In Q2 2015, it increased bookings to \$2.131 billion. Net revenue: For FY 2014, Uber netted \$495.3 million. In Q1 2015, it netted \$287.3 million. In Q2 2015, it netted \$375.9 million. Operating expenses: For FY 2014, Uber spent \$660.7 million on operations. In the first two quarters of 2015, it's already eclipsed that. In Q1 2015, it spent \$275 million and, in Q2, spent \$468.8 million. Losses: For FY 2014, its GAAP loss, which includes its stock based compensation, reached \$671.4 million. In Q1 of 2015, its GAAP loss totaled \$385.1 million. In Q2, losses increased to \$602.1 million."); Julie Weed, *Airbnb Grows to a Million Rooms, and Hotel Rivals Are Quiet, for Now*, N.Y. TIMES (May 11, 2015), [https://www.nytimes.com/2015/05/12/business/airbnb-grows-to-a-million-rooms-and-hotel-rivals-are-quiet-for-now.html?\\_r=0](https://www.nytimes.com/2015/05/12/business/airbnb-grows-to-a-million-rooms-and-hotel-rivals-are-quiet-for-now.html?_r=0) ("By any measure, Airbnb's growth has been stunning since the company was founded in 2008. It now has more than a million rooms available in homes, apartments and even former barns — more places to sleep than hotel giants like Marriott and Hilton.").

<sup>7</sup> See *Telecomms are Leading Smart Cities*, CRONOS GROUP (Feb. 5, 2015), <http://www.cronosgroup.net/telecom-smart-cities/#ptlink.fid=23516&isc=1&did=bookmark.f57e3a2d4cea5921d3a692df5b98bce17056a087&ctp=article> ("According to a Cisco study, the most important motivation for becoming a smart city is to improve the infrastructure, with the desire of being a better place to live. Nearly a third (31.6%) of the city officials identified it as the top reason. Another opportunity to bet for a Smart City is converting the metropolis more attractive for business and for economic development. Achieving these goals is also important because the city would create new short-term jobs, as well as enhance the prospects for long-term jobs.").

<sup>8</sup> See CARLOTA PEREZ, TECHNOLOGICAL REVOLUTIONS AND FINANCIAL CAPITAL 85 (2002).

Homeaway, this focus is typically on the legal requirements of the hotel industry, short-term rental requirements, or even ownership requirements. On a fundamental level, however, this approach is incomplete.

Under the theory of Computer Ethics,<sup>9</sup> the subsequent addition of a technological component to any first situation creates a unique situation; this causes the new situation to become less analogous to the first situation, and generates wholly new considerations that are based on the type of technology added.<sup>10</sup> Logically, this suggests that the regulatory characteristics of sharing economy firms can be broken down into those that are shared with their incumbent equivalent industries (i.e., hotels, taxis), and those that make them unique to their incumbent equivalent industries.

In the case of distributed networks, the storage of information and use of system rules to regulate behaviors subsequently creates a new set of legal issues that the incumbent industries do not have to deal with. Airbnb and Uber, for instance, are forced to address heightened concerns of informational privacy, self-regulation through the use of algorithms and by design, as well as operational concerns. And while this new set of issues, at this point, is more esoteric than the issues faced by traditionally regulated industries, if the sharing economy is to reach its full potential, regulations for the sharing economy must focus on adequately regulating *all* of the regulatory components, both non-technological and technological.

For regulators, the analysis is not limited to simply identifying these new issues, but extends to understanding the abilities of the technologies in place,

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<sup>9</sup> The concept of Computer Ethics is broad and often reinterprets different schools of philosophy. There is a general consensus, though, that adding a computer to a given situation will change the analytical framework through which the situation is evaluated. See *Computer and Information Ethics*, STANFORD ENCYCLOPEDIA OF PHILOSOPHY (Oct. 26, 2015), <http://plato.stanford.edu/entries/ethics-computer/> (“‘[C]omputer ethics’ has been used, in the past, in several different ways. For example, it has been used to refer to applications of traditional Western ethics theories like utilitarianism, Kantianism, or virtue ethics, to ethical cases that significantly involve computers and computer networks. ‘Computer ethics’ also has been used to refer to a kind of professional ethics in which computer professionals apply codes of ethics and standards of good practice within their profession. In addition, names such as ‘cyberethics’ and ‘Internet ethics’ have been used to refer to computer ethics issues associated with the Internet.”). For the purposes of this article, however, the term “Computer Ethics” and the concept of uniqueness are defined more narrowly by Walter Maner. See generally Walter Maner, *Is Computer Ethics Unique?*, 2 SCI. AND ENGINEERING ETHICS 137 (1996) (“By ‘unique’ I mean to refer to those ethical issues and problems that are characterized by the primary and essential involvement of computer technology, exploit some unique property of that property, and would not have arisen without the essential involvement of computing technology.”).

<sup>10</sup> Maner, *supra* note 9 (“My remaining remarks will suggest a rationale for computer ethics based on arguments and examples showing that one of the following is true: that certain ethical issues are so transformed by the use of computers that they deserve to be studied on their own, in their radically altered form, or that the involvement of computers in human conduct can create entirely new ethical issues, unique to computing, that do not surface in other areas.”).

reevaluating existing policy frameworks to find inefficiencies, and crafting new policies that have at least the same level of trust as existing regulations but that are much more efficient. In the context of the sharing economy, algorithmic regulation – the use of algorithms to monitor data, often metadata, to continually identify and fix problems – appears to be the answer.<sup>11</sup>

Instead of thinking about this shift to a more robust digital presence as a new experiment, the information sharing between local governments, individuals, and private companies ought to be seen as indicia that the rest of the world is finally catching up to the most up-to-date practices of the financial industry and a signal that the update of the Smart City's operating system is underway. By operationalizing data and information that already exists over the Internet, regulators will be able to leverage information produced by sharing economy firms to ensure that behavior in the sharing economy has a level of trust at least equal to that of their incumbent equivalent industries, while improving efficiency, incentivizing positive behavior in the market, and saving resources through more targeted enforcement against bad actors.<sup>12</sup> By adopting policies that are focused on the responsible sharing information with those that can make the best use of it, government offices can begin to shift from in-person, broad stroke compliance, to efficient, targeted, and automated compliance.

Rather than have essential institutional functions (such as credentialing, enrollment, authentication, authorization, regulatory oversight, auditing,

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<sup>11</sup> Algorithmic regulations refers to the general combination of data and system rules to create a system of micro directives that achieves a stated outcome with more precision, lower nominal cost, and can be scaled or applied to exponentially more outcomes. See Anthony J. Casey & Anthony Niblett, *The Death of Rules and Standards* 3 (U. of Chicago Pub. Law, Working Paper No. 550, 2015), <https://poseidon01.ssrn.com/delivery.php?ID=519021121111025082031094090095001026004062027018026066117023096007113125075090072067043099051062060010113068014086030093104127039071017081004079096068108115014068070040042049031069092117026085021115009065000009022110080120026030070108003107105069090064&EXT=pdf> (“In a world of rules and standards, a legislature hoping to optimize safety and travel time could enact a rule (a 60 miles-per-hour speed limit) or a standard (‘drive reasonably’). With micro-directives, however, the law looks quite different. The legislature merely states its goal. Machines then design the law as a vast catalog of context-specific rules to optimize that goal. From this catalog, a specific micro-directive is selected and communicated to a particular driver (perhaps on a dashboard display) as a precise speed for the specific conditions she faces. For example, a micro-directive might provide a speed limit of 51.2 miles per hour for a particular driver with twelve years of experience on a rainy Tuesday at 3:27 pm. The legislation remains constant; but the micro-directive updates as quickly as conditions change.”).

<sup>12</sup> Audun Josang et al., *A Survey of Trust and Reputation Systems for Online Service Provision*, SCIENCE DIRECT 618, 618 (July 5, 2006), <https://pdfs.semanticscholar.org/1d26/137926a698f02dad8a87df2953b3bf9a339c.pdf> (“Trust and reputation systems represent a significant trend in decision support for Internet mediated service provision. The basic idea is to let parties rate each other, for example after the completion of a transaction, and use the aggregated ratings about a given party to derive a trust or reputation score, which can assist other parties in deciding whether or not to transact with that party in the future. A natural side effect is that it also provides an incentive for good behaviour, and therefore tends to have a positive effect on market quality.”).

enforcement, dispute resolution, market making and clearing) be physical and human-dependent processes, it is now possible, indeed, even necessary to make such processes digital, algorithmic, autonomous, transparent and self-correcting.<sup>13</sup> This will not happen all at once, but local governments can easily start moving that direction, for instance, by using the same architecture as modern 311 reporting mechanisms, compliance for sharing economy firms could be managed through the creation of an API<sup>14</sup> that queries targeted sets of information to see if business licenses, or permits ought to be issued, suspended, or revoked.<sup>15</sup> On the front-end, this would be accomplished simply by requiring sharing economy hosts to register a business license or permit that mandates a limited amount of information sharing between the operators of the sharing economy platform in use and the governing jurisdiction. On the back-end, the information that is produced could be used to help identify correlations that lead to more informed policy, not only for the purposes of the sharing economy, but also to generate information that could help inform larger policy goals.

Then, in the case of platform-based ridesharing apps, the host's application information could be referenced alongside data the government already has, such as driver's license information, information about moving violations, information regarding criminal records or disabilities, etc. in order to help determine whether or not she poses a risk to public safety or should be permitted to drive. The data produced from these programs could relatively quickly be used to set the limits for the operation of such sharing economy programs in the jurisdiction being governed. Later on, as enough of this information accumulates, it could then be used to help regulators identify areas of congestion and implement more informed transportation policy. The same approach applies to homesharing as well. For platform-based homesharing apps, the host's application and rental history could be referenced alongside information from an open-data portal, such as code-violations, zoning districts, and 311 complaints, as well as externally stored information, including nuisance information, and restricted housing information. This information could then be used to help create more informed, representative zoning policies.

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<sup>13</sup> JOHN H. CLIPPINGER & DAVID BOLLIER, FROM BITCOIN TO BURNING MAN AND BEYOND: THE QUEST FOR IDENTITY AND AUTONOMY IN A DIGITAL SOCIETY xiii (2014).

<sup>14</sup> Vangie Beal, *API – Application Program Interface*, WEBOPEDIA, <http://www.webopedia.com/TERM/A/API.html> (last visited Feb. 20, 2017) (“Application program interface (API) is a set of routines, protocols, and tools for building software applications. An API specifies how software components should interact and APIs are used when programming graphical user interface (GUI) components. A good API makes it easier to develop a program by providing all the building blocks. A programmer then puts the blocks together.”).

<sup>15</sup> *Build Something Awesome with Open Data!*, SOCRATA, <https://dev.socrata.com> (last visited Feb. 20, 2017) (“The Socrata Open Data API allows you to programmatically access a wealth of open data resources from governments, non-profits, and NGOs around the world.”); WELCOME!, PLENAR.IO, <http://docs.plenar.io> (last visited Feb. 20, 2017) (“The Plenar.io API can be used to perform custom geospatial and temporal queries.”).

This article suggests that data centric compliance policies coupled with algorithmic regulations will be the most effective way to regulate the behavior on distributed networks because it not only leverages technology to improve the efficiency of governmental programs, but also helps improve civic trust, and most importantly, creates a way for local governments to begin to address more of the issues that will inevitably arise in the era of Big Data. The remainder of this paper will demonstrate why this is so.

Part I of this paper examines the history of disruption, explores the potential of distributed networks and identifies their core components, and uses Computer Ethics to break down the regulatory components<sup>16</sup> of both ridesharing and homesharing firms into more easily understandable behaviors in order to get an idea of what aspects of these platforms must be regulated.

Part II provides an overview of how the regulatory components of ridesharing and homesharing firms are being regulated by their nearest incumbent equivalent industry and suggests that algorithmic regulations are necessary for meaningfully regulating distributed networks, such as the sharing economy, because such regulations create a mechanism for local government to ensure the interests of all stakeholders can be monitored and addressed.

Finally, Part III identifies the needs for a system of algorithmic regulatory system, explains the concept of micro-directives, and prescribes steps through which such frameworks could be implemented for these sections of the sharing economy and beyond.

## **I. DISRUPTION, COMPUTER ETHICS, & THE POTENTIAL OF DISTRIBUTED NETWORKS**

Distributed networks have disrupted the economy by leveraging technology that is capable of harnessing the aggregate power of the crowd to make use of existing capital and achieve more than any company acting without the support of its users is capable of doing.<sup>17</sup> However, now that these networks are entering the physical world via the sharing economy movement, specifically in the context of ridesharing and homesharing, local governments are being forced to create regulations that ensure the safety of their citizens who are a part of these networks. This is not exactly straightforward, but is a lot less daunting than it sounds:

Insulated from regulators by their technological origins, sharing economy apps, at their core,

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<sup>16</sup> Regulatory components, as used in this paper, refers to those functions of a given behavior, which have been or are in need of regulation. Certain regulations, like petty theft, are described broadly and are going to have fewer regulatory components (namely, the theft) than something more complex such as identity theft, which touches on theft at a more specific level and refers to the theft of someone's identity theft. See *infra* Part II.

<sup>17</sup> See TECHOPEDIA, *supra* note 2.



are apps—beautiful ones but ultimately very simple ones—that make their money by encouraging people to engage in freelance versions of previously regulated industries . . . [a]nd that’s why local cabbies and hoteliers are up in arms. They have trained, invested, and conformed to numerous regulations to do what they do.<sup>18</sup>

And now, with the creation of a platform by a small group of people, their careers have been completely disrupted. However, these large scale disruptions have, in the past, led to an economy that not only functions more efficiently and creates a cadre of ancillary jobs building out the infrastructure that enables the disruption to operate thrive, synergy, and helps provide displaced workers with new opportunities.<sup>19</sup>

This cycle of regulating disruptive technologies is not new. In fact, it is something that follows every technological revolution in a fairly predictable manner. The next section explores the history of the disruption cycle, analyzes the core attributes that have made distributed networks so successful, and uses the theory of computer ethics to break down the basic behaviors of sharing economy apps into more easily understandable regulatory components in order to understand what a model policy for regulating ridesharing and homesharing firms might look like.

### A. The Ebb and Flow of Disruption

Following the creation of the Internet, the economy has been on a path common to all technologies that produce economic disruptions – the steam engine, the automobile, the television, etc. According to Carlota Perez, a researcher in techno-economic paradigm shifts, economies respond to technological revolution or disruption with the same five phases – Maturity, Irruption, Frenzy, Crash, and Synergy.<sup>20</sup>

In the first phase, maturity, established companies from the previous technological revolution plant the seeds for a new paradigm. Electric companies invested in the first radio and television companies; Xerox, an office machines company,

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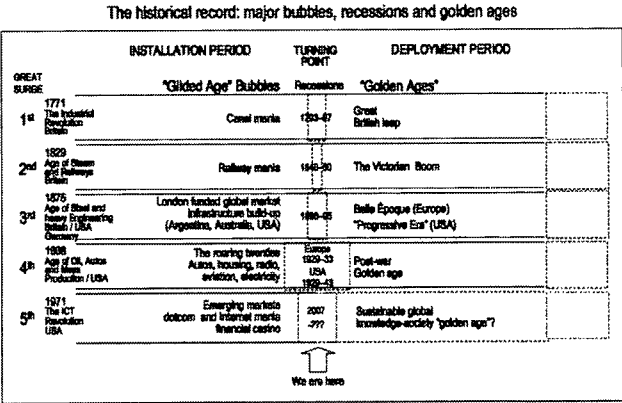
<sup>18</sup> See RUSHKOFF, *supra* note 4, at 47.

