The Sharing Economy, Digital Innovation, and the Future of Work

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Chairwoman Foxx and Ranking Member Scott, I am delighted to have been invited to speak to you about the sharing economy, innovation, flexibility, and the future of work and education. Thank you for convening this important hearing. What we call the sharing economy today represents early examples of new and digitally-enabled ways of organizing economic activity. In the future, these new systems will span multiple industries, change what it means to have a job, reshape our regulatory landscape, challenge our social safety net, and restructure how we finance, produce, distribute and consume goods, services and infrastructure. Forward-looking policy about education and the workforce that anticipates these changes is essential for the continued competitiveness and stability of the country.

Overview, definitions, and examples

The term "sharing economy" means different things to different people, which often complicates discussions about policy for the sharing economy or regulating the sharing economy.[1] The label is also often challenged because it seems at odds with our everyday use of the verb "sharing." I am unaware of any consensus on a definition of the sharing economy.[2] In my 2016 book[3] (which I nevertheless decided

[1] See Kenneth Olmstead and Aaron Smith, How Americans Define the Sharing Economy, Pew Research Center (May 20, 2016), which highlights the diversity of perceptions that Americans associate with the term, ranging from charity and socialism to asset rental marketplaces.

[2] I discuss a few alternative definitions from other authors in my 2017 report to the European Parliament's Committee on Internal Market and Consumer Protection. See Sundararajan, Arun, The Collaborative Economy: Socioeconomic, Regulatory and Policy Issues (February 2017).

to title "The Sharing Economy,") I explain why I find the term "crowd-based capitalism" more precisely descriptive of what most of us refer to as the sharing economy.[4]

Let me therefore start with a quick definitional summary to place my testimony in a clear context. Before I do that, let me clarify some terms. **Platforms** are the digital 'marketplaces' which facilitate the exchange of goods and services. **Providers** are the individuals or small businesses that supply goods and services in these marketplaces. **Consumers** are the individuals who generate the demand for (by buying, renting or otherwise consuming) what the providers provide.

Over the last twenty years, digital technologies have been blurring the boundaries between institutions of differing scale that have historically facilitated the provision of trust and the use of intellectual capital in business. This changes how we organize economic activity. In the early days of modern American capitalism, commerce resembled a textbook peer-to-peer market economy—the one-person business was the primary form of production and distribution. Following the revolutions in transportation and communication induced by the railroad and the telegraph in the mid-19th century, mass distribution and mass production became more prevalent, leading to emergence of the modern corporation in the early 20th century, and the subsequent dominance of managerial capitalism, today's familiar hierarchical organization, and the work arrangement of full-time employment in the second half of the 20th century.[5]

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[3] Sundararajan, Arun. The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism. (MIT Press, 2016)

[4] The sustained use of the term "sharing economy" may in part be due to some of its intellectual precursors. See Sundararajan (2016), Chapter 1, 30-35 for a more detailed discussion. For example, Yochai Benkler's notion of "commons-based peer production" discussed in 'Sharing Nicely': On Shareable Goods and the Emergence of Sharing as a Modality of Economic Production (Yale Law Journal, 2004), Michel Bauwens' conception of peer production discussed in The Political Economy of Peer Production (CTheory, 2005), and Lawrence Lessig's contrast between market economies and sharing economies in Remix: Making Art and Commerce Thrive in the Hybrid Economy (New York: Penguin, 2009). Rachel Botsman and Roo Rogers, What's Mine Is Yours: The Rise of Collaborative Consumption (Harper Business, 2010) prefer "collaborative consumption," and Lisa Gansky, The Mesh: Why the Future of Business is Sharing (Portfolio Trade, 2010) favors "the Mesh."

[5] An excellent history of the gradual transition from Adam Smith's famed "invisible hand" to the modern corporation of the late 20th century can be found in Alfred D. Chandler Jr., The Visible Hand: The Managerial Revolution in American Business (Harvard University Press, 1993).

