



BRIE Working Paper  
2016-9

**WHAT IS THE FUTURE OF WORK?  
UNDERSTANDING THE PLATFORM ECONOMY AND  
COMPUTATION-INTENSIVE AUTOMATION**

Martin Kenney and John Zysman

What Is the Future of Work?  
Understanding the Platform Economy and Computation-Intensive Automation  
A proto-paper  
December 2016

Martin Kenney  
Distinguished Professor  
Community and Regional Development  
University of California, Davis  
/  
Senior Project Director, BRIE  
Berkeley Roundtable on the International Economy

&

John Zysman  
Professor Emeritus  
Department of Political Science  
/  
Director, BRIE  
Berkeley Roundtable on the International Economy  
University of California, Berkeley

Proto-paper prepared for Radcliffe Institute, Conference on Work and Welfare in the Platform Economy, December 2, 2016. This paper is a merger of our two streams of research and the alphabetical order is for identification purposes only.

This note is intended to help set the groundwork for a discussion of cross-national variation in responses to the emergence of labor-market platforms (LMP). The politics and policy of the labor exchanges will unfold as part of the development of the platform economy. We consider in three steps: 1) The character of the rise of the Platform Economy in an era of computing abundance; 2) The diverse array of work arrangements that are in play; 3) Whether computation intensive automation will be an increasingly powerful force in labor politics in this era.

### **Platform Logic**

The digital transformation itself has been underway for half a century, but the ever-increasing power of digital tools and the deployment of high-speed and mobile wireless, connectivity is generating a new phase. We characterize this as the era of cloud computing and the rise of the Platform Economy.<sup>1</sup> The abundance of computing resources, expressed in Cloud Computing, is manifested as, Digital Platforms, Big Data, and Computation-Intensive automation (CIAutomation). Together, they provide tools with which social actors are reorganizing the very character of work, the nature and dynamics of labor markets, and the rules and the institutions of marketplaces more generally.<sup>2</sup>

The consequences of LMPs, the focus of this workshop, cannot be detached from this broader story. As difficult as this may make analysis, we must engage this broader setting, even while focusing upon LMPs in particular. Policy decisions made about this broader setting, and the political coalitions around those decisions will contribute to the context in which choices are made about the purely LMPs, and more broadly, about the character of work, the organization of labor itself, and the politics of labor. Consider two examples. Privacy rules made in response principally to social media may set the template for the way LMPs matching demand and supply can operate. Issues of the transparency of platform algorithms are certainly raised by Uber, and are increasingly of general concern.<sup>3</sup> The fights could be resolved, just a guess, in battles about the introduction of self-driving automobiles.<sup>4</sup> Critically, we must understand the economic forces and business logics that are impinging upon existing institutions, so that it is possible to identify the policy choices that will shape how digital platforms more generally can be deployed and operate. Those parameters will affect labor through diverse channels.

Digital Platforms, algorithmic structures in code, are built for very diverse purposes and

facilitate a variety of market and social ecosystems<sup>5</sup> Competition will often not be just amongst firms with their service and product offerings, but amongst platform-based ecosystems.<sup>6</sup> Platforms are, in that sense, algorithm-enabled “cyber-places” where constituents can act, interact, or transact.<sup>7</sup> Those transactions can be organized in a remarkably diverse set of ways depending upon whether they are motivated by market or social functions or by technical character.<sup>8</sup> Each category and, very often, each specific implementation, opens equally diverse issues and questions. There are consumer goods platforms from eBay through Amazon and Alibaba that link buyers to sellers, raising legal questions of tax collection and legal liabilities. There are LMPs such as Uber or Upwork that change who can buy and sell on-demand services; some of which can only be delivered locally, while others can be delivered globally,<sup>9</sup> thereby integrating previously separated labor markets or mobilizing new service providers in local markets. As a result, LMPs often force rethinking of traditional regulatory structures. Taxis cannot discriminate, but can Uber drivers? Hotels must obey land use rules and not discriminate, but must Airbnb providers do so?<sup>10</sup> Another illustration is that the data Facebook collects allows it (not by using facial recognition) to identify “ethnic affinities” for advertising purposes.<sup>11</sup> Who reviews the algorithms to decide if they are discriminatory? Who has access to the data to determine if the results are discriminatory? Who can inspect the algorithms? Who should have access to the private databases and for what purposes? And, if, for example, discrimination is possible, then who should enforce anti-discrimination – the private parties contracting, the platform owner, or the “State”? And if the latter, which “State”?