<sup>19</sup> *Id.* at 13-16. While technological disruption, if harnessed properly, has the effect of improving the bottom line of shareholders and corporations, the move toward technology often has the unfortunate side effect of automating more work, reducing the number of people required to perform a task, and displacing people.

<sup>20</sup> *Id.* at 98-99.

invested in research for the first computer user interfaces; Kodak developed the first digital cameras . . . The next phase, called irruption, is the technological breakthrough itself, and the disruption of the previous technology as well as the industry that built up around it. The automobile disrupts the horse trade, TV disrupts radio, the Internet disrupts TV, and so on. Next comes frenzy, when we see the formation of speculative bubbles, increasing unemployment, and the beginning of unrest. Then the stock market bubble pops. Perez sees that as the turning point, when wealthy disparity between winners and losers reaches an extreme, civil unrest reaches a peak, and government is forced to act through regulation. For instance, the irruption and frenzy phases of automobiles and mass-produced appliances led to the Roaring Twenties and eventually the 1929 crash. So government and industry begrudgingly supported the New Deal and the welfare state. Only then followed the more stable, regulated period—a golden age—where the middle class actually got to benefit from the industrial technologies. This period, what Perez calls synergy, leads to a wider assortment of industries that support the original technological revolution but in ways that give more people access.<sup>21</sup>

Looking at disruption success stories such as the automobile, the radio, and the Internet, it is clear that before synergy can take place there needs to not only be the creation of the technology, but also the creation of infrastructure to support the technology, the creation of clear standards to help people understand how to use the technology, and a mechanism through which the standards can be enforced.



<sup>21</sup> *Id.*

Figure 1: A survey of Technological Disruption Throughout History<sup>22</sup>

This framework helps pinpoint the position in the current disruption cycle at somewhere between frenzy and synergy. The high frequency trading bubble of 2007 has passed, unemployment is steadily going up, but on the government side of things, there is a reluctance to embrace new arrangements it has only been since the creation of implementation of Open Data programs that local governments have attempted to augment or iterate traditional arrangements for solving communal problems by leveraging the power of their distributed communities.<sup>23</sup> And while these old arrangements and processes may have once been the most efficient, or may even have been absolutely necessary for their incumbent production systems, given the technologies available to them, their extension under new technological conditions may undermine, rather than improve the capacity of society to produce and provision goods, resources, or functionalities that are the object of policy analysis.<sup>24</sup>

Throughout history, from the automobile to the television to the Internet, local governments eventually, after a certain period of time, harness the utility of each successful, new disruptions to improve their day-to-day processes. It should then be clear that in order to get the most from the Internet of Things and web 2.0, the government will need a subsequent update to its operating system – the infrastructure that allows us to monitor the behavior of the network – before meaningful regulation of the new disruption can occur.

### B. The Potential of Distributed Networks

One of the reasons distributed networks have become so popular is because they leverage the Internet to make use of idle capacity and provide an increased sense of community via the use of algorithms and rules that are coded into the system that manage the permitted uses of the network.<sup>25</sup> Applied to the

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<sup>22</sup> See Perez, *supra* note 1, at 3.

<sup>23</sup> See, e.g., Michael Chui et al., *Generating Economic Value through Open Data*, in BEYOND TRANSPARENCY 167 (Brett Goldstein ed. 2013). The shift toward opening up data and information is notable for improving both the internal efficiency of local governments that rely on such information on a daily basis, as well as external trust throughout the community by providing people with information, as it is produced so that civic tech groups (such as Code for America, Legal Hackers, and others) can use the information to solve problems that have plagued communities for years. Tim O'Reilly, *Gov't as a Platform*, in OPEN GOVERNMENT 11-40 (Daniel Lathrop & Laurel Ruma, eds. 2010).

<sup>24</sup> Yochai Benkler, *Sharing Nicely: On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production*, 114 YALE L.J. 273, 331 (2004).

<sup>25</sup> Daniel E. Rauch & David Schleicher, *Like Uber, but for Local Government Law: The Future of Local Regulation of the Sharing Economy*, 76 OHIO ST. L.J. 901, 910-11 ("Improved data storage and analytics make the cost of matching buyers and sellers lower than ever. And with the mass spread of smartphones, people can access web-based sharing services anywhere, any time.

sharing economy, this means that people now are capable of sharing resources with one another, affording more access to people within the network; in the physical realm, this means people in a network have more access to physical goods and services. Now, instead of letting cars and spare rooms idly collect dust and depreciate in value, they can be used by those in need and the costs of owning them can be offset, people who need a car can use them, and the value of these already-existing products can create more value.<sup>26</sup> While these networks have gained notoriety following the advent of social media, it has only been since the financial crash of 2007 and the following successes of Uber (founded in 2009)<sup>27</sup> and Airbnb (founded in 2008)<sup>28</sup> that they have truly become accepted as a tool that can be used to do things that would otherwise be impossible. This history, would appear to indicate that it is only a matter of time before these types of programs become an increasingly important tool for local government offices that are short on resources.

However, perhaps the most notable example of the technological potential of these types of networks and their potential outside of commercial activities can be found in the case of SETI@home, a supercomputer running on the collective power of a distributed network.<sup>29</sup> In his book, *The Wealth of Networks*, Yochai Benkler explains that SETI@home operates by requiring individuals to download a small screensaver that uses algorithms to run a series of calculations and mathematical functions that it sends to the main site whenever an individual's personal computer goes idle.<sup>30</sup> "As of the middle of 2004, the project had harnessed the computers of 4.5 million users, allowing it to run computations at speeds greater than those achieved by the fastest supercomputers in the world that private firms, using full-time engineers, developed for the largest and best-funded labs in the world."<sup>31</sup> Now, distributed networks using a central platform account for the early successes of the questionably legal Napster, Morpheus, and more recently BitTorrent, as well as the more widely accepted uses of Netflix, Etsy, and Ebay.

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Likewise, widespread GPS tracking allows for both better customer service (Uber knows where to meet you) and more careful monitoring (Citi Bike, New York's bike-share service, prevents theft by tracking bikes). And as scholars like Lior Strahelivitz have found with respect to eBay auctions, digital reputation "ratings" can form a functional substitute for personal trust, making more, and more credible, transactions possible – if a Lyft driver has 800 "five star" reviews, a rider may be willing to board her car even if she lacks classic indicia of trustworthiness, like a business license.") (citation omitted).

<sup>26</sup> *Id.* at 917. ("The average power drill is used only 13 minutes a year, spending the other 525,587 on the shelf. The average car is used only an hour a day, lying idle for 23. There are almost three parking spaces per vehicle in the United States, leaving huge amounts of land unused. And at any given time, millions of unemployed workers are idle, eager to trade labor for pay.")

<sup>27</sup> *Our Trip History*, UBER, <https://www.uber.com/our-story/> (last visited Feb. 20, 2017).

<sup>28</sup> *About Us*, AIRBNB, <https://www.airbnb.com/about/about-us> (last visited Feb. 20, 2017).

<sup>29</sup> YOCHAI BENKLER, *THE WEALTH OF NETWORKS: HOW SOCIAL PRODUCTION TRANSFORMS MARKETS AND FREEDOM* 81-82 (2006).

<sup>30</sup> *Id.* at 82.

<sup>31</sup> *Id.*

The software used by SETI@home, Airbnb, and Uber, have all been successful by their own respective measures and help identify what it takes to be a success in the digital economy, and helps inform the discussion about how the behaviors of the sharing economy could be regulated. These programs are designed with desired outcomes in mind. Their protocols are set up to meet the desired outcome. Data is collected to determine whether or not the desired outcome is being met. And the protocols are iterated until and as long as the desired outcome is being met.<sup>32</sup> The same can be said about the protocols of other successful distributed networks, including Netflix, Etsy, and Ebay.

Unfortunately, however, this is not how local policy works. And while programs like Airbnb and Uber continue to cause problems for regulators, it may be time for regulators to take a page out of the technologists' playbook and embrace the latest disruption. The next subpart of this section uses the theory of computer ethics to help provide a greater understanding of all of the behaviors of the sharing economy in need of regulation and provides an overview of what forms those regulations might take.

### C. A Framework for Understanding the Challenges of Disruption via Computer Ethics

The challenge for regulators of the sharing economy is that these platform-based apps are taking industries comprised of almost entirely non-technological functions, giving them a new operating system to improve the delivery of these services through the use of distributed networks, and creating a new set of bugs that need to be figured out. Specifically, many policies seek to regulate solely the non-technological functions of the sharing economy in the same way as their incumbent equivalent industry. And policymakers have shown over the years that they do know how to regulate the non-technological behaviors of the sharing economy, but with these new circumstances, some of these non-technological functions might be better suited for changes that compliment the abilities of distributed networks. Further, the issue of what to do about the technological components of sharing economies also remains. To get a better understanding of how all of these issues are impacted by each other, it is helpful to look at the scholarship of computer ethics.

In 1995, Walter Maner posited that adding new technology to certain situations creates wholly unique situations that do not fit neatly within the existing paradigms intended to govern them.<sup>33</sup> Under Maner's theory, in order for

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<sup>32</sup> See, e.g., Molly Cohen & Arun Sundararajan, *Self-Regulation and Innovation in the Peer-to-Peer Sharing Economy*, 82 U. CHI L. REV. DIALOGUE 116, 116-17 (2015), [https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/Dialogue/Sundararajan\\_Cohen\\_Dialogue.pdf](https://lawreview.uchicago.edu/sites/lawreview.uchicago.edu/files/uploads/Dialogue/Sundararajan_Cohen_Dialogue.pdf). In the sharing economy literature, this step is often referred to as self regulation.

<sup>33</sup> Maner, *supra* note 9, at 137 ("The involvement of computers in human conduct can create

one of these unique scenarios to exist, three criteria must be met: the situation must 1) be characterized by the primary and essential involvement of computer technology, 2) the situation must exploit some unique property of that technology, and 3) the situation would not have arisen without the primary and essential involvement of computing technology.<sup>34</sup> Here, with the sharing economy, it is clear that these criteria are met: the problems with the sharing economy are characterized by the primary and essential involvement of computer technology – in this case, the use of a distributed network; the situation exploits a unique property of that technology – in this case, the ability of the network to connect people with assets to others that need to use those assets and the self-regulation of the network through system rules; and, the situation would not have arisen without the primary and essential involvement of computing technology – this is clear here because these services would otherwise fall into the traditionally regulated categories. Maner, goes on to describe eight common examples of uniqueness that fundamentally alter a situation to the point where new analogies are necessary in order to understand them; there is no satisfactory non-computable analog when a new issue is unique ability to store information; uniquely altered so that to do any activity that can be characterized in terms of inputs, outputs, and connecting logical operations; uniquely complex; uniquely fast; uniquely cheap; uniquely cloned; uniquely discrete; and, uniquely coded.<sup>35</sup> Again, all of these considerations apply to sharing economies.

So, at least on a theoretical level, it is indisputable that the ability to use protocols to regulate for desired outcomes makes sharing economy programs unique from their incumbent equivalent industries. It then stands to reason that in addition to the regulations created for their incumbent equivalents, sharing economy firms should also have regulations that address all of the technological issues facing sharing economy firms, not just the ones for which there are directly comparable regulations. A roadmap for regulating disruption logically would seem to start with an analysis of how incumbent equivalent industries are regulated. From there, however, it is absolutely imperative that the technological abilities of the disruption be understood, whether this is done with the Maner's schema or through some other calculus is irrelevant. After the technology is understood, it is helpful to break down the functions of the disruptive technology into their most comparable counterparts. In analyzing what this says about ridesharing and homesharing firms, it is clear that their use of distributed networks provides them with two basic types of regulatory components: non-technological regulatory components (the pieces of the regulation that most resemble existing regulations that do not have the added technological issues)

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entirely new ethical issues, unique to computing, that do not surface in other areas.”).

<sup>34</sup> *Id.* at 141 (“By ‘unique’ I mean to refer to those ethical issues and problems that are characterized by the primary and essential involvement of computer technology, exploit some property of that technology, and would not have arisen without the essential involvement of computing technology.”).

<sup>35</sup> *See id.*

and technological regulatory components (those enabled by the subsequent addition of a technological platform).

On the non-technological side, regulators of both ridesharing firms and homesharing firms will need to come up with a legal framework that addresses the familiar characteristics associated with the taxi and hotel industries, such as licensing, zoning, insurance, anti-competitive behavior, and standards for enforcement and verification.<sup>36</sup> On the technological side, regulators will also need to find a suitable analog that can guide them in addressing issues relating to privacy, security, and enforcement.<sup>37</sup> With regard to the technological regulatory components of the sharing economy, the most readily accessible analogs to these programs include open data platforms, smart city programs, and their corresponding authorities.<sup>38</sup>

After identifying all of the components of a new technology disrupting transactions in an existing vector (i.e., homesharing firms and hotel industry, ridesharing firms and taxi industry, etc.) and understanding how each of those components are regulated, the next step for regulators will be to determine what policy goals they seek to achieve and how they can regulate all of the components in the most responsible method for its citizens. And while this framework for evaluation can be directly helpful for regulators grappling with how to regulate sharing economy firms, if used properly, this methodology for evaluating disruptive technologies can be applied to test the efficacy of policies for increasingly advanced technologies well into the future. The next section will seek to gain a basic idea of how all of the separate components of Uber and Airbnb are being regulated by their nearest incumbent equivalent industry in order to shed some light on what model regulations would look like for ridesharing and homesharing firms.

## II. REGULATORY COMPONENTS OF SHARING ECONOMIES

Technology makes possible things that would otherwise be impossible. Think back to the genesis of the United States. At that time, it was impossible to travel across the country in a day. Now, with advances in transportation industries, such travel happens on a daily basis. Advances in technology now mean that money, time, and effort all can be saved by operationalizing information. Open data portals are the early indicators that show releasing information to the public, governments are enabling the citizens to use

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<sup>36</sup> See *infra* Section III.A.

<sup>37</sup> See *infra* Section III.B.

<sup>38</sup> The technological regulatory components for sharing economies, among other things, include understanding the concept of self-regulation and private ordering as it has shaped the regulatory landscape of the Internet, the concept of privacy because there is not the same digital footprint with a taxi as there is with Uber, and informational security. Each of these sections will identify the most easily accessible regulatory analogs for the technological regulatory components.

information and technology to solve some of their most pressing issues.<sup>39</sup> This is why the shift from regulating behavior that primarily happens in person, toward regulation across a distributed network, by algorithm, makes sense.