Today, we are witnessing the emergence of another new way of organizing economic activity—**crowd-based capitalism**—that is the successor to 20th century managerial capitalism. What we often call the "sharing economy" (and what I prefer to call crowd-based capitalism) describe an economic system with the following five characteristics:

(1) **Market-based exchange facilitated by a platform.** Such platforms almost always aggregate demand, match customers with providers, and provide some digitized form of trust. For example, the platform Airbnb facilitates the provision of short-term accommodation by its 3 million hosts (providers) to its 200 million guests (consumers). Many platforms do significantly more. My analysis of over 100 sharing economy platforms in 2015 suggested considerable variation: some platforms resemble light-touch marketplaces that simply match buyers and sellers, while others provide support that may include production financing, provider mentoring, customer support, provider pricing tools, logistics support, payment processing and other operational assistance to providers.[6]

(2) **High-impact capital and asset-light consumption.** The sharing economy creates opportunities for assets, skills and time to be used at levels closer to their full capacity. In parallel, it allows a greater fraction of consumption to occur through a variety of rental models, and without the need for individual asset ownership. For example, rather than owning a second car, many people may instead engage in market-based "sharing" using the platform Lyft or Uber.

(3) **Crowd-based "networks" replace centralized institutions or hierarchies.** Much of the supply of capital and labor comes from decentralized and heterogeneous crowds of providers who vary in scale and objectives. For example, the platform Getaround facilitates peer-to-peer vehicle rental. A majority of its providers in San Francisco list just one car, a personal vehicle, on the platform. However, many other providers own small fleets of two to ten cars, and run a small car rental business through the platform. Additionally, City CarShare, a Bay Area shared mobility company, rents out its fleet of over 100 vehicles through the Getaround platform.

(4) **Blurring lines between the personal and the professional**. The supply of services through sharing economy platforms often commercializes and scales peer-to-peer activities like giving someone a ride, having a house guest, preparing a meal for friends, helping someone move, or lending someone money, activities which used to be considered "personal."

[6] See Sundararajan (2016), Chapter 3, 77-79.

(5) **Blurring lines between fully-employed compensated and casual labor, between independent and dependent employment, between work and leisure.** Many traditionally full-time jobs are supplanted by a variety of non-employment work arrangements ranging from on-demand contract work to micro-business ownership, featuring a continuum of levels of time commitment, granularity, capital ownership, economic dependence, and entrepreneurship. I will return to this point later in my testimony.

Short-term accommodation and transportation ("ride-sharing") services have dominated the public dialog about the sharing economy over the last five years. By most measures, Airbnb is already the world's largest provider of short-term accommodation; it's 4 million listings (as of mid-2016) dwarf the 1.1 million room inventory of Marriott-Starwood, the world's largest hotel chain. Around the world, mobile phone-hailed transportation has been made possible by platforms like Uber and Lyft in the US, Didi Chuxing in China, Grab and Go-Jek in South East Asia, and Ola in India, platforms that have collectively raised about $30 billion in venture financing. However, it is important to recognize that the changes induced by the transition to crowd-based capitalism **span a broad range of industries**, ranging from commercial real-estate (WeWork) and long-term accommodation (Common) to groceries (La Ruche Qui Dit Oui) and healthcare (Care.com, Clineeds, UberDocs).

Of particular interest are those platforms which aggregate the consumer demand for different services, connecting freelance workers and small businesses with this demand. Some, like Upwork and Thumbtack, span a broad range of professions, from accounting and copy editing to personal fitness and photography. Others, like Handy, concentrate on a cluster of related services like house cleaning, moving, and home maintenance. Still other platforms focus on one specific profession, like Catalant for management consulting (over 40,000 providers), Gigster (whose providers are highly curated software engineers), and Upcounsel for legal services.

The scale of such specialized platforms is growing. As an illustration: Upcounsel lists over 20,000 active providers. These include professional solo law practitioners, stay-at-home parents who work part-time through the platform, and boutique law firms. 70% of Upcounsel's lawyers (who have an average of 15 years of experience) have worked at top-200 law firms, and 50% of them have worked at Fortune-500 firms. Essentially, Upcounsel is building the infrastructure of a law firm to support a highly skilled crowd-based provider population by aggregating demand, managing client relationships, and guaranteeing client payment for them. The pace of growth of such platform-based non-employment work accelerates with the emergence and popularity of new enterprise software from companies like WorkMarket and SAP

that manages corporate task-based workflows, allowing traditional corporations to integrate on-demand talent into more complex internal processes.