From a different vantage, that of industrial production, the Internet of Things, that vague category of objects linked through cyber connections, opens questions of industrial standards and data. There is already a global struggle about standards and rules for data. Setting industrial standards and determining who owns the algorithms on production platforms, will then powerfully set or reset the landscape of competition amongst industrial equipment producers? Power may turn on who owns or has access to different kinds of industrial data.<sup>12</sup> The German promoted notion of Industrie 4.0 presents a particular relationship of manufacturing to the cyberworld. For Silicon Valley, it is an entirely different relationship of the cyberworld to manufacturing with manufacturing integrated into a software-defined framework.<sup>13</sup> The difference is more than symbolic, but rather touches how standards are to be set and regulated, i.e., where the locus of power will sit. The corporate market competition amongst the likes of

Cisco, G.E., Google, Komatsu, and Siemens will, at least, in part turn on the answers to such questions.

The feature common to all platforms, and central to our discussions of the politics of labor, is that digital platforms are private governance structures (PGS – as a shorthand) existing by their very nature in tension with public governance. Digital platforms are sets of parameters and rule systems that shape what can be done by whom and on what terms. The notion of private governance structures, PGS, thus extends the fundamental insight of Larry Lessig in his book *Code and Other Laws of Cyberspace* nearly twenty years ago.<sup>14</sup> Code, he argued, operates very much like law in regulating behavior. Computer code, which he referred to as West Coast Code, as the digital revolution was then underway in Silicon Valley, is juxtaposed to “East Coast Code”, i.e. legal code.<sup>15</sup> Hence, laws governing platforms in general are central to understanding the structure of choice in any particular domain within which digital platforms become central organizing institutions.<sup>16</sup> Critically, objectives and values expressed in a pre-code, pre-platform era cannot just be restated in the digital era. Rather they must find expression in the code-based operation of the economy, in the algorithms of the Platform Economy.<sup>17</sup> Indeed, we note, but do not develop here, that some of the decisions about data privacy, algorithm transparency, and competition may be made in international negotiations.

Let us, therefore, before returning to labor issues, consider the character of the present phase of the digital revolution. Digital abundance, symbolized and actualized in cloud computing, accelerates the Digital transformation of services. This transformation has been underway for some time and is central to labor. The story of supply chains and the decomposition of production is well studied and widely discussed. The business dynamics of outsourcing that generated global supply networks are several. Certainly, labor costs, conditions, and skills are part of diverse “production functions” that diffuse location of activity. In many cases, as important, is the growing complexity of products and materials requiring know-how and skills outside a particular firm’s expertise.<sup>18</sup> That contributes to the belief that it is best to focus on strategically important capacities. That notion would be attractive if only what is strategically important would stay constant.<sup>19</sup> For example, it is hard to judge when manufacturing is a commodity to be bought in the market or an asset to be developed internally, and the answer evolves.<sup>20</sup> The recomposition of production around specific phases of production from original design through volume production at particular locales is the

counterpoint to the original decomposition.<sup>21</sup> The result of the decomposition/recomposition process is an industrial commodity trap often with intense price-based competition. The extent of price competition, of course, depends on a firm's power in the value chain, which is derived from product and process innovation, branding, and platform-based service systems.

There are multiple strategies to escape price traps including traditional product or process innovation and branding. Embedding a product – a tire, a jet engine, a refrigerator -- in a digital-based service offering is one strategy that is relevant here, a strategy we labeled “services with everything,” services provided on an ICT platform.<sup>22</sup> This not only shifts the terms of competition, but creates new forms of work and new ways of engaging with workers. Indeed, “services with everything”, along with the outsourcing of services changes more broadly the meaning of services in the economy. “Service activities themselves are changed when they can be converted into formalizable, codifiable, computable processes, processes often with clearly defined rules for their execution.” It is a complex process that has now become a fundamental feature of the business strategy of most major companies. To give it a name, Zysman refers to it as the algorithmic service transformation, facilitated by IT tools.

Platforms, then, are algorithms residing in the Cloud. To repeat, platforms are, in that sense, algorithm-enabled cyber-places where constituents can act, interact, or transact. Business processes from finance and accounting through to customer support and CRM are altered when they can be treated as matters of information and data management.<sup>23</sup> These platform services mean that the producer, in a sense, sells the function for which the product is intended rather than the standalone product. Hence, a producer of construction equipment, Komatsu in Japan, sells site management services that use digital tools embedded in their product to create platforms that, for instance, redesign the work; a crane manufacturer in Finland sells port management platforms and services linked to their equipment; tire manufacturers such as Michelin sell services to monitor tire wear across fleets, and jet engine manufacturers such as GE do something similar. Entirely new forms of work are generated, often in new locations, and also much work is replaced. In many cases, the work is organized in traditional employment relationships (i.e., full-time etc.), but in other cases the work is organized to be provided through consulting, gigs, consignments, or yet other relationships. The formats for organizing production become, in that sense, fissured.<sup>24</sup>