In analyzing the policies for both platform-based ridesharing and homesharing apps, the following schema can be used to determine which policies for various platform-based sharing economy apps are complete, and if they are not complete, this framework can help point to what the apps are missing. In looking at the ways in which policymakers have attempted to regulate the behaviors of disruption, four types of regulations emerge:

- Type I regulations exist where jurisdictions explicitly incorporate the new disruption using the same standards under existing regulatory frameworks for incumbent equivalent industries.
- Type II regulations exist where jurisdictions explicitly incorporate the disruption under existing regulations and hold them to new and different standards.
- Type III regulations exist where jurisdictions have failed to regulate the disruption at all, which results in an unclear legal status for firms operating in this type of jurisdiction.<sup>40</sup>
- Finally, Type IV regulations exist when a jurisdiction completely bans the disruptive practices.<sup>41</sup>

The next two subsections provide an overview of the components that make up ridesharing and homesharing platforms and surveys how they are being dealt with across the country. Section II.A reviews the more traditional, non-technological components, the components shared by platform-based ridesharing and homesharing apps and their respective incumbent equivalent industries.

<sup>39</sup> See generally BEYOND TRANSPARENCY, *supra* note 23.

<sup>40</sup> Sofia Ranchordás, *Does Sharing Mean Caring? Regulating Innovation in the Sharing Economy*, 16 MINN. J.L. SCI. & TECH. 413, 422-23 (2015) Ranchordás suggests three options for evaluating whether or not an innovation fits into an existing framework, noting “The regulation of innovation in the sharing economy is particularly complex because it is unclear whether these practices fit within existing legal frameworks that apply to equivalent commercial practices and should play by the same rules, whether these practices should remain to a great extent unregulated, or whether these practices should benefit from less demanding regulations.” *Id.* Our paper draws from Ranchordás’ schema, but to help with policy analysis delineate further between regulatory frameworks.

<sup>41</sup> Katie Lapotin, *No More Uber and Lyft in Kansas as New Restrictive Ride-Sharing Law Goes Into Effect*, INDEPENDENT J. REVIEW (Mar. 2015), <http://ijr.com/2015/05/313783-uber-packs-kansas-states-new-restrictive-ride-sharing-law-goes-effect/> (“Since Uber Launched in 2009, government agencies worldwide have tried to restrict, or block, the ride-sharing service and competitors, like Lyft and Sidecar. In the United States – Eugene, Oregon and the State of Nevada have successfully banned Uber from servicing customers. Several other cities have suspended service . . .”). But see Bryan Lowry, *Uber is Back in Kansas After Gov. Sam Brownback Signs Bill Into Law*, KANSAS CITY STAR (May 22, 2015), <http://www.kansascity.com/news/politics-government/article21709980.html>.



Section II.B looks at how regulation takes place for distributed networks, identifies some of the most important regulatory components for distributed networks, and then analyzes the legal requirements that have emerged for various technological regulatory components.

### A. Non-Technological Regulatory Components

Regulation of the sharing economy and, more generally, distributed networks in these early stages has proven to be challenging. Distributed networks have disrupted the regulatory frameworks associated with the taxicab and hotel industries, often creating a legal grey area.<sup>42</sup> To help bring clarity to this conundrum, regulators face the challenge of balancing safety and competition while promoting innovation and efficiency.<sup>43</sup> Achieving this balance requires regulating the more traditional, non-technological behaviors such as licensing, zoning, insurance, anti-competitive behavior, and creating standards for enforcement and verification. Thus, the issue becomes how could state and local regulators address the more traditional concerns that have brought about justifiable regulations for the ridesharing and homesharing sectors of the economy without unnecessarily restraining competition or hindering the innovative practices that have allowed sharing economies to thrive? Regulators must keep in mind that as the sharing economy moves forward, strict regulations that were once justified on the grounds of both consumer protection and ensuring processes have been executed properly may now be an obsolete means of regulation, in light of the development and proliferation of distributed networks.

Incumbents have argued that because they still face these strict regulatory burdens, new entrants should be held to the same standards.<sup>44</sup> And if these applications were not already doing this using an app to perform some of the same exact regulatory functions, this would certainly be the case because of the incredible amount of risk it creates for consumers and for economic growth.<sup>45</sup>

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<sup>42</sup> Daniel Fisher, *The Big Question with Uber, Airbnb and the Rest of the 'Sharing Economy': Who to Sue?*, FORBES (Mar. 25, 2015), <http://www.forbes.com/sites/danielfisher/2015/03/25/the-big-question-with-uber-airbnb-and-the-rest-of-the-sharing-economy-who-to-sue/#5e3b63297256>.

<sup>43</sup> Ranchordás, *supra* note 40, at 423. The spotlight here is on the challenges that characterize innovation and the balance between the need to encourage innovation on the one hand and, on the other, limit the uncertainty and risks attached to the sharing economy.

<sup>44</sup> See Rauch & Schleicher, *supra* note 25, at 904 ("The taxi industry claims Uber, the leading "ride sharing" firm, enjoys an unfair advantage because it need not purchase medallions or comply with consumer protection or pricing regulations. Hotels and neighborhood groups argue Airbnb, the leading "house sharing" firm, skirts taxes, violates lease terms, uses residentially-zoned property for commercial purposes, and lacks safeguards for guests and operators.") (citation omitted).

<sup>45</sup> Richard A. Epstein, *Can Technological Innovation Survive Government Regulation?*, 36 HARV. J.L. & PUB. POL'Y 87, 88 (2013) ("Even in purely competitive markets, a system of property rights must be established. Systems of recordation and a statute of frauds are needed to make the system operate properly, and taxes and other income streams are required to support the public activities

For example, it makes no sense to permit a driver hailed through a digital platform – who has not passed a background inspection, has no digital reputation, or other indicia of trustworthiness – to drive people around as part of his job. But, on the other hand, as it becomes easier to share information via the use of network, it does not make sense for the driver to have to undergo multiple background checks, with the same information for both the platform and the government in order to do one job. This type of administrative check made more sense and was probably the most economical way to do things when the systems for information sharing were limited to conversations on the telephone or in person. However, the impact of the Internet and, subsequently, the rise of distributed networks has also affected areas such as insurance coverage, vehicle or home inspections, and anti-competitive behavior.

Left unaddressed, private ordering could create a system that could pose a risk to riders if there is not a meaningful way for the driver to ensure that she did in fact go through a background check, carry insurance, or subject her vehicle to regular inspections. Moving forward, as the standard of efficiency progresses, if regulations are crafted without leveraging any of the benefits offered by the sharing economy, transactions will be unable to fulfill their potential and create additional liabilities for those involved. For example, some of the broad regulations that adopt a one-size-fits-all attitude toward the range of behaviors across the spectrum of transactions possible in the sharing economy are lazy because they treat sharing in its most altruistic form as being the same as *laissez-faire* capitalism in its most selfish form. With the proliferation of data producing applications, many of these things can be regulated more efficiently by taking advantage of the technology in place.

It would be foolish to try and suggest that there is a way to solve all the possible problems of the sharing economy with a single policy,<sup>46</sup> but to start to address the unique challenges posed by distributed networks, there needs to first be a framework for analyzing policy tensions. The next section examines some of the boundaries for what a model policy might include. This section outlines how regulators have attempted to bridge the disparity between the operational needs of the sharing economy and the incumbent industries through the regulation of the regulatory components for both ridesharing and homesharing firms. The next sub-section specifically focuses on the non-technological behaviors of sharing economy firms that have been frequently regulated including: a licensing component (with insurance), price controls and anti-competitive behavior,

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that are needed to make the system work. The belief that a disembodied free market, one which does not rest upon government force, will function effectively is certainly a mistake of epic proportions, if not an anarchist myth.”).

<sup>46</sup> Ranchordás, *supra* note 40, at 422-23 (“The regulation of innovation in the sharing economy is particularly complex because it is unclear whether these practices fit within existing legal frameworks that apply to equivalent commercial practices and should play by the same rules, whether these practices should remain to a great extent unregulated, or whether these practices should benefit from less demanding regulations”).

service area restrictions and zoning, marketing limitations, and technology standards.

### 1. Licensing

Cities and states frequently require both ridesharing firms and their drivers to go through a formal process in order to obtain an operating license. Though many jurisdictions have become more accepting of ridesharing and homesharing, by either incorporating these behaviors under existing regulatory frameworks or creating entirely new regulatory frameworks, some regulators have either ignored the problem completely or have refused to listen to it.

#### *Ridesharing*

Before obtaining a license to operate as a for-hire vehicle, applicants usually undergo some sort of background check.<sup>47</sup> Cities that subject ridesharing firms to Type I regulation run the drivers of TNCs through the same strict criminal background checks as required by the taxi industry.<sup>48</sup> In Type II jurisdictions, background check procedures are different for incumbents and ridesharing firms. In Type I jurisdictions, the applicant is responsible for paying the processing fees for a fingerprint background check.<sup>49</sup> In a Type II jurisdictions, the service provider – Uber, Lyft, etc. – is required to pay for the background check fee<sup>50</sup> whereas a ridesharing firm pays for the third party background check of the ride sharing applicant.<sup>51</sup> For Type II jurisdictions, this typically results in more expensive and thorough background check processes for the incumbent.<sup>52</sup> The process for sharing economy firms is often perceived by incumbent industries as less intrusive, less onerous, and more efficient than the process for the incumbents, who view the disparity as unfair.<sup>53</sup> Criminal

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<sup>47</sup> See Matthew W. Daus & Pasqualino Russo, *One Standard For All: Criminal Background Checks for Taxicab, For-Hire, and Transportation Network Company (TNC) Drivers*, WHO'S DRIVING YOU? 1, 2 (May 2015), [http://www.whosdrivingyou.org/wp-content/uploads/2015/06/background\\_check\\_report.pdf](http://www.whosdrivingyou.org/wp-content/uploads/2015/06/background_check_report.pdf).

<sup>48</sup> See *id.* New York requires that all drivers (taxis and ridesharing) be fingerprinted for the purpose of obtaining criminal history records from New York State Division of Criminal Justice, the City then transmits fingerprints to the New York State Department which accesses the FBI's more intensive background check process. *Id.* at 25. Houston, Texas also subjects all for-hire drivers, whether taxicabs or ridesharing drivers, to the same requirements. *Id.* at 27.

<sup>49</sup> See *id.* at 26 (New York applicants are required to pay the \$75 processing fee). Houston applicants are also required to cover the cost of any fees. *Id.* at 30.

<sup>50</sup> See *id.* at 44.

<sup>51</sup> *Id.* at 48.

<sup>52</sup> A statute in one of these jurisdictions might contain the following language, "A person shall obtain a criminal history record check pursuant to the procedures placed on the incumbents or through a privately administered national criminal history record check." See COLO. REV. STAT. § 40-10.1-605(o)(3)(a)(I).

<sup>53</sup> California regulates incumbents and ridesharing applicants differently when it comes to

background checks run by the state are often more intrusive, so the argument is made that ridesharing firms are not adequately protecting the public.<sup>54</sup> This is also the case in Type III jurisdictions that have not yet decided to attempt to meaningfully regulate ridesharing firms, results in the ridesharing firms conducting their own background checks, usually through the same third party providers who use the less strict name check. However, in some Type II jurisdictions that have allowed ridesharing firms to conduct background checks through a non-governmental third party, they have set standards for those third party background check providers, which include a heightened requirement for fingerprint scanning.<sup>55</sup> The background check process has received a lot of attention, and more Type II jurisdictions are considering a move toward a system where TNC drivers will have to submit to the stricter, fingerprint background check process.<sup>56</sup>

### *Home sharing*

Many cities require owners or operators of short-term rental properties to obtain a license, special use permit, or register with the applicable city authorities before renting out their properties. As it is with ridesharing firms, Type III jurisdictions that regulate homesharing have nothing in place to specifically address this issue for homesharing.<sup>57</sup> Most regulations, including Type III jurisdictions, do typically have regulations for the incumbent industries such as

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background checks. See Daus & Russo, *supra* note 46, at 35. Ridesharing applicants are not required to be fingerprinted but are subject to submitting a social security number, register in the EPN program and submit a one-year driving history report. *Id.*

<sup>54</sup> See *id.* at 70-72 (showing examples of alleged criminal or inappropriate conduct by ride sharing drivers with some prior criminal, driving, or licensure history that may have led to such drivers not qualifying as taxi drivers if the prior history has been found as a part of a background check).

<sup>55</sup> Virginia's regulation on ridesharing requires that before authorizing a driver to act, the transportation network company must obtain a national criminal history records check of the applicant, every two years. The National Association of Professional Background Screeners must accredit the background check provider or be approved by the Department. VA. CODE ANN. § 46.2-2099.49(B)(1).

<sup>56</sup> William Scalzi, *Md. Uber and Lyft Drivers Should be Fingerprinted*, THE BALTIMORE SUN (Dec. 20, 2016), <http://www.baltimoresun.com/news/opinion/oped/bs-ed-uber-fingerprinting-20161220-story.html>. "The question is: Who wouldn't sign up with Uber because of fingerprinting? Fingerprint background checks deter both criminals and criminal activity. Law enforcement experts state that when individuals undergo fingerprint-based criminal background checks, the process creates a significant deterrent to future criminal activity." *Id.* The City of Boston's Police Chiefs, in a letter to state legislative leaders, urged, "There is no dispute that biometrics, like fingerprints, serve as the best way to identify any individual . . ." Brian MacQuarrie, *Mass. Police Chiefs Urge Fingerprinting for Uber Drivers*, BOSTON GLOBE (Jan. 6, 2016), <https://www.bostonglobe.com/metro/2016/01/06/mass-police-chiefs-urge-fingerprinting-for-uber-drivers/Qtvp15kKODXOY588ADDubO/story.html>. Los Angeles Mayor, Eric Garcetti, wrote a letter to the California Public Utilities Commission, urging the initiation of a pilot program to fingerprint ridesharing drivers. See Letter to California Public Utilities Commission, *Who's Driving You?* (Mar. 16, 2016), <http://www.whosdrivingyou.org/wp-content/uploads/2016/03/20160315-Fingerprinting-Pilot-Program-Letter.pdf>.

<sup>57</sup> See *supra* Part III.

hotels, bed and breakfast establishments, boarding houses, carriage houses, etc.<sup>58</sup> Type I and II jurisdictions vary on the requirements that a homeowner or operator must meet to be approved for a permit or license, as well as the restrictions imposed on short-term rental permit or license holders after being approved.

Most type I and II jurisdictions have settled on a length restriction of 30 days or less, consecutively for the renting of a non-commercial property.<sup>59</sup> In cases where a city requires an operator to obtain a license, it is typically some form of general business license because when an owner charges a rental fee for use of their home, they are essentially turning their home into a business.<sup>60</sup> Other cities have taken the approach to require homeowners to obtain a special use permit,<sup>61</sup> which operators would have to reapply for annually. Additionally, most cities do not differentiate permit or licenses types based on the aggregate amount of days an operator short-term rents their property throughout the year or the type of property being rented. Rather local governments have just imposed a flat fee for all short-term rental permits or licenses. This failure to distinguish between the type of operators and the property being rented creates a serious issue when attempting to regulate zoning restrictions, nuisance violations, housing and safety codes, etc.