Although the last few years has witnessed a striking expansion of this new way of organizing economic activity, there are many aspects of crowd-based capitalism that predate the modern sharing economy.[7] eBay, founded in 1995, was the pioneer of digitally-enabled peer-to-peer commerce, and currently has over 25 million sellers. YouTube, founded in 2005, aggregates content provided by a distributed and heterogeneous crowd of creators, and has more viewers than any television network in the world. The YouTube platform (owned by Google since 2006) centralizes the aggregation of demand, provides search and discovery capabilities, and performs some content filtering. (The demand aggregation and content distribution activities are thus still handled by a traditional hierarchical organization.) In contrast, content production is done by a distributed and varied "crowd" of providers. Some content comes from large studios: traditional entertainment hierarchies that also produce YouTube-ready music videos and Internet-customized programming. But there are also millions of independent and semi-professional producers who create media 'micro-businesses' which generate revenue from the advertising shown to consumers who view their content. Some of these producers boast tens of millions of subscribers and earn millions of dollars in annual revenue.[8] Numerous others cater to a niche audience and generate more modest incomes. Still millions of other YouTube content creators simply post content for fun.

While one might think of Amazon (founded in 1994) as a traditional online retailer, it is in fact one of the world's largest crowd-based capitalism platforms. About 50% of its estimated US merchandise sales of $125 billion[9] (and closer to 60% of its global sales) are from small businesses selling through the platform. Many of these small businesses use Amazon's inventory management and fulfillment services,

[7] In Sundararajan (2016), Chapter 2, I discuss the confluence of technological and trust factors that have led to dramatic recent acceleration.

[8] Some of the most prominent earners on YouTube include Lilly Singh (comedy sketches and music videos, $7.5 million in 2016), Tyler Oakley (variety entertainment, $6 million in 2016) and Rosanna Pansino (unconventional baking ideas, $6 million in 2016).

[9] Amazon does not report the aggregate gross merchandise value (GMV) of merchandise sold through its platform, or break down the fraction of GMV that comes from marketplace sellers. These estimates are based on my own analysis of research done by investment banks and other third parties.

and the platform's "Fulfillment by Amazon" feature often masks the distinction between buying directly from Amazon and buying from one of these smaller sellers.[10]

The sharing economy is also contributing to a broader (but distinct) ongoing shift in the American workforce, away from full-time employment and towards non-employment work arrangements. Several studies over the last two years have documented a rise in this non-employment labor force: people who derive their primary or supplemental income from work arrangements other than employment. Estimates of the total number of such "independent" workers in the United States range from 40 million to 68 million.[11] This variation reflects different definitions and methods; nevertheless, both the high and low estimates demonstrate that independent workers represent a significant fraction of the country's civilian labor force of 160 million people.

In the future, the aspiring law associate of today might instead become a tiny law firm that operates through a legal services platform. That would enable the young lawyer to gain access to corporate clients that the platform maintains relationships with, while perhaps leveraging artificial-intelligence-enabled legal research capabilities to scale. Similarly, micro-entrepreneurs might run transportation businesses using small fleets of autonomous cars or trucks through a logistics platform. A local mom-and-pop store may evolve into one that caters to a specific niche it reaches through a global retailing platform. A multinational consulting firm might evolve into a platform through which millions of individuals run micro-consulting practices (or even small partnerships).

Economic impacts, regulatory challenges, and data-driven delegation

These digital platforms that aggregate demand, provide search and discovery, and ensure sufficient trust for commercial exchange create significant opportunity for small business growth. Millions of small and

[10] This shift in how retail is organized will be reinforced as platforms like Postmates and DoorDash "index" one's physical neighborhood, create effective last-mile delivery systems, and make local purchases initiated through a digital interface more commonplace.