This section highlights three points of relevance to our discussion: 1) The diversity of platforms means rules for LMPs will often be determined as the result of fights about other sorts of platforms. Many rules influencing LMP will, for instance, be set in the struggles over IOT and manufacturing systems. Certainly, there will be battles amongst privately generated platform-based eco-systems. Indeed, national or regional platform eco-systems may vary dramatically, complicating the platform wars<sup>25</sup>. The clearest instance is the contrast between Chinese platform structures, evolving into business group-like structures, and Silicon Valley platform structures emerging as best of breed.<sup>26</sup> As important, some of the fights about the parameters of the platforms will be settled in international negotiations. 2) Platforms are PGS, extending Lessig's metaphor, that stand in tension with each other and with public governance arrangements. Of particular importance will be rules about algorithmic transparency and data privacy. 3) The era of computing abundance, expressed in platforms and the cloud, accelerates the ICT-enabled transformation of services. Indeed, the increasing ease of constructing platforms means platforms will be built on platforms creating fascinating and often competing systems.

### **Platforms Reorganizing Work**

Let us then move to the specific context of labor and work. The task, it seems to us, is to situate the subset of platforms on which this conference chooses to focus, in the context of the broader perspective of labor participation and compensation in the Platform Economy. So, in this section we make an initial effort to classify the variety of labor market-related platforms by their compensation schemes, number of participants, and organizational logic, even while understanding that no such classificatory scheme can be exhaustive.

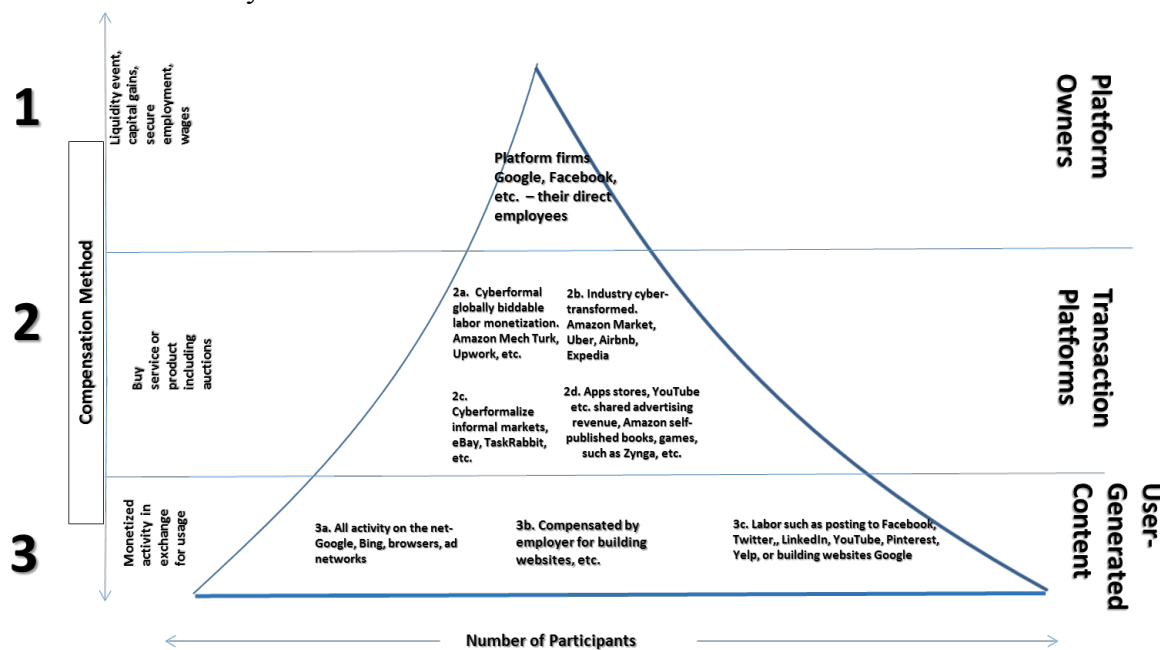
What Friedman termed the movement toward a "Gig Economy", we note, was underway without the influence of digital platforms.<sup>27</sup> It is the outcome of a process of eroding the tight coupling of work and employment in the production of goods and services and the creation of value. Recent studies by JPMorgan Chase Institute suggest that the gig platform segment (LMP in our terminology) is quite small and, more surprisingly, according to their measurements, which focus most directly upon transportation network (Uber/Lyft) and alternative lodging services (Airbnb) is not growing rapidly.<sup>28</sup> The segments of work touched by the categories that are our focus continue to be a small fragment of the totality of platform-based work.<sup>29</sup>

Let us consider the types of work/value creation activities that may be found in the Platform Economy (PE). In Figure One, we identify three sets of general types, three layers in a pyramid, of value creation activities that are emerging or, perhaps, more properly, coalescing in the Platform Economy.