Type I and II jurisdictions have attempted to classify short-term renters based on the type of property they own in order to determine the proper business license. Two cities have set up the same classification system as follows: Type-1 is an owner occupied (single-family, multifamily or duplex) renting the entire dwelling to a single party of individuals, or if only part of the dwelling then the dwelling must include at least one sleeping room with a bathroom, and the owner is generally present during the rental. Type-2 are non-owner occupied (single-family or duplexes), rented to a single party of individuals. Type-3 are non-owner occupied multifamily properties (multifamily apartments and condominiums) that include rental to a single party of individuals.<sup>62</sup>

## 2. Service Area Restrictions

Zoning and service area restrictions are another regulatory component of the more popular sharing economy practices that policymakers have grappled with as they attempt to reduce the negative outcomes produced by both

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<sup>58</sup> See e.g., KANSAS CITY, MO. CODE OF ORDINANCES 40-111 & 88-305.

<sup>59</sup> SANTA MONICA, CA., MUN. CODE § 6.20.010).

<sup>60</sup> AUSTIN, TX., CITY CODE § 25-2-791.

<sup>61</sup> PORTLAND, OR., ZONING CODE § 33.207.040.

<sup>62</sup> See *Short Term Rental Property*, NASHVILLE.GOV, <http://www.nashville.gov/Codes-Administration/Construction-and-Permits/Short-Term-Rentals.aspx> (last visited Feb. 20, 2017); *City of Austin Vacation Rental Licensing Program*, AUSTINTEXAS.GOV (Feb. 17, 2015), [https://www.austintexas.gov/sites/default/files/files/Code\\_Compliance/STRs/STR\\_FAQ\\_Packet\\_2-20-2015.pdf](https://www.austintexas.gov/sites/default/files/files/Code_Compliance/STRs/STR_FAQ_Packet_2-20-2015.pdf).

traditionally regulated industries and sharing economy firms. Zoning in the context of ridesharing is not a major issue, and the only real problems arise when jurisdictions place service area restrictions on ridesharing firms near airports; however this type of action is discussed further in the anti-competition section below.<sup>63</sup> Zoning becomes a more important issue in the context of home sharing because critics of the concerns that the increase in short-term rentals will ultimately increase property values of homes and eliminate affordable housing and because it is a well-settled principle of modern zoning that a city has an interest in upholding the values of their master-plan.<sup>64</sup> The response to this argument caused Type I and II jurisdictions to create zoning laws that control the problem. Type III jurisdictions that have not accepted home sharing use zoning to ban home sharing.

### *Ridesharing*

Implementing a medallion system is the primary way regulators limited ridesharing. In most major cities, taxis are governed by New Deal-era medallion systems, with government setting the maximum number of cabs allowed to operate and banning new competitors from freely entering the market.<sup>65</sup> Most often, these types of service area restrictions are implemented in order to reduce congestion or in accordance with a city's comprehensive zoning plan. In jurisdictions with these types of restrictions, it is illegal to operate a taxi or a for hire vehicle without a medallion. The number of medallions is tightly controlled and determined by politics rather than market forces. The only way for a new company to operate is if an existing medallion holder decides to sell his medallion. Because the incumbent industry faces competition, medallions will not be sold to ride sharing companies.

Due to the limited supply of medallions, they are very expensive and most ridesharing drivers do not work enough to cover the high cost of leasing a medallion. Taxi drivers thus have to make a certain amount of money each day to cover their medallion-leasing fee before they start profiting. Ridesharing however

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<sup>63</sup> Incumbent industries in many jurisdictions have challenged Uber's ability to operate at local airports. See *TNC and Airport Updates*, AGTA, <http://agtaweb.org/TNCInformation> (last visited Feb. 20, 2017) [hereinafter AGTA]. The most recent challenge to Uber operating in Airports has been in Palm Springs, California. See Corinne S. Kennedy, *Palm Springs Votes to Postpone Uber Airport Decision*, THE DESERT SUN (Aug. 3, 2016, 11:15 PM), <http://www.desertsun.com/story/news/local/palm-springs/2016/08/04/palm-springs-votes-postpone-uber-airport-decision/88045186/>.

<sup>64</sup> Most jurisdictions justify home sharing plans based on (1) protecting property values and the character of the neighborhood; (2) taxation and revenue; or (3) public safety. See Jamila Jefferson-Jones, *Airbnb and the Housing Segment of the Modern "Sharing Economy"*; *Are Short-Term Rental Restrictions an Unconstitutional Taking?*, 42 HASTING CONST. L.Q. 557, 573 (2015).

<sup>65</sup> Jason Sneed, *Taxicab Medallion Systems: Time for a Change*, THE HERITAGE FOUNDATION (Dec. 10, 2015), <http://www.heritage.org/research/reports/2015/12/taxicab-medallion-systems-time-for-a-change>.

is a more efficient and more practical solution to the medallion system. Without the high cost of leasing a medallion, and the trust frameworks inherent in ridesharing apps, drivers do not risk as much as a taxi driver picking up an anonymous person. In cities that still have a medallion system, regulators have the choice of preserving a system that only benefits a few at the expense of many, or change the system in favor of a free market that enhances public welfare.

### *Home sharing*

When it comes to short-term rental zoning, communities must decide on a policy that fits their history and ideals. Zoning laws are frequently the regulatory mechanism through which these policies are created and implemented. Traditionally, zoning laws protect homes within a community from incompatible uses, and defend residential areas against outside threats.<sup>66</sup> Many zoning ordinances place restrictions on home-based businesses, a fact that, when read literally, is potentially problematic for home sharing hosts as it could see them positioned outside what is actually legal.<sup>67</sup> Though Type III jurisdictions have outright banned short-term rentals, because of the strong ties to a city's master plan, Type I and II jurisdictions often use the same existing zoning restrictions to ban the practice or severely limit homesharing. This is why there are so many short-term zoning provisions that are defined as less than 30 days, which limit both the homeowner's potential profits and also ignore the ability of the sharing economy to capitalize on the excess capacity that was too impractical to realize before organizations like Airbnb, Homeaway, and Vrbo came along. The following will discuss how jurisdictions have used zoning to regulate home sharing.

Type I and II jurisdictions put a cap on the number of certain types of short-term rentals in different census tracts.<sup>68</sup> Other jurisdictions prohibit short-term rentals if the property is currently violating certain code violations.<sup>69</sup> This also incorporates a prohibition of short-term rentals where the residential units are subject to an affordable house program or are below market rate.<sup>70</sup>

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<sup>66</sup> Shelly Kreiczer-Levy, *Consumption Property in the Sharing Economy*, 43 PEPP. L. REV. 61, 85 (2015).

<sup>67</sup> Many zoning ordinances place restrictions on home-based businesses. For example, in San Diego, home occupations are permitted only as accessory uses to a residential unit. A resident shall not rent space to others in association with a home occupation. SAN DIEGO, CAL., LAND DEV. CODE § 141.0308 (2017).

<sup>68</sup> Some cities have placed a cap on Type II and Type III short-term rentals in each census tract. See, e.g., AUSTIN CITY CODE § 25-2-789 (2016).

<sup>69</sup> San Francisco, California does not allow short-term rentals if the property is currently violating any Planning, Building, Housing, Fire, Health, Police, or other City planning codes. *Office of Short-Term Rental Registry & FAQs*, S.F. PLANNING DEP'T., <http://sf-planning.org/office-short-term-rental-registry-faqs> (last visited Feb. 20, 2017).

<sup>70</sup> *Id.*

### 3. Insurance

The rise of the sharing economy adds another wrinkle of complexity to the question of liability when a participant in a sharing economy transaction suffers harm, due to the unique and unknown relationship between the operator, the sharing economy firm, and the consumer. Because there is a greater transactional velocity among ridesharing firms, this issue is not as pressing for home sharing firms, but several jurisdictions have already taken steps to address these issues.

#### *Ridesharing*

For ridesharing firms, jurisdictions that have defined ridesharing firms as Transportation Network Companies (“TNCs”),<sup>71</sup> most frequently Type II jurisdictions, require documentation evidencing the TNC or driver has obtained primary liability insurance for the driver for liabilities incurred during a prearranged ride<sup>72</sup>. On the side of consumers, the main risk that has brought about new dialogue is the problem with coverage gaps; where the insurance requirements placed on ride sharing firms protect consumers in certain situations during a ridesharing transaction and not others.<sup>73</sup> The insurance issues arise when ridesharing drivers use personal vehicles for commercial activity without obtaining commercial auto insurance. Personal Auto Policies (“PAP”s) generally contain livery exclusions that do not cover transporting people for a fee.<sup>74</sup> Early on, ridesharing drivers may not have known they were not covered for their services. There are three known exposure periods during these ridesharing transactions. The first is when the driver logs in to the application but is not matched with anyone to give a ride, Period 1.<sup>75</sup> The second is when a match is made, but the passenger has yet to enter the vehicle, Period 2.<sup>76</sup> The third is when the passenger has been picked up and is present in the vehicle, Period 3.<sup>77</sup> Responding to this dilemma, ridesharing firms decided to provide commercial coverage, however, the policies often do not provide the same uninsured motorist coverage, medical payments, and comprehensive coverage that the driver purchased in their PAPs, and more importantly, only cover the driver when they

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<sup>71</sup> See COLO. REV. STAT. § 40-10.1-602(3); VA. CODE ANN. § 46.2-2099.45; CAL. PUB. UTIL. CODE § 5431(c).

<sup>72</sup> See COLO. REV. STAT. § 40-10.1-604(2).

<sup>73</sup> *Transportation Network Company Insurance Principles for Legislators and Regulators*, NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS 1, 2 (2015), [http://www.naic.org/documents/committees\\_c\\_sharing\\_econ\\_wg\\_exposure\\_adopted\\_tnc\\_white\\_paper\\_150331.pdf](http://www.naic.org/documents/committees_c_sharing_econ_wg_exposure_adopted_tnc_white_paper_150331.pdf).

<sup>74</sup> *Id.* at 3.

<sup>75</sup> *Id.* at 4.

<sup>76</sup> *Id.*

<sup>77</sup> *Id.*



have a passenger in the car, Period 3, but might not cover drivers during period 1 or 2.<sup>78</sup>

Major coverage gaps will continue to exist unless either ridesharing firms provide the appropriate insurance coverage for their drivers during all activities or the driver maintains appropriate coverage or insurance companies start to craft new policies, inclusive of activity in the sharing economy. For the driver to maintain coverage, PAPs would need to be amended in order to provide coverage during period 1, while the TNC or driver obtains coverage during period 2 and 3. Luckily, in 2015, insurance policies have begun to evolve in order to cover the gaps.<sup>79</sup> These policies have an additional cost of \$6 or \$8 to provide coverage during periods 1 and 2, and save the driver from paying the more expensive commercial premiums covered by the ridesharing firm in period 3.<sup>80</sup> Type II jurisdictions left placeholders in their regulations to accommodate for these amended insurance policies so that a driver's insurance alone could cover the entire insurance requirements.<sup>81</sup> Type III jurisdictions fail to address the issue but do require that taxicab operators carry \$1 million for bodily injury and property damage.<sup>82</sup>

Regulators have approached these challenges in many different ways and the existence of new PAPs covering ridesharing drivers has increased the number of available options. One approach, found in Type II jurisdictions, is to have drivers maintain coverage during Period 1 and TNCs to maintain coverage in period 2 or 3.<sup>83</sup> Another option is for TNC drivers to maintain primary coverage up to a certain limit (\$100K), while requiring TNCs to maintain excess coverage that pays for accidents resulting in damages above the primary limit. Furthermore, TNCs drivers can maintain primary coverage in Period 1 up to a certain limit, while requiring TNCs to maintain excess coverage in Period 1 and primary coverage in Periods 2 and 3. Combinations of these options may also be combined to fit the needs of the jurisdiction.<sup>84</sup>

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<sup>78</sup> *Id.* at 5.

<sup>79</sup> *Id.* at 15.

<sup>80</sup> *Id.*

<sup>81</sup> A personal automobile insurer may offer an automobile liability insurance policy, of an amendment, that covers a private party passenger vehicle while used in connection with a TNC only if the policy expressly provides coverage in period 1. CAL. PUB. UTIL. CODE. § 5434(c). See also VA. CODE ANN. § 46.2-2099.52(B)(6).

<sup>82</sup> Dayton, Ohio, has not addressed insurance requirements for TNCs, but they have insurance requirements placed on the incumbent industry. See NATIONAL ASSOCIATION FOR INSURANCE COMPANIES, *supra* note 71, at 23.

<sup>83</sup> California, Colorado, and Virginia have all set out requires insurance coverage requirements that differ between period one, when the driver is logged on, and periods two and three when a driver accepts a ride and completes the trip. See COLO. REV. STAT. § 40-10.1-604; VA. CODE ANN. § 46.2-2099.52(B); CAL. PUB. UTIL. CODE § 5433(b). For the most part, coverage during periods two and three must be in an amount of at least one million dollars per occurrence. COLO. REV. STAT. § 40-10.1-604(2).

<sup>84</sup> Houston, Texas has made it illegal for a TNC driver to operate on a PAP alone and has attempted

There is no clear answer to the coverage issues, and there could be a variety of possible solutions based on each jurisdiction and their policy goals. Ideally, there should be coverage on a full time basis for all ride-hailing activities, achieved by having the driver purchase commercial coverage or the TNC provide coverage in all three periods. Having the drivers purchase commercial insurance is not ideal because of the great expense. Additionally, TNCs are reluctant to provide full time coverage during all periods. Until TNCs agree to provide full time coverage, coverage gaps will continue to exist. It would be mutually beneficial for legislators to communicate more with TNC drivers and passengers about the insurance issues instead of adhering to old insurance requirements placed on the incumbent industry.

### *Home Sharing*

Most home sharing companies generally provide certain protection for property and liability related to short-term rentals. There are gaps in the coverage provided by the companies however,<sup>85</sup> and most companies warn users that they should check their own homeowner's insurance policy to understand whether or not there is coverage for their property due to short-term rental. Most homeowner's insurance policies cover the owner-occupants of a dwelling, tenants, and those people related to the insured.<sup>86</sup> Property coverage is excluded for roomers, boarders and other tenants that are not related to the insured. Most policies exclude coverage for liability arising out of conducting business within the property, but exclusions provide coverage for occasional rentals in which they are not being rented out to two or more roomers.<sup>87</sup> Thus, there are potential exposures relating to different parties in a short-term home sharing transaction unless it is made clear whether or not homesharing firms are operating as a business. A host may incur accidental property damage at their home, be a victim of theft if not on site, or be responsible for medical expenses or damages if a guest is injured or causes injury while renting.<sup>88</sup> Guests may cause injury or damage the property that could potentially trigger liability exposure for the guest

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to put drivers on notice of livery exclusions. There must be one million dollars coverage of commercial automobile insurance during periods two and three, and commercial automobile insurance of no less than the state minimum coverage amounts during period 1. *Frequently Asked Questions: Chapter 46 Related to Vehicles-for-Hire*, HOUSTONTX.GOV 1, 1-2 (Aug. 6, 2014), [https://www.houstontx.gov/ara/chapter46docs/vehicle\\_for\\_hire-faqs.pdf](https://www.houstontx.gov/ara/chapter46docs/vehicle_for_hire-faqs.pdf).