[11] See, for example, Manyika, J., Lund, S., Bughin, J., Robinson, K., Mischke, J. and Mahajan, D., Independent Work: Choice, Necessity and the Gig Economy. (McKinsey Global Institute, 2016), Katz, L., and Krueger, A. (2016). The Rise and Nature of Alternative Work Arrangements in the United States, 1995-2015 (National Bureau of Economic Research Working Paper 22667), and studies from the Freelancers Union/Upwork and from MBO Partners.

micro- businesses already operate through platforms ranging from Amazon and Airbnb to Upwork and Thumbtack. It is important that any assessment of economic impact not focus exclusively on the scale and market power of the large platforms, but actively measures the positive effects that the transition in business has on millions of smaller businesses that these platforms enable and support.

My academic research about the projected economic impacts of crowd-based capitalism indicates that in the long run, the sharing economy will contribute positively to economic growth. Some of this growth may stem from total factor productivity (TFP) increases that accompany the more efficient use of assets. Additionally, the dramatic increase in variety that accompanies the emergence of crowd-based capitalism (contrast product variety on Airbnb with that of traditional hotel chains) will increase consumption, leading to further growth. Furthermore, shared assets are used more intensively, and as a result, might need to be replaced more actively. So even though there may be fewer owners, these owners will buy more frequently because, in a sense, they are "spending" the capacity of their asset more rapidly.[12]

My research also suggests that the sharing economy may reduce *economic inequality*. There are a number of factors that explain this counterintuitive effect.[13] Lower-income consumers who were previously excluded from ownership are now able to enjoy the benefits of access-based consumption. For example, families who may not have been able to afford vacations in the past can now enjoy them because of the ease of renting affordable or family-friendly short-term accommodation on Airbnb. Many lower-income consumers realize ownership cost savings, gains from greater usage efficiency and higher quality consumption. Still others benefit from being able to afford to purchase better assets because these personal assets can now be commercially monetized through sharing economy platforms. I highlight this finding because it speaks to what may eventually be the true promise of the sharing economy, as an economic force that democratizes access to a higher standard of living.

As more and more of the economy transitions to crowd-based capitalism, the ensuing creation of millions of micro-businesses that reach global markets through digital platforms will require rebalancing regulatory responsibility between governmental and non-governmental bodies. Many of our current regulatory systems are premised on large corporations dominating the supply of goods and services, like they did in the second half of the 20th century. Because the sharing economy creates new ways of providing familiar services that are traditionally often highly regulated, regulatory conflict is to be

[12] I discuss these effects in greater detail in Sundararajan (2016), Chapter 5.

[13] Many of the details of this research are reported in Samuel Fraiberger and Arun Sundararajan, Peer-to-Peer Rental Markets in the Sharing Economy (March 2015, updated August 2017).

expected, and indeed, around the world, governments have struggled with how to best regulate this new form of exchange. However, the sharing economy provides new solutions to existing trust challenges, and regulation, often interwoven with the provision of trust, doesn't always have to originate with governments. Regulation can take on myriad forms, governmental and otherwise.

To summarize, responding to this ongoing shift requires a fundamental rethinking of how we regulate. It is important to imagine a regulatory system that works with, rather than against, the platforms of the sharing economy.[14]

Drawing new lines between governmental regulatory agencies and platforms is not simple. An approach I have often advocated considering is **data-driven delegation**—delegating enforcement of regulations, with appropriate oversight and application programming interfaces (APIs) for audit purposes, to the entity that routinely gathers and holds, as a natural byproduct of the commerce in question, the data necessary for regulation—as an alternative to either government-only regulation or the "open data" approach of transferring consumer information to government regulators. Some of the principles I have formulated to aid the difficult decisions about when data-driven delegation is appropriate are summarized below.

- Are there new technological solutions to information asymmetry? Platforms represent a new generation of third-party institutions. Often, the existence of a governmental regulatory body was due to market failure caused by some form of information asymmetry. Does the platform naturally provides a technological fix to what required intervention in the past?[15]
- Do economic externalities have to be internalized? If government intervention has historically been because of economic externalities, delegation to platforms may be less effective. The commercial choices made by a buyer or provider may impose costs on (or result in benefits to) others, and these externalities often may not be naturally taken into account (or internalized) when trading peers make choices. When these externalities are negative, continued involvement by either the government or a non-platform third-party may be necessary.