- \* Layer 1 consists of a small group who finance and organize, build and implement the business models, and are compensated by wages and stock options.
- \* Layer 2 consists of transaction platforms of various forms. This is core of what people perceive as the marketplace of the Platform Economy. We examine four subsets below.
- \* Layer 3 is a mix of activities that underpin the operation of the platform economy. In many senses, those activities are foundational.

Together this constitutes a complex, diverse, and extensive Platform Economy workforce.

Figure One: Stylized Depiction of the Organization of Labor Participation and Compensation in the Platform Economy



Acknowledgements: Thanks to John Zysman, Ruth Collier, Bryan Pon and Lilly Irani for suggestions and comments on this figure.

Copyright: Revised from Martin Kenney 2015

Source: M. Kenney. 2015<sup>30</sup>

The layers are organized in the form of a pyramid, Figure One. The Y axis describes the dominant form of compensation for service providers at that level. The X axis illustrates the relative number of users and providers in each layer. The pyramid is intended to evoke the differential benefits to the participants and producers at each layer. We briefly describe the



value creation process at each layer and observe that at each layer the platforms have different labor implications.

Layer One is the apex of the pyramid. This layer encompasses those organizing and financing the platforms, and compensated, often significantly, by participation in the success of the platforms. The overall number of employees in this layer is remarkably few, particularly when compared to the firm's revenues. As a successful platform expands, revenues often grow even more rapidly than direct employment. The compensation for employees in Layer One is through salary and stock options/equity, which ties their economic fates directly to their firms.<sup>31</sup> In return for working long hours, direct employees of the platform firms, have remarkable benefits that often include free meals, transportation, etc. As these firms are almost invariably venture capital-funded, the goal of both the financiers and employees is to successfully be acquired or undertake an initial public stock offering, whereby the value of the platform is realized in capital gains. In successful firms, early employees and investors experience outsize capital gains. Despite the centrality of these firms, they employ relatively small numbers of direct employees.

Layer 2 is composed of a wide variety of transaction platforms. We divide this transaction layer into four categories that, in different ways, organize the sale of a service or a product. A number of these are LMPs, which is the conference focus. We emphasize that these LMPs are part of a larger, more encompassing, set that includes platforms such as Amazon, eBay, and Etsy that are platforms for product sales.

- \* a. Globally biddable labor platforms: Biddable service work is composed of firms that leverage the fact that an increasing amount of work can be done virtually. This group can be understood, in some ways, as an extension of service work offshoring that has been underway since the late 1980s. The difference between earlier offshoring is that the introduction of publicly-accessible platforms such as Upwork, Freelancer.com, Outsourcely, or Guru.com and many others allow transacting between a purchaser and a provider. There is a large variety of platforms in this sector ranging from Amazon Mechanical Turk, which is oriented toward micro-work, to Upwork, which is oriented toward longer-term jobs; most of which are relatively standardized. There are also various platforms for more innovative work. While these platforms are growing, there may be limits to their expansion, as the tasks must be amenable to spot-contracting. If the tasks are either too complex to describe with the exact specifications necessary for an entirely digital relationship, require larger teams organized hierarchically, or must be coordinated across very different tasks or geographies, such spot-contracting is not likely to be effective. In other words, there

appear to be limits to the growth of these platforms, as the tasks contracted must be amenable to such spot-contracting.

- \* b. Cyber-Transformed Industries. Platforms transforming existing industries create new forms of labor relations; we include existing industries that may be or are being transformed by digital platforms. While Uber/Lyft and Airbnb have received the greatest attention, as mentioned earlier, Amazon had a dramatic transformative effect upon retailers of physical products, in particular, books but increasingly many other products. In the case of Uber/Lyft, the service provider monetizes both their labor and their assets (automobile or housing space). Obviously, in cities where Uber/Lyft are unregulated the taxi industry is in danger of extinction. The question of whether jobs are lost by the entry of platforms such as Uber is unclear, but recent research suggests that in the case of the transportation platforms, even while there is clearly a displacement of taxi drivers, the total number of drivers may be increasing.<sup>32</sup> What is in question is whether the incomes for taxi drivers have decreased. The impact on the number of jobs and incomes of hotel workers, the labor group most likely to impacted by Airbnb, is less understood.<sup>33</sup>
- \* c. Cyber-formalized Informal Markets. These markets replace, augment, or exist alongside existing informal markets. Salient examples of this are Craigslist and eBay, which replaced not only classified ads but also informal markets such as garage sales and swap meets with online alternatives. In pure service provision, firms such as TaskRabbit, GrubHub, etc. are formalizing work that previously had been provided through informal relationships. These platforms formalize services that have been previously been provided through quite informal labor markets. This has some interesting ramifications as now there are cyber records of all of the transactions, which makes them visible to regulatory or taxation authorities. Despite the recent hype and flood of venture capital into startups in this area, the LMP in 2c may have limited growth opportunities. The most difficult obstacle to overcome is the possibility that the contractor and service provider will form an offline relationship and thus will no longer transact on the platform. In cases where there are face-to-face interactions and the desire for repetition, disintermediation of the platform is not only possible, but also likely.
- \* d. Virtual Consignment Markets. The emergence of online platforms provides opportunities for producers to monetize digital goods. These are “consignments”, because the goods are created by the producers and then uploaded to the platform, at no cost to the platform owner. The most important of these are the Apple and Google apps stores and YouTube, but also includes Amazon self-publishing and various platforms for indie music. The earnings on these platforms are growing rapidly. In 2015, in total the Apple and Google app stores paid developers more than \$10 billion, YouTube paid out in excess of \$4 billion, and Amazon is estimated to pay approximately \$1 billion per year to authors. These virtual consignment businesses have some interesting attributes. The first attribute is that the platform owner receives all content cost-free. The second attribute is that content producer returns are characterized by power law returns. Our calculations indicate roughly 18,000 YouTube channels earn \$60,000 or more per year in advertising, while 55,000 channels generate \$24,000 per year. However, as interesting is, that in the case of YouTubers, creators with substantial followings generate further income through