<sup>85</sup> *Home Sharing – The Other Way to Stay*, NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS 1, 1-2 (Aug. 16, 2015), [http://www.naic.org/documents/committees\\_c\\_sharing\\_econ\\_wg\\_related\\_150816\\_iso\\_home\\_sharing\\_white\\_paper.pdf](http://www.naic.org/documents/committees_c_sharing_econ_wg_related_150816_iso_home_sharing_white_paper.pdf).

<sup>86</sup> AUSTIN, TX., CITY CODE § 25-2-791.

<sup>87</sup> *Id.*

<sup>88</sup> *See Insurance Implications of Home-Sharing: Regulator Insights and Consumer Awareness*, NATIONAL ASSOCIATION OF INSURANCE COMMISSIONERS 1, 2 (Dec. 13, 2016), [http://www.naic.org/prod\\_serv/IHS-OP-16.pdf](http://www.naic.org/prod_serv/IHS-OP-16.pdf) (A host may incur incidental property damage of theft if not on site, or be responsible for medical expenses or damages if a guest is injured while renting.).

or homeowner.<sup>89</sup> Landlords may also suffer these types of liabilities in the event that a tenant rents out their apartment and the guest causes injury, damage or theft, even though the lease provision restricts homesharing services.<sup>90</sup> Due to the potential exposure gaps, states felt a need to respond.

Type I and II jurisdictions have placed certain insurance requirements on short-term renters that differ from jurisdiction to jurisdiction, as is the case for ridesharing insurance.<sup>91</sup> Type III jurisdictions do not have insurance criteria for short-term renters, but would need to determine one so that a data driven regulation could work.

#### 4. Anti-Competitive Behavior

While the most prominently clear theme and policy rationale driving regulation of sharing economy firms is public safety, policymakers must not forget to deal with anti-competitive implications posed by regulating sharing economy firms. Due to the incumbent industries' belief that ridesharing and homesharing firms have the upper hand, they argue for equal regulatory burdens.<sup>92</sup> However, these current regulatory burdens stem from the incumbent industries early lobbying efforts to shape regulations in a way that prevents competition.<sup>93</sup> Now, in Type I and Type II jurisdictions, incumbent industries are regretting their decision to attempt to drive competition away because it has left them at a disadvantage as sharing economy firms continue to use technology to gain a competitive advantage. Type III jurisdictions remained resolute and, in some cases, successfully prevented this new competition by banning ridesharing, homesharing, or both. While incumbent industries might prefer less competition, they deserve no more protection from it than do normal businesses. Society will fail to progress if regulatory frameworks are not responsive to new methods of competition, and a balance is between safety and innovation is achieved.

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<sup>89</sup> See *id.*

<sup>90</sup> See *id.* at 4.

<sup>91</sup> In San Francisco, California, a permanent resident may offer his or her primary residence as a short-term rental, if they meet all the other requirements and maintain liability insurance appropriate to cover the short-term rental in the aggregate of no less than \$500,000 or uses a hosting platform that provides equal or greater coverage. Also, in Nashville, Tennessee, an owner offering short-term rentals must provide proof of insurance of no less than \$1 million per occurrence. Austin, Texas requires proof of property insurance but does not state a minimum amount necessary.

<sup>92</sup> See, e.g., Rauch & Schleicher, *supra* note 25, at 904 ("The taxi industry claims Uber, the leading "ride sharing" firm, enjoys an unfair advantage because it need not purchase medallions or comply with consumer protection or pricing regulations. Hotels and neighborhood groups argue AirBnB, the leading "house sharing" firm, skirts taxes, violates lease terms, uses residentially zoned property for commercial purposes, and lacks safeguards for guests and operators. And so on.") (citation omitted).

<sup>93</sup> See *Taxis, TNCs and Deregulation: Is History Repeating Itself?*, WHO'S DRIVING YOU?, <http://www.whosdrivingyou.org/history-repeating-itself> (last visited Feb. 13, 2017).

Regulators have attempted to achieve this balance, as outlined in the following sections.

Briefly, another concern that is much greater for sharing economy firms than their incumbent equivalent industries is the creation of a platform monopoly. In a platform monopoly, one company gains such a stranglehold over the entire market because they are the only player. The ascensions of Uber and Airbnb pose the greatest risk of creating a platform monopoly. Yet, because these platforms are relatively easy to make and because others would love for an opportunity to make money by reducing the idle capacity of assets that are already owned, regulators may have more leverage than they think.

### *Ridesharing*

In response to the initial bans found in Type III jurisdictions, regulators in Type I and Type II jurisdictions began passing laws hoping to strike this balance and limit anti-competitive behavior. Trying to level the regulatory playing field is a challenge, but can ensure no one creates a monopoly. The passage of ridesharing laws in Type I and II jurisdictions that govern behaviors such as street hails, payment mechanics, and operating fees, are the first steps toward balancing the concerns of both sharing economy firms and the incumbent equivalent ridesharing firms.

#### **i. Street Hails**

As an example, Type I and Type II jurisdictions have passed laws that street hails, common to the taxicab industry, are not to be accepted by TNC drivers.<sup>94</sup> This type of transaction is reserved for taxi companies because they are required to prove to consumers they are trustworthy by meeting the requisite legal standards in order to operate.<sup>95</sup> This example simultaneously promotes competition and ensures an adequate level of safety because a rider is likely to feel more comfortable being picked up by a cab that has the designated signage on the outside, on the street, as opposed to a random car that drives up and asks a person if they need a ride. On the other side of the balance, the central usage of a digital platform to better allocate slack capacity of drivers in the ridesharing example challenges incumbent industries to become more innovative, pushing the needle of progress forward.

Risks begin to emerge, however, where regulators either ignore the problem completely or ban all behavior. For example, in Type III jurisdictions

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<sup>94</sup> No TNC partner shall transport a passenger unless a transportation network company has matched the TNC partner to that passenger through the digital platform. A TNC Partner shall not solicit, accept, arrange or provide transportation in any other a manner. VA. ANN. CODE § 46.2-2099.48(A). *See also* COLO. REV. STAT. § 40-10.1-605(1)(a).

<sup>95</sup> *See, e.g., Taxis, TNCs and Deregulation, supra* note 92.

where laws do not meaningfully regulate this type of activity, drivers in the sharing economy are usually not expressly permitted or prohibited from accepting street hails, which hurts the incumbent industry and also incentivizes the wrong sorts of behaviors for drivers in the sharing economy.

## ii. Payment Mechanics, Operating Fees

Most jurisdictions require that the ridesharing firm itself obtain a business license before drivers may begin operation. As a result, a decision must be made on the cost of the license as well as who is responsible for paying for the license.

For example, some jurisdictions have the discretion to either require a large fee be paid up front for business licenses before a ridesharing firm can operate.<sup>96</sup> Recognizing this behavior can promote the creation of monopolies, some regulators have implemented requirements that impose fees that are a closer reflection of the administrative costs of the services incurred throughout the registration process. One city has taken the approach of charging a \$0.10 fee per ride, submitted quarterly for all trips originating in that city, in order to cover the costs of enforcement and licensing.<sup>97</sup> Additionally, operating in airports in many jurisdictions has been granted solely to the incumbent industries, due to national security implications and a heightened degree of scrutiny for drivers routinely making trips in and around airports.<sup>98</sup>

The differences in payment mechanics also have created some issues that need to be addressed. For ridesharing firms, whose payments are done entirely through the platform in a cashless manner, this improves safety and reduces the potential for theft,<sup>99</sup> some even go as far as removing the driver for up to a year for accepting a cash payment.<sup>100</sup> This decision leaves the consumer with more choices, while encouraging incumbent industries to evolve their practices and

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<sup>96</sup> Colorado law requires that the transportation network company pay an annual fee of \$111,250 to the licensing commission. COLO. REV. STAT. § 40-10.1-606(2) (2017). Kansas City's ordinance has some flexibility in that it also requires the TNC firms themselves to pay either the up-front sum of \$40,000 per year of operation plus \$100.00 per operator, or instead pay only \$250.00 per operator. KANSAS CITY, MO. CODE OF ORDINANCES 76-75.

<sup>97</sup> See SEATTLE, WASH., MUN. CODE § 6.310.150 (2017). See also *Transportation Network Communities*, SEATTLE.GOV, <http://www.seattle.gov/business-regulations/taxis-for-hires-and-tncs/transportation-network-companies/tnc-companies> (last visited Feb. 13, 2017).

<sup>98</sup> See AGTA, *supra* note 62 (providing a list of ridesharing firms challenging airport regulations in different jurisdictions).

<sup>99</sup> "A transportation network company shall authorize collection of fares for transporting passengers solely through a digital platform. A TNC partner shall not accept payment of fares directly from a passenger or any other person prearranging a ride or by means other than electronically via a digital platform." VA. CODE ANN. § 46.2-2099.48(B) (2017).

<sup>100</sup> *Id.* § 46.2-2099.48(C).

stay competitive by preserving their ability to collect cash in exchange for the heightened licensing standards and background checks.

Fare calculation is another piece of this issue that has received some regulatory oversight. Ridesharing firms are criticized for the lack of transparency they have shown with surge pricing. Due to the operating system that they use, the distributed network, platform-based sharing economy programs are capable of charging surge prices at a multiple that is calculated by an algorithm, with a minimum reserve priced that must be spent, all of which is based on the supply of drivers available and the number of riders requesting their services.<sup>101</sup> While this may make sense, this practice undoubtedly raises more anti-competitive concerns than cab companies, many of which must have their fare rates posted on the outside of their vehicles.<sup>102</sup> One type II jurisdiction has gone as far as to allow taxicabs to charge surge rates if they use a digital platform.<sup>103</sup> Other jurisdictions require all ride sharing fare calculations must be made available to consumers beforehand, if a platform is being used.<sup>104</sup>

### iii. Misc.

Other measures put in place to level the playing field between ridesharing firms and the incumbent industries include taxicabs adapting to the use of an online digital platform for transacting, subject to approval from the proper authority,<sup>105</sup> and also a ban of discriminatory practices, preventing drivers from declining fares based on personal biases.<sup>106</sup> Additionally, the total number of vehicles has been capped in some jurisdictions, and one city requires a certain number of vehicles have wheel chair access. Most jurisdictions also do not allow cabs to be used as TNCs unless all markings are stripped off vehicles.<sup>107</sup> Uber also can remove drivers who fall beneath a certain rating on the platform; drivers who fall beneath a certain threshold are required to show proof that they have taken steps to improve their skills before they are allowed back on the platform.<sup>108</sup>

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<sup>101</sup> See *Uber Surge Pricing*, UBER ESTIMATE, <http://uberestimator.com/uber-surge-pricing> (last visited Feb. 13, 2017).

<sup>102</sup> See, e.g., CHARLOTTESVILLE, VA., CITY CODE, ch. 32, art. II, div. 3, § 32-93(b) (2016) (“In addition, the currently filed rate schedule shall be displayed on both sides of the exterior of every cab in letters at least three (3) inches high”).

<sup>103</sup> See *Frequently Asked Questions*, *supra* note 83, at 4.

<sup>104</sup> See, e.g., COLO. REV. STAT. § 40-10.1-605(1)(b) (2016).

<sup>105</sup> See, e.g., *id.* at 1(n).

<sup>106</sup> See, e.g., SEATTLE, WASH., MUN. CODE, § 6.310.270(G) (2017); SEATTLE MUN. CODE § 6.310.275(G) (2016); COLO. REV. STAT. § 40-10.1-605(6)(a) (2016).

<sup>107</sup> COLO. REV. STAT. § 40-10.1-605(1)(n) (2016).

<sup>108</sup> *Uber Community Guidelines*, UBER, <https://www.uber.com/legal/community-guidelines/us-en/> (last updated Dec. 8, 2016).

### *Home sharing*

In light of the ability to permit greater use of assets that are idle, many of the zoning restrictions placed on home sharing firms would appear to be anti-competitive in nature because they create artificial barriers to entry, reduce the range of choices available to citizens seeking these services, and reduce the earning capacity of individuals seeking to make the most out of their existing assets. These regulations severely limit the benefits afforded to individuals conferred through the use of short-term rentals<sup>109</sup> better than they protect the public. Regulators should be welcoming of the efficiencies and economic development brought by the home sharing economy.

### **iv. Taxes**

Apart from zoning, several type I jurisdictions require a short-term renter to pay a hotel occupancy tax, resulting in an additional mechanism for regulators to protect the interests of the hotel industry, and make short-term renting less appealing. In New York for example, permanent occupants,<sup>110</sup> can house guests for up to 30 days, even when the permanent occupant is not there as long as no monetary compensation is paid. However if monetary compensation is paid, hotel occupancy tax must be paid on the occupancy of a room or rooms, because in that case the home falls under the definition of a hotel, and hotels are required to pay the tax. However, in Austin, Texas, a hotel occupancy tax is required if the owner is operating a short-term rental in an area zoned for full purpose or limited purpose.<sup>111</sup> In this type of jurisdiction, it is often the case that regulations requiring a hotel ownership tax creates a negative incentive for people to register, especially if they do not plan on operating for more than a few nights every year.

Type 2 jurisdictions, jurisdictions where a new set of taxes is created based on the number of nights per year a unit is rented or the total amount of gross receipts that are generated by a renter, creates the proper incentive framework for the wide variety of behaviors in the sharing economy. Those that operate as de facto hotels are taxed like de facto hotels. Those that operate less frequently are taxed on a basis that is representative of their actual behaviors.

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<sup>109</sup> These benefits include: supplemental income, maximizing use of property, and strengthening the character of neighborhoods that attract more consumers.

<sup>110</sup> *New York State Multiple Dwelling Law*, NYC.GOV, <http://www1.nyc.gov/assets/buildings/pdf/MultipleDwellingLaw.pdf> (last visited Mar. 1, 2017). "For the purposes of this definition, 'permanent residence purposes' shall consist of occupancy of a dwelling unit by the same natural person or family for thirty consecutive days or more and a person or family so occupying a dwelling unit shall be referred to herein as the permanent occupants of such dwelling unit." *Id.*

<sup>111</sup> *City of Austin Vacation Rental*, *supra* note 61.

### **v. Inspections**

Another issue that has received quite a bit of attention for a heavy-handedness that has raised anti-competitive issues involves inspections. Square footage requirements, which have been implemented in some jurisdictions,<sup>112</sup> besides being difficult to both measure and enforce, are also creating an additional strain on government resources.