[14] I discuss this issue in greater detail in Sundararajan (2016), Chapter 6.

[15] For example, in the past, a passenger might not have known the shortest route in a new city, or the right prices for taxicab services. Thus, it was necessary for a government body to set standards and install meters in taxicabs. But in today's era of GPS and smartphones, the need to install government-issued meters seems lower; besides, the existence of nationwide or even global platforms indicates that this role can be delegated to them in a manner than benefits society.

- Are social and profit interests aligned? If a desired social outcome is at odds with a platform's profit motive, delegation must be considered with care.
- Does regulatory effectiveness increase with data? Does the effectiveness of regulation increases as the scope and volume of available data for regulation increases? If it does, data-driven delegation may be in society's best interest. These advantages may be greater when there is significant variety in or a rapidly changing provider population.
- How sensitive is the data required for regulatory purposes? Do the potential privacy costs to society from mandating data transparency outweigh the potential costs to society from auditing platforms for compliance? If the data required to regulate effectively is of the kind whose sharing imposes a potentially high cost on the platform's users, or that may raise citizen concerns about government surveillance, this favors data-driven delegation.
- How much technological sophistication is required? The technological sophistication of the potential non-governmental partner, and the complexity of the data analysis required for effective detection and correction are also important considerations. If the platform in question has technological talent resources that are likely to be superior to those a government agency can attract or afford, and the task at hand requires some technological sophistication, this favors data-driven delegation.
- How timely does the enforcement need to be? In deciding on the right situations for data-driven delegation, it is also helpful to consider the social costs and benefits of a timely regulatory response.[16]
- Are there societal cost advantages to delegation? In deciding on the right situations for data-driven delegation, it is also useful to consider the relative costs of the governmental and non-governmental options.[17]

[16] For example, the availability of certain kinds of inappropriate content on YouTube has immediate social costs given the speed with which access to such content may spread. Thus, delegating the role of regulating such content to YouTube can benefit society, since YouTube has a far superior ability to detect, as well as to act on enforcement (block or remove the offending content) much more rapidly.

[17] For example, it costs Airbnb a lot less to simply deduct taxes for each transaction, aggregate these receipts, and transfer them to a city government periodically, than it does for a government to set up a reporting system for hosts, for hosts to have to report their earnings, compute tax and file paperwork associated with the tax remittal, and for the government to then have to audit these receipts.

Workforce and education policy issues

With these opportunities, however, come new challenges. When coupled with a rise in the cognitive capabilities of artificial intelligence and robotics technologies, sharing economy platforms will dramatically reshape tomorrow's workplace, threatening the viability of today's dominant model of work: being a salaried provider of labor and talent.[18] Three important areas of policy intervention that are necessary to effectively manage this transition are related to capital ownership, to labor law and the social contract, and to education policy.

Capital ownership. A particularly attractive feature of crowd-based capitalism is its promise to redistribute and make less unequal the ownership of capital. But this promise is just a possibility, and not a certainty. As the workforce moves away from the 20th century model of earning money by providing labor and talent to a large organization which owns the capital associated with the economic activity, a critical policy direction will be to guide the shift towards an economy in which a greater fraction of the workforce are **capital owners**, running tiny businesses that use a mix of labor and talent inputs from the individual themselves and from others (perhaps even via an on-demand platform). These guidelines contrast with other proposed policy responses to digitally enabled work changes which focus on the redistribution of income through progressive taxation, a capital tax,[19] or a universal basic income.[20]

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[18] At a specific level of technological progress, different tasks that comprise a job have always been automatable to different degrees. However, work arrangements that involve long-term labor relationships allow greater slack in the design of work systems. In contrast, if the work associated with full-time jobs is "unbundled," this must necessarily be accompanied by a far more structured production process, one that is designed to make tasks more separable and modular. This will naturally increase the pace and precision at which such tasks can be automated when the technology is ready, which in turn will accelerate the pace of displacement of human labor. The labor displacement effects of technological progress are also affected by the differential speed with which it lowers the cost of doing different tasks that comprise a job. Of the many tasks that comprise a production process, if only a few are automated, the variable cost of production associated with these tasks is lowered. As a consequence, production may increase, thereby increasing the demand for the human labor associated with the other tasks. This mitigating effect may be higher when the tasks are done as a "bundle" of work, and less so when separated.