personal appearances, product placements and endorsements, patronage sites, and even dedicated product lines. PewDiePie, the most successful independent YouTuber, is estimated to earn \$12 million per year from his entire portfolio of income sources.<sup>34</sup> How large the virtual consignment model can become is uncertain.

Layer 3 is foundational to the entire Platform Economy. It involves a complex web of activities and merits a much longer discussion. For now, we truncate the discussion and just note subsets of activities.

- \* One subset includes those who are paid or volunteer to build websites and platforms. (We distinguish these workers from those not in Layer 1 who organize the business models and companies.) This is the world, for example, of website creators, effectively, the “books” for which the users are searching. The scale of Internet is remarkable as there are now more than one billion websites globally. For any organization to “exist” today it must have a web presence that is discoverable. The work building them can be analogized to physical infrastructure building and maintenance. The creation is done either by compensated or uncompensated human labor. The sheer scale of the social investment in websites is often not fully considered when thinking about work in the Platform Economy.
- \* A second subset consists of users who create uncompensated value through their activities on the websites and platforms. It includes search which generates advertising revenue. The activities of users of the search engine are converted into value by Google’s (or Microsoft’s) search engines and advertising algorithms. User’s actions have been termed “digital exhaust,” which is the data generated as users search the Internet.<sup>35</sup> Also, included in this subset is user generated and uploaded content in a wide variety of social media sites. The best known include Facebook, Twitter, and YouTube, for example.<sup>36</sup> In sum, user-generated digital exhaust and uploaded content are themselves forms of work and value creation.

The user-generated content subset in Layer 3 is particularly interesting. Not only is it of enormous size, but the business models of two of the dominant platform firms, Google and Facebook, are based on the content (value) being generated by users. For the firms, the content can be seen as “free labor,” which is not quite correct, because there is quid pro quo, namely users are allowed to use the platform for free.<sup>37</sup>

Most of the platforms discussed in this section have an international reach and, by their very nature, impinge upon nationally specific industrial, social and political arrangements. For this reason, cross-national research can provide important insights into whether a one-size-fits-all model based upon Silicon Valley values, imperatives, and understanding of work and workers will vanquish other models and values. One very important field of study will be LMP. However, it is important to situate LMP in the larger space of the Platform Economy. We will

want to identify the alliances and conflicts amongst groups, and the policy conflicts that will influence the parameters, the rules, of the LMP. Finally, we will need to locate the potential alliances between employees and employers in the Platform Economy.

### **Computation Intensive Automation: The Next Phase of Work?**

While the conference is focused principally on labor exchange platforms, we would propose that the most powerful impact on labor of ICT in the age of computing abundance will be the continuing deployment of and the socio-political responses to Computation Intensive Automation.<sup>38</sup> We use that more inclusive term to avoid depending on the semantically loaded terms of AI and Deep Learning. In any case, whatever the terms, the long run impact of Uber may be the introduction of driverless cars and the displacement of drivers, a consequence well beyond the dispute over employment law. As a hypothesis we might argue that the political and policy responses to CA and the industrial Internet will powerfully influence the terms and character of the labor exchange platforms that are the focus of this conference. Certainly, the reverse will hold; as this conference emphasizes, Google, Facebook, Upwork, and Uber, as examples, have all reshaped our understanding of the workplace.