### **5. Verification and Enforcement Standards:**

Perhaps the greatest disparity between sharing economy firms and their incumbent equivalent industries centers around the verification and enforcement standards of each. For sharing economy firms, the use of the Internet permits quicker and often more effective verification, reducing the amount of time it takes to perform a specific tasks. Yet, the more analog forms of verification are most frequently used, creating a regulatory burden for both the incumbent equivalent industries and also for sharing economy firms. While the format of these regulations were the norm for incumbent equivalent industries at the time when they were crafted, the inability to adapt is putting them at a competitive disadvantage to platform-based sharing economy firms. On the other side of the spectrum, for sharing economy firms, the application of these antiquated requirements, without appreciation for the nuance and potential of sharing economy firms, is severely limiting one of the greatest benefits of sharing economy firms, the up-front convenience and back-end information-sharing that can be conducted through the use of a digital platform. Moving away from traditional, preemptive regulation into a model that utilizes the automatic sharing of information can ensure the requisite policies are in place, based on the data that is being generated from the platforms.

All of the requirements discussed above are not achieved if either the information called for by those regulations is not delivered to the appropriate authority, or there is no mechanism to enforce the standards, regulations, or ordinances in place. For these various frameworks to function properly, information needs to be transmitted, either in person or by some other means, in order to verify that an applicant is fit for the position that they are seeking to hold. The following section looks at the mechanisms through which platform-based ridesharing and homesharing applications have traditionally conducted verification and enforcement.

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<sup>112</sup> See L.A., CA., MUN. CODE § 12.22A(31)(g)(6)(b)(3) (Los Angeles is one example of a city that places square footage requirements on units that can be rented.).



### *Ridesharing*

The format of the regulations placed on ridesharing firms are relatively uniform across the country.<sup>113</sup> On the broadest level, regulations require the completion of some specific task and then some degree of information sharing about that task with the appropriate authority. Before a ridesharing platform can legally operate, it must prove to the regulatory body that it can be trusted to do the job it is supposed to and will not behave in a way that puts the public at unnecessary risk.

In the states that have regulated ridesharing firms, TNCs cannot operate without first obtaining a permit issued by an office like a Public Utilities Commission.<sup>114</sup> To do so, the company must complete and submit an application, pay the annual application fee, and file proof of financial responsibility (the bulk of which is evidence of insurance compliance).<sup>115</sup> The TNC shall not allow individuals to act as drivers unless certain conditions are met, including: verifying age, valid drivers license, medical qualification, vehicle inspection form, and insurance verification.<sup>116</sup> Before a driver can operate, the TNC will need a driving history report, and more importantly, a criminal background check.<sup>117</sup> A vehicle inspection will be required at some point along the process in order to secure licensing.<sup>118</sup> Additionally most vehicles are required to display the proper vehicle markings distributed by the licensing commission.<sup>119</sup>

Many states allow for applicants to submit their applications online or in person, depending on preference.<sup>120</sup> However, in jurisdictions that require fingerprinting for background check purposes, the applicant must arrive in person for their application to proceed. In most states, ridesharing firms applying for their TNC license have the option to mail in application or deliver them in person. Delivery of information evidencing that the TNC has met all the insurance requirements has taken different approaches. In Colorado, the insurance companies are able to file documentation on a web based filing system. In other jurisdictions it is the TNCs responsibility to transmit that information to the licensing authority. In addition, TNCs have continuous reporting duties that require reporting drivers convicted of serious criminal offenses and reporting

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<sup>113</sup> See *infra* section II.A.5.

<sup>114</sup> COLO. REV. STAT. § 40-10.1-606(1).

<sup>115</sup> COLO. REV. STAT. § 40-10.1-606(2). See CAL. PUB. UTIL. CODE. § 5439.

<sup>116</sup> See COLO. REV. STAT. § 40-10.1-605(1)(d).

<sup>117</sup> See *id.* at § 40-10.1-605(3).

<sup>118</sup> See *id.* at § 40-10.1-605(1)(g)(I).

<sup>119</sup> *Id.* at § 40-10.1-605(1)(o).

<sup>120</sup> New York no longer accepts paper applications, everything must be submitted online. See *New Driver Applicants*, NYC.GOV., <http://www.nyc.gov/html/tlc/html/industry/drivers.shtml> (last visited Feb. 20, 2017). In Seattle, UBER will submit an applicant's application and upon approval, the driver can pick up the permit from the licensing office. See *Driving in Seattle*, UBER, <https://www.uber.com/drive/seattle/resources/local-regulations/> (last visited Feb. 20, 2017). In Seattle the business license can be applied for in person, by mail, or online. *Id.*

driving offenses. Most jurisdictions also require that TNC websites provide almost all the information explained above.

### *Homesharing*

The requirements of homesharing and ridesharing are very similar in the way the regulations themselves are delivered. Like with ridesharing regulations, homesharing regulations also require some degree of delivery of information to the appropriate authority and also a process that an individual must go through in order to utilize the home sharing platform.<sup>121</sup> The typical process for obtaining a short-term rental license is to submit an application, pay a fee, file proof of property insurance and proof of payment of taxes as well as obtain a certificate of occupancy or certified inspection.<sup>122</sup>

As applied to the non-technological regulatory components, Type III jurisdictions will obviously have the least burdensome regulatory format, as sharing economy participants are unable to register at all. Type IV jurisdictions on the other hand, appear to be wasting community assets that could be used for the benefit of the community, subsequently burdening all uses of an asset for would-be participants in the sharing economy. Type I and II jurisdictions will have variably burdensome regulatory formats that entirely depend on exactly how the regulations are crafted. However, given the disparity between the capabilities of platform-based sharing economy apps and their incumbent equivalents, in most places an entirely new regulatory framework, or at least an entirely new category of regulations within the existing framework, should be required. Moving forward, it should be expected that even among the different types of regulations, there will be relatively little uniformity among how the information is shared back and forth between the various government entities and the individuals.

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<sup>121</sup> As an example, Austin, Texas requires that applicants submit information to the City of Austin Code Department including, an application through certified mail, a \$443 fee, proof of property insurance from current insurance policy, proof of hotel occupancy taxes if applicable, and a certificate of inspection. See *Austin Code Department*, AUSTINTEXAS.GOV., <https://www.austintexas.gov/str> (last visited Feb. 20, 2017).

<sup>122</sup> In Nashville, Tennessee, an owner of a short-term rental property must apply in person at the Metro Codes Department. The owner must bring with them: floor plans of the residence, name, phone number, and email address of responsible party residing in a 25 mile radius, proof of insurance not less than \$1 million dollars, proof of notification to neighbors sharing a common wall or driveway, and proof of residence. Applicants must determine their short-term rental type (1,2,3), and pay a \$50 permit fee. Once granted the license, owners must post the operating permit in a visible area in the rental property. See *Short Term Rental Property*, NASHVILLE.GOV., <http://www.nashville.gov/Codes-Administration/Construction-and-Permits/Short-Term-Rentals.aspx> (last visited Feb. 20, 2017).

### III. TECHNOLOGICAL REGULATORY COMPONENTS

The most common failure of policymakers seeking to regulate the behaviors of the sharing economy is to ignore the realities that have been brought into existence by the usage of a platform to create a distributed network, instead of trying to create an environment that makes use of the unique advantages of these disruptions. One of the things that regulators have not realized is that in order to regulate behavior on the Internet in any meaningful way, it takes a system on the Internet that is capable of even understanding what is happening. This problem is, in fact, one of the main reasons why private ordering plays such a big role in the regulation of the Internet – the regulation is done through the protocols themselves.

“[W]hy should government be somehow immune from the same forces that have disrupted Encyclopedia Britannica, retailing in all sectors, the music industry, metropolitan daily newspapers and book publishing?”<sup>123</sup> The refusal by regulators to accept the reality that sharing economy firms, in order to maintain their competitive advantage of being able to more efficiently deliver services to consumers, must self-regulate through the use of protocols on their platform is eliminating the competitive advantage that has brought about such drastic efficiency gains. Therefore, in order to understand what regulations for the technological regulatory components of the sharing economy look like, it is necessary to survey the regulations of all the actors in the regulatory ecosystem and not just the strictly governmental regulations.

The schema introduced in section II.A still suffices to help understand what regulations for distributed networks look like, or what they could look like, but because of the reality that most of the regulatory behavior that takes place in and for distributed networks is self-regulation, the results are a bit more abstract and decentralized than they were for the non-technological regulatory components covered in the last section. However, due to the unique ability to duplicate and recalibrate code, a greater level of uniformity exists in the realm of the technological regulatory components and some standards can be coded into the networks themselves.

The remainder of this section will analyze examples of regulation by both private entities and government, the regulation by protocols that is being done by private actors and government entities, the regulation of privacy by government entities, the regulation of information security (INFOSEC) by both private actors and government entities.

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<sup>123</sup> CLIPPINGER & BOLLIER, *supra* note 13, at 22-23.

### A. Self-Regulation and Regulation by Protocol

The algorithms used by platform-based sharing economy firms, perform a great deal of regulation on their own. It is not regulation in the strictly legal sense used in the last section. Nonetheless, it is regulation. Deep within the annals of Uber and Airbnb, there are repositories of code that permit these programs to run. And in many ways, this way of regulation is why these apps have been able to operate as efficiently as they do. Since the eventual commercial success of a platform depends on its participants' ability to engage in exchange, the platforms have invested significant resources in addressing the misfit between existing regulation and the exchange that they facilitate.<sup>124</sup>

While the complexity of the Internet is causing people to rethink what it means to regulate,<sup>125</sup> self-regulatory organizations have been around for some time, varying based on voluntariness, accountability, enforcement, and governmental intervention.<sup>126</sup> There is probably no industry more susceptible to attack than the credit card industry and they are even permitted to self-regulate through the creation of the PCI Data Security Standard.<sup>127</sup> Though it is important to highlight the relationship created between government, private companies, and individuals as one that works best when all parties are committed and involved. With organizations that leave a trail of data behind, this information can be used to monitor and ensure compliance. In fact, one of the reasons, these digital regulations are able to operate so effectively is because algorithms can be designed and iterated to regulate, more specifically, the types of behavior it desires within a given network. Algorithms make compliance easier by requiring a greater degree of design and forethought than traditional regulations.<sup>128</sup> That is to say, the regulations should be designed to achieve a specific result based on

<sup>124</sup> Cohen & Sundararajan, *supra* note 32, at 119.

<sup>125</sup> See, e.g., Lawrence B. Solum, *Models of Internet Governance*, in INTERNET GOVERNANCE: INFRASTRUCTURE AND INSTITUTIONS 48-49 (Lee A. Bygrave & Jon Bing eds., 2009) ("In the broad sense, the Internet is a complex entity that includes the hardware and software technical infrastructure, the applications, and the content that is communicated or generated using those applications. In the broad sense, the Internet includes millions of computers running a myriad of applications generating, manipulating, and retrieving a vast array of information.") And in an even broader context, Tim O'Reilly makes the case for even broader regulations: "An airplane's auto-pilot regulates the countless factors required to keep that plane aloft and heading in the right direction. Credit card companies monitor and regulate charges to detect fraud and keep you under your credit limit."). Tim O'Reilly, *Open Data and Algorithmic Regulation* *Open Data and Algorithmic Regulation*, in BEYOND TRANSPARENCY, *supra* note 23, at 289.

<sup>126</sup> See Cohen & Sundararajan, *supra* note 32, at 123.

<sup>127</sup> PCI Security, PCI SECURITY STANDARDS COUNCIL, [https://www.pcisecuritystandards.org/pci\\_security/](https://www.pcisecuritystandards.org/pci_security/) (last visited Feb. 12, 2017).

<sup>128</sup> Francesca Musiani, *Governance by Algorithms*, INTERNET POLICY REVIEW (Aug. 9, 2013), <https://policyreview.info/articles/analysis/governance-algorithms> ("The algorithms subtending the information and communication technologies we daily use, the internet first and foremost, are (also) artefacts of governance, arrangements of power and politics by other means.").



Figure 2: Chicago Crime Data from 2001-Present<sup>133</sup>

In the context of a government exploring this type of self-regulation, the most readily accessible example of this is the open data portal. Open data portals are designed with a specific goal in mind. Information is either included or excluded based on a set of legal standards – what must legally be accomplished – and then certain bits of information are either included and excluded based on what makes sense for design – what *ought* to be done. For example, the City of Chicago created one of the earliest useful open data portals, publishing all crime incident data dating back to January 1, 2011.<sup>134</sup> In order to even be able to release this information, however, Goldstein was required to make sure that they were collecting the right pieces of information and so he block-reduced addresses to protect privacy, spatial coordinates were scattered to assist privacy, updates were captured and replicated into the data system as the records were uploaded, and the system requirements for the platform – ability to upload, update, query, etc. – had to be confirmed.<sup>135</sup> All of these standards were met and what is left is one of the most robust open data platforms in the country with upwards of 6 million<sup>136</sup> crime records automatically pushed to the data site as they are created.

The Chicago Crime data example and the microdirectives example from earlier in this article, about speed limit signs automatically recalibrating to weather conditions, road conditions, traffic flow, etc. provides a great example of how a regulation could function in an algorithmic manner.<sup>137</sup> Tim O'Reilly, the tech disruptor credited with modernizing the terms Open Source and Web 2.0, has distilled the acts required by this type of regulation into the following principles:

1. A deep understanding of the desired outcome
2. Real-time measurement to determine if that outcome is being achieved

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<sup>133</sup> This image is a screenshot directly from the City of Chicago's Open Data Portal. It is a list of all of over 6 million pieces of crime data that is published as soon as it becomes available. *Crimes - 2001 to Present*, CITY OF CHICAGO, <https://data.cityofchicago.org/Public-Safety/Crimes-2001-to-present/ijzp-q8t2> (last visited Feb. 20, 2017).

<sup>134</sup> See Brett Goldstein, *Open Data in Chicago: Game On*, in BEYOND TRANSPARENCY, *supra* note 23, at 15.

<sup>135</sup> *Id.* at 16.

<sup>136</sup> *Crimes*, *supra* note 132.

<sup>137</sup> Casey & Niblett, *supra* note 11, at 21. "Traffic lights in some jurisdictions already contain sensors that detect traffic flow and adjust the timing of red and green lights accordingly. Some traffic lights contain detectors allowing emergency service vehicles to "preempt" the signal and expedite their journey. In the near future, these systems will take into account more variables, such as the number of cars, speed of travel, or type of intersection. They might even take into account personal characteristics of a vehicle's driver or passengers. In the not-so-distant future, a traffic light system may know that a passenger in a regular vehicle is injured, and give the rushing driver a series of green lights all the way to the hospitals." (citations omitted). *Id.*

3. Algorithms (i.e., a set of rules) that make adjustments based on new data
4. Periodic, deeper analysis of whether the algorithms themselves are correct and performing as expected.<sup>138</sup>

With an algorithmic regulatory framework, an individual's identity signature would be stored in an encrypted personal cloud that could only be accessed through a secure API to upgrade the signature and to allow third-party verification.<sup>139</sup> These principles could be just as easily applied to platform-based sharing economies in order to determine how to create more operationally lightweight regulations to ensure that efficiency is achieved both from an operational point of view, but also from a policy perspective. In large part this already being done by the likes of Uber, who has already been granted patent protection for their surge pricing algorithm.<sup>140</sup> Moving forward, to effectively govern, local governments will need to be able to be at least on the same playing field as these new disruptive companies, otherwise they will be able to shape the regulatory environment as they choose. However, when the norms created by private ordering start harming consumers, the government, like it has with privacy laws, can mandate that companies redesign their collection of information to prohibit certain bad behaviors.