There are a number of estimates of the scale of work activities touched by ICT; for example, Frey and Osborne have estimated that up to 47% of the work force will be displaced, while OECD estimates are much lower.<sup>39</sup> The core question of course is whether work, or work activities, will be displaced by CA; whether new work will be generated; whether the very character of work is transformed and reorganized. Recall that with early NC machine tools and robotics, the Japanese approach to how to deploy workers and technology was fundamentally different than that in Detroit. The Japanese created a powerful competitive advantage in what is now called the lean production system. In similar fashion, administrative work and secretarial work was transformed by a user interface between people and computers through applications such as Word. Indeed, the user interfaces that develop in the Platform Economy are already influencing the dynamics of control and value creation.<sup>40</sup>

For now, we just want to signal the question. The answer, which is not knowable at this point, depends, in our view, on how and by which social actors the technologies are deployed. One driver of the answer, or more awkwardly but put better-a conditioning force propelling change, is whether ongoing innovation throughout the production chain can itself be automated

using AI or machine learning tools, or whether it depends fundamentally on the sustained involvement of people. From a different angle one must ask whether, or rather how completely, platforms, algorithms, data, and computation intensive automation, can reorganize and entirely remove people from and automate the production and distribution chain. Will production processes provide employment and include people in essential roles? One element shaping the outcome will be whether companies view workers as assets to be developed or costs to be contained, or the mix that is pursued. The answers developed by firms and by governments to these questions are likely to shape how the technologies are deployed.

Since this “proto-paper” is now far too long, let us simply note several issues. First, what is the relation between the “service” platforms, including transaction platforms, and manufacturing. The union and political ties between manufacturing and services will vary nationally, with likely consequences for the struggles around labor exchange platforms. Second, the strategies of traditional unions and alt-labor organizations will condition and be conditioned by the national responses to the cyber transformation of industries. The German Industrie 4.0 discussion is a fascinating instance of such a debate.<sup>41</sup>

## **Conclusion**

We should understand the political economy of labor-exchange platforms in the context of the rise of the Platform Economy and the continuing diffusion of computation intensive automation. We highlight three matters. *First*, the logic and law of the platform economy more broadly will shape the choices about labor exchange platforms. Indeed, not developed here, many of the decisions about data privacy, algorithm transparency, and competition will be made in international negotiations as much as by national fiat. *Second*, labor-exchange platforms still only directly affect a small segment of the workforce. We have sought to locate that story in the picture of work, value creation, and income in the Platform Economy era. *Third*, computation intensive automation, including AI and deep learning, will reshape all facets of the economy including production, distribution, and retail—and the workforces in all industries. How they are deployed, whether workers are considered Assets or Costs, will shape the choices for labor throughout the economy.

---

<sup>1</sup> Martin Kenney and John Zysman, “The Rise of the Platform Economy” *Issues in Science and Technology* 32, no. 3: 61-69 (2016).

<sup>2</sup> We want to specifically reinforce this point. There is a dual character to the transformation. At the micro-level, it reaches into the labor process itself. At the macro-level, it threatens the rules and institutions through which labor is organized.

<sup>2</sup> See for example, Ray Fisman and Michael Luca, *Harvard Business Review*, “Fixing Digital Discrimination.” (December 2016). <https://hbr.org/2016/12/fixing-discrimination-in-online-marketplaces>.

<sup>4</sup> Driving automation is often treated as a single technological event. Namely, there are automobiles driven by human beings and then these are replaced by self-driving vehicles, but, in fact, the transition is more likely to be in stages and thus gradual. For a description of this process, see Litman, T. “Autonomous Vehicle Implementation Predictions: Implications for Transport Planning. (September 1, 2016). <http://www.vtpi.org/avip.pdf>

<sup>5</sup> There are a whole variety of definitions. However, we prefer to adopt E. Gawer’s definition that a platform is “a set of technical building blocks that act as a foundation upon which an array of firms, sometimes called a business ecosystem, can develop complementary products, technologies or services.” See, Gawer, A. (2009). Platform dynamics and strategies: From products to services. In *Platforms, Markets and Innovation*, (A. Gawer, Ed.) 45-57.

<sup>6</sup> Henning Kagermann, formerly CEO of SAP and now President of the German National Academy of Science and Engineering, makes this point explicitly in his presentation at “The Digital Transformation of Manufacturing Industries: Revolution or Evolution?” Presentation in Munich November 22-24, 2016.

<sup>7</sup> John Zysman and Martin Kenney, “The Next Phase in the Digital Revolution: Platforms, Abundant Computing; Growth and Employment” BRIE Working Paper 2016-3 (2016).

<sup>8</sup> Mikolaj J. Piskorski, *A Social Strategy: How We Profit from Social Media* (Princeton University Press, 2014).

<sup>9</sup> Ruth Collier makes this point in her work

<sup>10</sup> For a discussion, see Debra Cassens Weiss, “Does Airbnb have a legal responsibility to end bias by its hosts?” *ABA Journal* (2016).