### B. Privacy

Privacy law in the United States is sectoral, with differing authorities for various areas of privacy. Privacy issues are one of the most directly apparent issues facing operators of digital platforms because of the litany of reports over the last year that address hacking, data breaches, identity theft, and a litany of other crimes related to people having their private information taken by others.<sup>141</sup> Under modern tort law, invasion of privacy is classified as a tort,<sup>142</sup> but because the Internet has added some new wrinkles to the calculus for analyzing privacy rights, government entities, both large and small, are continuously crafting new standards to help clarify what it means to maintain reasonable privacy standards

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<sup>138</sup> See Tim O'Reilly, *Open Data and Algorithmic Regulation* *Open Data and Algorithmic Regulation*, in BEYOND TRANSPARENCY, *supra* note 23, at 289-91 ("O'Reilly later notes that 'Laws should specify goals, rights, outcomes, authorities, and limits. If specified broadly, those laws can stand the test of time.'").

<sup>139</sup> CLIPPINGER & BOLLIER, *supra* note 13, at 16.

<sup>140</sup> See Brian Solomon, *Uber Granted Patent for Surge Pricing Verification*, FORBES (Apr. 6 2016), <http://www.forbes.com/sites/briansolomon/2016/04/06/uber-granted-patent-for-surge-pricing-verification/#4e6e332a1d09>.

<sup>141</sup> See *supra* Section II.B.3.

<sup>142</sup> See, e.g., RESTATEMENT (SECOND) OF TORTS § 652 (AM. LAW INST. 1977). See also PETER P. SWIRE & KENESA AHMAD, U.S. PRIVATE-SECTOR PRIVACY: LAW AND PRACTICE FOR INFORMATION PRIVACY PROFESSIONALS (2012).

on the Internet.<sup>143</sup> Under Section 5 of the FTC Act,<sup>144</sup> “unfair or deceptive acts or trade practices,” includes unfair practices (acts that are likely to cause substantial injury to consumers, cannot be reasonably avoided by consumers, and are not outweighed by countervailing benefits to consumers or competition)<sup>145</sup> such as failing to encrypt user information,<sup>146</sup> and deceptive acts or trade practices (material acts that are likely to mislead the reasonable expectations of a consumer)<sup>147</sup> such as selling user information after promising not to sell user information.<sup>148</sup> The remainder of this section starts from the origins of privacy law and moves toward the specific regulations that affect the way privacy works in the context of distributed networks.

Under the Constitution, a certain amount of privacy protection exists from the more general protections of Due Process and then also more specifically the Fourth Amendment limits government searches.<sup>149</sup> Government entities on the federal and local levels have taken actions to regulate more specific aspects of privacy, including certain applications of information (such as use of information for marketing or pre-employment screening, certain industries (such as financial institutions or healthcare providers), certain data elements (such as Social security numbers or driver’s license information) or specific harms (such as identity theft or children’s online privacy).<sup>150</sup>

The Federal Trade Commission (FTC) has the authority to prosecute unfair and deceptive practices, such as not including adequate privacy protections and using personally identifiable information without their approval. The Fair Information Practice Principles (FIPPs) serve as guiding principles and help clarify what “unfair and deceptive practices” means, stating that when it comes to personally identifiable information, people should have Notice, Choice, Access,

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<sup>143</sup> Urs Gasser, *Recoding Privacy Law: Reflections on the Future Relationship Among Law, Technology, and Privacy*, 130 HARV. L. REV. 61 (Dec. 9, 2016), <http://harvardlawreview.org/2016/12/recoding-privacy-law-reflections-on-the-future-relationship-among-law-technology-and-privacy/>. “The development, adaptation, and use of innovative technologies that enabled and increased the collection and use of personal information later in the twentieth century were also among the key drivers that led to the birth of modern information privacy law in the early 1970s.” *Id.*

<sup>144</sup> See, e.g., 15 U.S.C. § 45 (2016).

<sup>145</sup> *Federal Trade Commission Act Section 5: Unfair of Deceptive Acts or Practices*, FEDERAL RESERVE 1, 7 (2016), <https://www.federalreserve.gov/boarddocs/supmanual/cch/ftca.pdf>

<sup>146</sup> *In the Matter of BJ's Whole Sale Club, Inc.*, FTC File No. 042-3160, FEDERAL TRADE COMMISSION (Sept. 23, 2005), <https://www.ftc.gov/enforcement/cases-proceedings/042-3160/bjs-wholesale-club-inc-matter>.

<sup>147</sup> 15 U.S.C. § 45 (2016).

<sup>148</sup> Decision and Order, *In the matter of GeoCities, Inc.*, FTC File No. 982-3015, FEDERAL TRADE COMMISSION (Feb. 12, 1999), <https://www.ftc.gov/enforcement/cases-proceedings/982-3015/geocities>.

<sup>149</sup> U.S. CONST. amend. IV, V, XIV, IV.

<sup>150</sup> SWIRE & AHMAD, *supra* note 142, at 32.



and Security.<sup>151</sup> Some notable examples of the FIPPs, as they have been operationalized under federal law include COPPA's clear and convincing notice requirement,<sup>152</sup> HIPAA's Privacy Rule,<sup>153</sup> and FERPA's annual notice of rights and ability to inspect personal information.<sup>154</sup>

There have also been drafts circulating of a consumer privacy bill of rights act that states that entities collecting personally identifiable information (PII) shall provide individuals "in concise and easily understandable language," accurate, clear, timely, and conspicuous notice "about the entity's privacy and security practices."<sup>155</sup> Interestingly enough, however, is the fact that a number of self-regulatory regimes play a significant role in governing privacy practices for specific industries, including the Network Advertising Initiative, the Direct Marketing Association, and the Children's Advertising Review Unit.<sup>156</sup>

On a more local level, states have their own privacy laws, but much of the impact that is being had with regard to privacy within the confines of distributed networks has been on the level of individual cities.<sup>157</sup> Actions for more state level invasions of privacy can be brought are typically brought by state attorney generals.<sup>158</sup> Leading the way is the city of Seattle, who created a set of robust privacy principles for collecting and using information<sup>159</sup> and also operationalized a citywide Privacy Program to provide guidance and tools to City employees when working with personal information.<sup>160</sup> For cities that do not have the same resources as a city like Seattle, the Sunlight Foundation crafted a

<sup>151</sup> *Privacy Online: Fair Information Practices in the Electronic Marketplace*, FEDERAL TRADE COMMISSION 1, 4 (May 2000), <https://www.ftc.gov/sites/default/files/documents/reports/privacy-online-fair-information-practices-electronic-marketplace-federal-trade-commission-report/privacy2000text.pdf> (The FIPPs were most recently updated in 2010).

<sup>152</sup> 15 U.S.C. § 6501–6505 (1998).

<sup>153</sup> 45 C.F.R. § 160 (2000); 45 C.F.R. § 164(A), (E) (2013).

<sup>154</sup> 20 U.S.C. § 1232(g) (2013); 34 C.F.R. § 99 (1996).

<sup>155</sup> See Bryan Thompson, *President Obama's Proposed Privacy Bill of Rights*, PRIVACY & SECURITY LAW BLOG (Mar. 3, 2015), <http://www.privsecblog.com/2015/03/articles/marketing-and-consumer-privacy/president-obamas-proposed-privacy-bill-of-rights/> (Stating that such notice shall be "reasonable in light of context." Covered entities shall provide convenient and reasonable access to such notice, and any updates or modifications to such notice, to individuals about whom it processes personal data). *Id.*

<sup>156</sup> SWIRE & AHMAD, *supra* note 142, at 7, 23–24.

<sup>157</sup> There are state level privacy principles, such as South Carolina's which include many of the safeguards prescribed by the FIPPs and other federal privacy regulations. See *Privacy Principles*, S.C. DEP'T ADMIN., [http://admin.sc.gov/technology/enterprise-privacy/privacy-principles\\_](http://admin.sc.gov/technology/enterprise-privacy/privacy-principles_) (last visited Feb. 20, 2017). But much like the Smart City revolution, many of the biggest changes are being felt on the level of cities, such as Seattle, who are crafting more targeted and specific privacy policies to deal with the specific Smart City framework that is being implemented there. See Michael Mattmiller, *Privacy*, SEATTLE.GOV., <http://www.seattle.gov/tech/initiatives/privacy> (last visited Feb. 20, 2017).

<sup>158</sup> SWIRE & AHMAD, *supra* note 142, at 39.

<sup>159</sup> Mattmiller, *supra* note 157.

<sup>160</sup> *Id.*

list of principles that could be adopted when a government based platform wants to begin collecting, analyzing, and publishing information.<sup>161</sup>

Among the more popular mechanisms through which privacy rights are enforced, the types of protected information are defined and standards are created to determine who can keep the information, how long the information can be kept, how it is amended, and how it is removed.<sup>162</sup> With federal and local laws in mind, the easiest way to adhere to these principles would be to proactively design them so that they are not even capable of collecting personally identifiable information. The proactive approach of “privacy by design” has actually become a guiding principle for data privacy professionals across the United States.<sup>163</sup> The preceding section demonstrates that many open data platforms have been deliberately designed not to collect specific fields of information that might contain personally identifiable information or other sensitive information.<sup>164</sup> However, because such transfers of information pose a risk of harm to the users who have a great deal of their information on these platforms, information security must also be addressed.

### C. Information Security

Just as privacy is sectoral, there is no comprehensive authority in the United States for information security. As it is with privacy law, actions can be brought under Section 5 of the FTC Act for unfair and deceptive practices with regard to information security. Another facet information security shares with privacy is that many of the problems created by security vulnerabilities can be avoided by design – through having targeted collection and timely disposal of information.<sup>165</sup> These steps alone, however, are not going to be enough to eliminate all risk. Over the last several years, many groups have been devoted to understanding how to regulate cybsersecurity as it pertains to the distributed architecture of the Internet of Things. Among the standards that have emerged in

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<sup>161</sup> *Open Data Policy Guidelines*, SUNLIGHT FOUNDATION, <http://sunlightfoundation.com/opendataguidelines/> (last visited Feb. 20, 2017).

<sup>162</sup> See 12 U.S.C. § 1232(g) (2013). The HIPAA statute, Transaction Rule, Privacy Rule (with all the amendments), Security Rule and published guidance can be found online. *Health Information Privacy*, HHS.GOV, [www.hhs.gov/ocr/privacy/](http://www.hhs.gov/ocr/privacy/) (last visited Feb. 20, 2017).

<sup>163</sup> *Glossary of Privacy Terms*, IAPP, <https://iapp.org/resources/glossary/group/cippus/> (last visited Feb. 20, 2017).

<sup>164</sup> See, e.g., Eric Gordon & Jessica Baldwin-Philippi, *Making a Habit Out of Engagement: How the Culture of Open Data Is Reframing Civic Life*, in BEYOND TRANSPARENCY, *supra* note 23, at 139.

<sup>165</sup> Exec. Order No. 13636, 78 Fed. Reg. 33, 11739 (Feb. 19, 2013). President Obama introduced Executive Order 13636, which Established that “[i]t is the Policy of the United States to enhance the security and resilience of the Nation’s critical infrastructure and to maintain a cyber environment that encourages efficiency, innovation, and economic prosperity while promoting safety, security, business confidentiality, privacy, and civil liberties.” *Id.*

this space include Executive Order 13636, National Institute of Standards in Technology (“NIST”): Framework for Improving Critical Infrastructure Cybersecurity, the FISMA Metrics,<sup>166</sup> the Gramm-Leach-Bliley Act Safeguards Rule,<sup>167</sup> the HIPAA Security Rule,<sup>168</sup> and FACTA’s “Red Flags Rule.”<sup>169</sup>

The NIST framework codifies some of the basic standards and practices that were already employed by private companies into five Core Functions, that requires organizations to identify the areas and assets it has that produce information, create appropriate safeguards for the transfer of that information, develop a mechanism for detecting when that information is vulnerable, outline the appropriate activities to take regarding given cybersecurity events, and establish strategies for recovering any lost information.<sup>170</sup> The framework then establishes implementation tiers which monitor the extent to which organizations are complying with these standards via a two pronged process which involves an audit and penetration testing.<sup>171</sup>

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<sup>166</sup> Coordination of Federal Information Policy, 44 U.S.C. §§ 3501-3558 (2017).

<sup>167</sup> Corporate Powers of Associations, 12 U.S.C. § 24(a) (2016).

<sup>168</sup> 45 C.F.R. §§ 160, 164(A), (C) (2013).

<sup>169</sup> 15 U.S.C. § 1681(c) (2010).

<sup>170</sup> *Framework for Improving Critical Infrastructure Cybersecurity*, NAT’L INST. OF STANDARDS & TECH. 1, 8-9 (Feb. 12, 2014), <https://www.nist.gov/sites/default/files/documents/cyberframework/cybersecurity-framework-021214.pdf>. “The five Framework Core Functions are defined below. These Functions are not intended to form a serial path, or lead to a static desired end state. Rather, the Functions can be performed concurrently and continuously to form an operational culture that addresses the dynamic cybersecurity risk . . . Identify – Develop the organizational understanding to manage cybersecurity risk to systems, assets, data, and capabilities. The activities in the Identify Function are foundational for effective use of the Framework. Understanding the business context, the resources that support critical functions, and the related cybersecurity risks enables an organization to focus and prioritize its efforts, consistent with its risk management strategy and business needs. Examples of outcome Categories within this Function include: Asset Management; Business Environment; Governance; Risk Assessment; and Risk Management Strategy. Protect – Develop and implement the appropriate safeguards to ensure delivery of critical infrastructure services. The Protect Function supports the ability to limit or contain the impact of a potential cybersecurity event. Examples of outcome Categories within this Function include: Access Control; Awareness and Training; Data Security; Information Protection Processes and Procedures; Maintenance; and Protective Technology. Detect – Develop and implement the appropriate activities to identify the occurrence of a cybersecurity event. The Detect Function enables timely discovery of cybersecurity events. Examples of outcome Categories within this Function include: Anomalies and Events; Security Continuous Monitoring; and Detection Processes. Respond – Develop and implement the appropriate activities to take action regarding a detected cybersecurity event. The Respond Function supports the ability to contain the impact of a potential cybersecurity event. Examples of outcome Categories within this Function include: Response Planning; Communications; Analysis; Mitigation; and Improvements. Recover – Develop and implement the appropriate activities to maintain plans for resilience and to restore any capabilities or services that were impaired due to a cybersecurity event. The Recover Function supports timely recovery to normal operations to reduce the impact from a cybersecurity event. Examples of outcome Categories within this Function include: Recovery Planning; Improvements; and Communications.” *Id.*

<sup>171</sup> *Id.* at 5. “The Framework Implementation Tiers (‘Tiers’) provide context on how an organization views cybersecurity risk and the processes in place to manage that risk. . . The Tiers characterize an organization’s practices over a range, from Partial (Tier 1) to Adaptive (Tier 4) and

In another report that has yet to become law, NIST identified several areas that would be impacted in the context of smart cities and big data analytics operations, including: numerous points of attack, exploitation of city data by attackers, physical consequences for cyberattacks, cloud security, vulnerabilities in the constant collection and transfer of data, security systems on resource-constrained devices, security maintenance for a diverse range of devices, and balanced and streamlined regulations.<sup>172</sup> And while not all of these considerations are going to apply specifically to the sharing of information within a sharing economy's distributed network, security needs to be addressed and these companies are doing it.