[http://www.abajournal.com/news/article/does\\_airbnb\\_have\\_a\\_legal\\_responsibility\\_to\\_end\\_bias\\_by\\_its\\_hosts](http://www.abajournal.com/news/article/does_airbnb_have_a_legal_responsibility_to_end_bias_by_its_hosts)

<sup>11</sup> See, for example, Chaykowski, K. “Facebook to Ban ‘Ethnic Affinity’ Targeting for Housing, Employment, Credit-Related Ads.” *Forbes* (November 3, 2016). See, also, Z. Tufekci, “Algorithmic harms beyond Facebook and Google: Emergent challenges of computational agency.” *Journal on Telecommunications & High Technology Law*, 13, 203 (2015).

<sup>12</sup> In a celebrated case John Deere used the Digital Millennium Copyright Act to prevent farmers from hacking the software in their tractors for repair or any other purposes. Effectively, denying them one of the normal prerogatives of ownership of a productive – the ability to modify it. In November 2015, the Copyright Office gave farmers partial relief in that gave them and other owners of motor vehicles the ability to modify the software for certain purposes. For more on this, see, for example, Brachmann, S. “Copyright Office issues DMCA exemptions for automotive software, jailbreaking smart TVs.” *Wired* (November 9, 2015).

<sup>13</sup> This characterization has been made explicitly in a number of German presentations. Precise citations to follow.

<sup>14</sup> Lawrence Lessig, *Code and Other Laws of Cyber Space* Basic Books, 1999

<sup>15</sup> Of course, to think of this more globally, West Coast Code is also threatening to disrupt Brussels, Berlin, Paris, and Mexico City Code.

<sup>16</sup> We strongly commend Orly Lobel’s “Law of the Platform” Legal Studies Research Paper Series Research Paper #16-212 March 2016.

<sup>17</sup> This is not a simplistic McLuhan-like argument, but does recognize that the medium does shape the grounds upon which social and political action occurs. See, also, John Zysman and Abraham Newman, eds., *How Revolutionary Was the Digital Revolution* (Stanford University Press, 2006).

<sup>18</sup> On outsourcing, see, for example, Martin Kenney, *Locating global advantage: Industry dynamics in the international economy* (Stanford University Press, 2004). David Weil’s excellent book emphasizes “fissuring” as a strategy to circumvent labor and liability law. However, other issues, we note, are at play as well.

<sup>19</sup> Zysman, John “Strategic Asset or Vulnerable Commodity: Manufacturing in a Digital Age” in *New Directions in Manufacturing*. National Academy of Sciences 2003

<sup>20</sup> Ibid

<sup>21</sup> Breznitz, D., & Murphree, M. (2011). *Run of the red queen: Government, innovation, globalization, and economic growth in China*. Yale University Press. See, also chapters in 21<sup>st</sup> Century Manufacturing UNIDO 2012

---

<sup>22</sup> J. Zysman, S. Feldman, J. Murray, N. Nielsen, K. Kushida, “Services with Everything: The ICT-Enabled Digital Transformation of Services” (2011).

<sup>23</sup> Ibid. Certainly business processes from finance and accounting through to customer support and CRM are altered when they can be treated as matters of information and data management. Routine and manual functions are automated, and fundamental reorganization of activities is enabled. Likewise, sensors and sensor based networks change many personal services. For example, with sensors and communications, some services such as the monitoring aspects of the home care for the ill, the convalescent, or the elderly can be transformed fundamentally from highly personal activities requiring a continuous presence to a distance activity with sensor data signaling a need for attention.

<sup>24</sup> David Weil uses the fissured metaphor. For the fissured metaphor, see Weil, D. *The Fissured Workplace*. (Harvard University Press, 2014). It is possible to think of other metaphors instead of fissured, as we believe that the changes are even more complex than he suggests. When we examine the income strategies of, for example, YouTubers, even a single individual will generate only part of their income from the platform, but then monetize their fame through product endorsements and placements, personal appearances, Patreon fund-raising, and even writing books. The complex variety of income-creation schemes is bewildering in its diversity and ingeniousness. Further, YouTube is becoming a vital part of traditional broadcast media operations – not only for the income generated but also to remain connected with audiences. These indicate something more than fissures in the workplace, rather some type of patchwork.

<sup>24</sup> Jia, K. and M. Kenney. 2016. “Mobile Internet Business Models in China: Vertical Hierarchies, Horizontal Conglomerates, or Business Groups?” BRIE Working Paper 2016-6.

<sup>25</sup> At a recent conference in Munich sponsored by ACATECH and Munchner Kreis, speakers directly referred to platform ecosystem conflicts. One speaker used, then backed away from, the phrase “platform wars”. Finding a basis for common standards that would permit interconnection and interoperability was the critical matter.

<sup>27</sup> G. Friedman. “Workers without employers: Shadow corporations and the rise of the gig economy” *Review of Keynesian Economics*, 2(2): 171-188 (2014). G. Standing, *The Precariat: The New Dangerous Class*. (London: A&C Black, 2011).