The government has set up a plan through which they operationalize their information security measures, through the Federal Information Security Management Act ("FISMA"), which defines a comprehensive framework through which government information ought to be protected.<sup>173</sup> The FISMA metrics create standards that based on an audit of the security system, requiring an analysis of the number of endpoints on a network, the locations of those endpoints, the operating system(s) for the various endpoints on the network(s), the people that are permitted to access the network(s), the varying levels of security given to individuals across the networks(s), the training required for each tier of access to the network(s), the Internet protocol services connections within the network, the directions data can flow within a network, network defense, and breach response plans.<sup>174</sup>

And while the regulation of the security of information on the Internet is a step in the right direction, it is not going to prevent digital thieves from trying to steal information. The market will likely be the provider of many of the greatest weapons against these threats, with worldwide spending on information security reaching \$70 billion in 2015 and 2016 "promises to be a big year for the cybersecurity industry."<sup>175</sup> The following section identifies how all of these various components might be packaged together to create optimal policy frameworks.

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describe an increasing degree of rigor and sophistication in cybersecurity risk management practices and the extent to which cybersecurity risk management is informed by business needs and is integrated into an organization's overall risk management practices." *Id.* at 9. The services offered by many of the organizations that conduct cybersecurity operations involve assessments of risks, audits, and penetration testing in order to see where vulnerabilities exist, identify why they are there and what can be done to fix them.

<sup>172</sup> Hogan Lovells, *NIST Tackles Cybersecurity in the Smart City*, LEXOLOGY (June 22, 2015), <http://www.lexology.com/library/detail.aspx?g=fb349903-16b3-467d-9350-be9ba71573a8>.

<sup>173</sup> See Federal Information Security Management Act, § 44 U.S.C. 3554 (2016).

<sup>174</sup> See *id.*

<sup>175</sup> See Steve Morgan, *Cybersecurity Market Reaches \$75 Billion in 2015; Expected to Reach \$170 Billion by 2020*, FORBES (Dec. 20, 2015), <http://www.forbes.com/sites/stevemorgan/2015/12/20/cybersecurity%E2%80%8B%E2%80%8Bmarket-reaches-75-billion-in-2015%E2%80%8B%E2%80%8B%E2%80%8Bexpected-to-reach-170-billion-by-2020/#4c803e1e2191>.

#### IV. RECOMMENDATIONS AND CONCLUSIONS

The last two sections of this paper have explored the historical and theoretical underpinnings of the different regulatory components that exist in both the ridesharing and the homesharing vectors for platform-based sharing economy apps and sorted them into two different categories: the non-technological regulatory components that they have in common with their incumbent equivalent industry and the technological regulatory components that they have in common with other types of distributed networks. Because distributed networks have disrupted the way services are delivered, this has not only created new issues for regulators to deal with but it has also changed the way regulation takes place. Notably the increased production of data means that policies can better suited to achieving their intended purposes, as demonstrated through the concept of micro directives.<sup>176</sup> The results have been shown by the successes of sharing economy firms such as Uber and Airbnb, who use proactive, digital self-regulatory strategies to gain a competitive advantage over their rivals are clearly helping them move the bar well beyond that of their rivals. So why aren't cities doing more to try to emulate these successes?

Moving forward, in order to harness the power of the disruption caused by distributed networks, model sharing economy policies should defer to the self-regulation that is taking place on these platforms already, but enter into a system of information sharing and algorithmic regulation in order to properly leverage the power of the latest disruption. A long held maxim is that "[e]very law maker, public or private should make decisions based on all information available at reasonable cost."<sup>177</sup> And "[i]n absence of good reasons to the contrary, every lawmaker should leave as much flexibility as possible to later, more decentralized, or more informed actors."<sup>178</sup> In the current technological environment, this could logically be extended to mean actual data that is already being produced by these platforms.

Additionally, certain policies that were crafted before the type of sharing that takes place today could be implemented ought to be reevaluated and that place a great emphasis on ownership ought to be reevaluated. For if these policies are truly motivated to achieve efficiency, then they will need to be reformed to accommodate these new efficiencies. The appropriately named organization that has been promoting many of these policies, Shareable, has a policy framework that identifies how such policies could be implemented to help achieve efficiency in ridesharing, homesharing, and other areas.<sup>179</sup> However, these changes are

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<sup>176</sup> See Casey & Niblett, *supra* note 11, at 11.

<sup>177</sup> Avery Katz, *Taking Private Ordering Seriously*, 144 U. PA. L. REV. 1745, 1752 (1996).

<sup>178</sup> *Id.*

<sup>179</sup> See generally *Policies for Shareable Cities: A Sharing Economy Policy Primer for Urban Leaders*, SHAREABLE & SUSTAINABLE ECONOMIES LAW CENTER (Sept. 9, 2013), <http://d3n8a8pro7vhmx.cloudfront.net/theselc/pages/209/attachments/original/1394836950/policies>

typically quite political and each city might not yet be ready to implement these types of things, or their interests might be contrary to these goals. One way that local governments could start to prepare for these changes is by creating data-centric regulatory frameworks and a mechanism through which the frameworks can be implemented.

### A. Model Sharing Economy Policy

While it will certainly be challenging to lead this shift the potential uses and applications for this type of policy framework promises to increase the abilities of regulators to perform tasks which would otherwise be impossible without the use of the technology. By leveraging the infrastructure that is already in place by companies like Airbnb and Uber, cities can shift the regulatory burden from the operators seeking a permit to the platform and regulate behaviors emanating from the network through code.

From the computer ethics analysis, it is clear that a model sharing economy would contain those regulatory components that the platform-based sharing economy apps have in common with their incumbent equivalent industries. Nick Grossman has shown that this shift in the mechanics of compliance can be enabled by trading some of the up front permissions for a more data-driven form of accountability.<sup>180</sup>

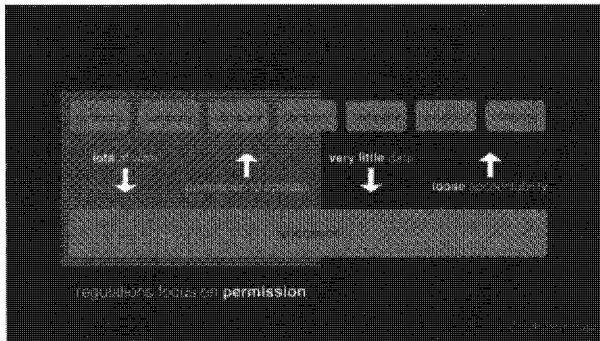


Figure 3: Reactive Regulatory Framework<sup>181</sup>

[for\\_shareable\\_cities\\_selc\\_9\\_9\\_13.pdf?1394836950.](#)

<sup>180</sup> Nick Grossman, *The Public Data Layer*, THE SLOW HUNCH (Jan. 26, 2017), <http://www.nickgrossman.is/2017/01/the-public-data-layer/>.

<sup>181</sup> Nick Grossman, *Here's the Solution to the Uber and Airbnb Problems – and No One Will Like It*, THE SLOW HUNCH (July 23, 2015), <http://www.nickgrossman.is/2015/07/23/heres-the-solution-to-the-uber-and-airbnb-problems-and-no-one-will-like-it/>.

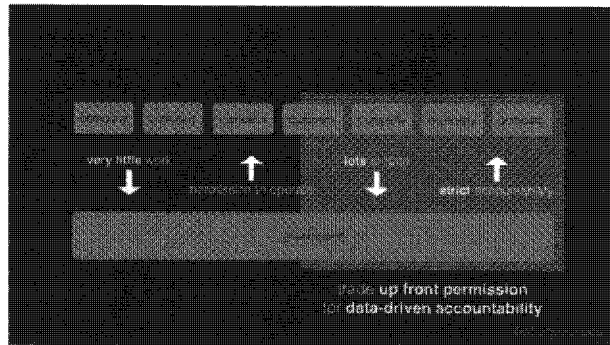


Figure 4: Proactive, Data-Driven Regulatory Framework<sup>182</sup>

Instead of requiring sharing economy firms to register, give them an option to be regulated under either the traditional model or under the data-model. The traditional model could include the four types of regulations pointed out in section 2, but would also be supplemented with standards that are centered around the sharing of information between platform-based sharing economy operators, the platform-based sharing economy providers, and the local governments interfacing with the platform-based sharing economy. As more and more applications start making use of advances in decentralized computing, an analysis of the data produced by disparate systems will be able to provide regulators with better insights that can be used to drive better policy decisions.

For instance, a model ridesharing regulation would include the regulatory components that are found in the taxi industry (background checks, licensing, etc.), the regulatory components that exist for operators of platforms (privacy, information security, etc.) and would do so in a way that simultaneously reduces the burden on city officials and improves the information from which policies are making decisions. The same could be said for the homesharing industry as well. There would be the regulatory components for issues faced by the hotel industry, such as inspections, but it would be done in such a way that highlights the data producing abilities of the platforms. Some data scientists have started collaborating with cities to use data about restaurant reviews from Yelp, a platform where people can review services around their city, to identify the specific restaurants that had the greatest likelihood of having a health code violation, and were able to do so more effectively than health code inspectors.<sup>183</sup> The beauty of this type of regulatory framework is that it takes information that already exists, but it gives it a greater value.

<sup>182</sup> *Id.*

<sup>183</sup> See, e.g., Laura Adler, *What Can Boston Restaurant Inspectors Learn from Yelp Reviews?*, GOVTECH.COM (May 26, 2015), <http://www.govtech.com/dc/articles/What-Can-Boston-Restaurant-Inspectors-Learn-from-Yelp-Reviews.html>.

## B. Steps for Implementation

Government offices with a technological infrastructure already in place will be better equipped to handle the disruption than those without. However, the path for all offices to get the most out of these distributed networks remains the same. First, the default rule for the production of information will need to be that it is in machine readable format. Then, an architecture will need to be built or otherwise acquired in order to have the ability to monitor what the information is producing. And finally, algorithms will have to be created to help indicate when and where policy goals are being met, where they are falling short, and what can be done to fix that.

For offices that are overstressed, this trend toward more complicated and expensive hardware and software may seem superfluous, especially if there simply are not the resources to begin regulating in this capacity, but these costs can be reduced through the leveraging of the network. This could be done most simply by putting information into excel sheets. Once in excel, code can be written to make better use of the information on an as needed basis. Policies then can be calibrated and recalibrated as needed in order to meet desired outcomes. This is not a revolutionary idea, either. Sunset clauses and legislation requiring periodic review has become increasingly popular over the last several decades and has been included in the Patriot Act, the Congressional Budget, and Impoundment Control Act of 1974.<sup>184</sup> Some have even suggested that *all* laws should be time limited.<sup>185</sup> This shift toward iterative policy measures will also help mitigate the fears of technology skeptics that do not believe that the technology is capable of regulating behavior because their will be a required review period in the future.

As enforcement becomes more effective through the use of algorithms, many of the jobs that were suited to the previous regulatory operating system will become unnecessary. This is a reality of saving money and part of Carlota Perez' cycle of disruption. But just like with the development of the automobile and the passage of the New Deal, this regulatory shift and its subsequent savings will add jobs rebuilding infrastructure (technological or non-technological) or as otherwise needed and could meaningfully help improve the function of the city.

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<sup>184</sup> See Sofia Ranchordas, *The Whys and the Woes of Experimental Legislation*, 1 THEORY & PRACTICE LEGISLATION 415, 430 (2013); 2 U.S.C. §§ 601-688 (2016).

<sup>185</sup> See Tom Giovanetti, *Every Law Should Have an Expiration Date*, NATIONAL REVIEW (Jun. 8, 2015, 4:00 AM), <http://www.nationalreview.com/article/419433/every-law-should-have-expiration-date-tom-giovanetti>.



### C. Thoughts and Concerns for the Future

The implementation of algorithmic regulations represents a large change to the operating system of the modern smart city, but it will be necessary in order to harness the disruption created by distributed networks. The best regulators, moving forward will be the ones that can figure out a way to solve the challenges faced by disruption with the best information. The City of Seattle, for example, has implemented a data-reporting regulatory component for the use of TNCs in that jurisdiction.<sup>186</sup> As demonstrated in this article, other cities would be benefitted in the long-term by taking steps to address the disruption caused by the sharing economy in a similar fashion. And as technology continues to get more advanced, the framework offered in Section 2, can serve as a guidepost for how to evaluate regulations and realign them to solve new challenges. Otherwise, problems associated with private ordering, such as information asymmetries, lack of transparency, and negative incentive structures will become larger and more apparent.

Already, with the Blockchain, for example, the world is seeing an increased ability to record incredibly large numbers of interactions on an incorruptible public ledger and encode system “rules linking these interactions to specific transactions (e.g., the assignment of cryptographic tokens or the allotment of micro-payments)” to establish better incentive systems and improve the efficiency of commons-based resources.<sup>187</sup> As technology continues to progress, and the Internet of Things and smart city movements proliferate, the way law and civic functions are performed needs to be reoriented in such a way

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<sup>186</sup> *Transportation Network Companies: Data Reports*, SEATTLE.GOV, <https://www.seattle.gov/business-regulations/taxis-for-hires-and-tncs/transportation-network-companies/tnc-companies> (last visited Mar. 1, 2017) (“Taxicab associations, for-hire vehicle companies and transportation network companies must compile accurate and complete operational records and keep these records for two years. The records must include: The total number of rides provided by each taxi, for-hire vehicle license holder or transportation network company; The type of dispatch for each ride (hail, phone, online app, etc.); The percentage or number of rides picked up in each ZIP code; The pick up and drop off ZIP codes of each ride; The percentage by ZIP code of rides that are requested by telephone or applications but do not happen; The number of collisions, including the name and number of the affiliated driver, collision fault, injuries and estimated damage; The number of rides when an accessible vehicle was requested; Reports of crimes against drivers; Records of passenger complaints; and Any other data identified by the director of the Department of Finance and Administrative Services to ensure compliance. Records may be maintained electronically. Data must be reported quarterly to the director of the Department of Finance and Administrative Services. Reports are to be made electronically on forms provided by the director.”).

<sup>187</sup> Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia*, SSRN 1, 38 (Mar. 20, 2015), <https://poseidon01.ssrn.com/delivery.php?ID=635090098026019005082106103030031113035055008027063057097125087071104125123026114023103053058028021063113099016014125095007122118025036001009121112069071113093086093032069067098123026104070103009112072118104068073080106095122069066081026107105070105127&EXT=pdf>.

that can take advantage of technologies that improve efficiency and efficacy. Creating a system that is capable of processing machine readable information to instantaneously make complex decisions is something that will have to happen before organizations can begin to realize the vast potential of Smart Cities, Big Data, Blockchain, the Internet of Things, Machine Learning, and other disruptive developments looming on the horizon.