<sup>28</sup> J.P Chase’s recent studies estimate that the online workforce, the gig workforce, is less than 1%. It does not see that expanding. See: “The Online Platform Economy: Has Growth Peaked”, November 2016, JP Morgan Chase Institute, Diana Farrell and Fiona Grieg; and “Paychecks, Paydays, and the Online Platform Economy” February 2016, JP Morgan Chase Institute, Diana Farrell and Fiona Grieg.

Both are available here: <https://www.jpmorganchase.com/corporate/institute/institute.htm>

<sup>29</sup> As an aside, in many cases, Platform Economy firms do not always just displace work, but also insinuate themselves into work-related activities in interesting ways. For example, nearly every manager or consultant has (indeed nearly must have) a LinkedIn account, as they are a vital tool in managing a career.

<sup>30</sup> Kenney, M. 2015. Value and Work in the Platform Economy PowerPoint Presentation (March 2015) [http://www.brie.berkeley.edu/?page\\_id=72](http://www.brie.berkeley.edu/?page_id=72). This diagram was initially developed in 2014, further elaborated in 2015, and again revised in 2016.

<sup>31</sup> Amazon, in its enormous logistics operations has many part-time employees that do not share in the same benefits that its professional staff receive.

<sup>32</sup> For an attempt to measure whether taxi drivers are decreasing more than compensated driving is increasing, see I. Hathaway and M. Muro. 2016. “Tracking the gig economy: New numbers.” *Brookings Institution*. <https://www.brookings.edu/research/tracking-the-gig-economy-new-numbers/>

<sup>33</sup> Ibid. Hathway and Muro’s research appears to show some negative impact on hotel sector employment. But, it is possible that these employees could be replaced by workers hired to clean Airbnb rentals.

<sup>34</sup> Parker, L. 2015. The Cult of PewDiePie: How a Swedish Gamer Became YouTube’s Biggest Star. *Rolling Stone* (December 16, 2015).

<sup>35</sup> Huberty, M. “Awaiting the second big data revolution: From digital noise to value creation.” *Journal of Industry, Competition and Trade*, 15(1), 35-47 (2015).

<sup>36</sup> The value of social media websites such as Facebook, LinkedIn, Instagram, Snapchat, and the like whose value is based on uncompensated, user-generated content (UGC). The most successful of these firms have become extremely large and very influential in social life (e.g., Facebook, Instagram, LinkedIn, Pinterest, Snapchat, and Twitter) and have given rise to entire ecosystems dependent upon them. These firms, for the most part, are monetized through advertisement, and have relatively few direct employees (E.g. Facebook employs approximately

---

18,000 persons in 2015). However, in the case of Facebook, in particular, but with all successful social media firms, large ecosystems dependent upon the platform can emerge. These ecosystems include platform-dependent service producers. In the case of Facebook, these include game producers such as Zynga, which was the largest of these, advertisers, marketers, a wide variety of consultants, click farms that specialize in generating “fake likes” and many other activities.<sup>36</sup> In contrast, LinkedIn’s revenues are based upon selling various sorts of premium services, one of the most lucrative of which is to sell the ability to sort and identify job candidates to recruitment firms and human relations departments. Another service is for sales prospecting.<sup>36</sup> On the larger platforms such as Facebook and LinkedIn, other participants in the ecosystem are generating income, though, often, this income is not generated through traditional employment relationships.

<sup>37</sup> From a Marxist perspective, see, Tiziana Terranova (2000). Free labor: Producing culture for the digital economy. *Social Text*, 18(2), 33-58. She has conceptualized this as “free labor.” Of course, search and other such activities are not truly “free” in that the information from our digital activities are then sold to advertisers. In media studies, this has been conceptualized as “audience labor.” For a summary of this discussion, see Caraway, B. (2011). Audience labor in the new media environment: A Marxian revisiting of the audience commodity. *Media, Culture & Society*, 33(5), 693-708. Importantly, our attention is captured in the form of data, which must be monetized through analysis. Here, it is the algorithms and data centers that transform this “raw material” into value for advertisers. The employees (and contractors etc.) are new jobs that are on Level One of the pyramid.

<sup>38</sup> J. Zysman and M. Kenney, “The Next Phase in the Digital Revolution: Platforms, Abundant Computing; Growth and Employment” BRIE Working Paper 2016-3 (2016).

<sup>39</sup> Frey, C. B., & Osborne, M. A. (2013). “The future of employment: how susceptible are jobs to computerisation.” <http://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf>

<sup>40</sup> Note that taxi drivers in diverse locales, Paris and Denver, are building their own platforms to seize control, and gain, from both platforms companies such as Uber and traditional taxi companies such as G-7 in Paris.

<sup>41</sup> Industrie 4.0 also is a powerful marketing tool. It certainly expresses the ambitions of many large companies. How and whether the fabric of small- and middle-sized firms will adapt to the new industrial imperatives is an open question.