[19] For a discussion of capital taxation ideas following a robotic technology induced productivity shock, see Jeffrey D. Sachs and Laurence J. Kotlikoff, Smart Machines and Long-Term Misery (National Bureau of Economic Research Working Paper 18629, 2012)

Put differently, sensible policy will shift the workforce away from those platform models under which the workforce is simply on-demand labor, and favor those platform models under which the providers have genuine ownership of some fraction of the organizational and intellectual property capital associated with the service. For example, a seller on Amazon or a host on Airbnb is not simply providing labor: they run a small business by setting prices, managing inventory, positioning their product, making merchandizing choices, engaging in customer service, and building a brand through the platform's reputation system. If an economy attains decentralized capital ownership, as an increasing fraction of labor inputs shift away from human labor and towards AI and robotics technologies, the workforce can more easily retain their ability to earn a living through their ownership of part of the associated capital.

In addition to favoring the platform models that are creating genuine individual-owned businesses, there are other policy actions that may aid this decentralization. For example, as some of the larger platforms become publicly traded corporations, government incentives that encourage the creation of "provider" stock ownership programs—under which providers are allocated shares in a platform—would be helpful. Additionally, since providers build "brand capital" through the profiles that exist on platform reputation systems, allowing these providers ownership over the associated reputation data (perhaps through an extension of current intellectual property law) will enable them to credibly port not just summary information but the details of their commercial histories from one platform to another, thereby increasing the value of the associated intangible capital.

Labor law and the social contract. It is critical that we rethink how benefits, workplace insurance, paid vacations and other facets of the social safety net are funded, since there will not be a well-defined employer responsible for a majority of tomorrow's workforce. Most saliently, the 20th century social contract for a worker was often defined in a way that presupposed or depended on the work arrangement being full-time employment. Employers frequently provided the funding for all or parts of a worker's benefits, paid vacations, income stability and workplace insurance. Salaried employment also provides a natural career trajectory and source of community for workers. None of these assumptions will hold for the majority of the workforce of 21st century.

The challenge of funding a new safety net will be greatest in countries like the United States and the United Kingdom, where large institutional employers have a bigger hand in providing worker benefits.

[20] See, for example, Andy Stern and Lee Kravitz, Raising the Floor: How a Universal Basic Income Can Renew Our Economy and Rebuild the American Dream (2016).

The creation of new government-individual-institution partnerships may be one solution.[21] For example, as corporate pension plans have dwindled in the US over the last few decades, the 401(k) and associated programs have evolved to facilitate retirement planning that complements Social Security benefits. These represent a partnership between different stakeholders – individuals put aside a portion of their income each month, corporations supplement their contribution, and the government provides tax incentives.[22]

It is also important to remove any barriers to the platforms themselves embracing some of the responsibility. Protecting the providers who generate their profits can be both "doing the right thing" and smart capitalism. For a platform to offer a branded service experience of consistently high quality requires a reliable and steady source of high quality supply from providers. Since platforms lack the typical directive authority or culture-building capabilities that traditional firms use to manage their employees, provider benefits may eventually be naturally viewed as good business practice. It is essential, however, to remove labor classification barriers to the emergence of these market responses, recognizing that the binary classification of "employee" versus "contractor" does not describes the market reality today.

It is also necessary to rethink labor laws predicated on an assumption of full-time employment. For example, minimum wage laws do not easily port to a platform-based world. Someone who drives for Uber or Lyft can connect and disconnect from the platform at will, can take time off whenever they want, and can drive for multiple platforms. Any economic objectives of a minimum wage cannot therefore be reasonably accomplished by requiring one platform to guarantee its providers a minimum hourly income.

Rethinking transition education. In tomorrow's world of work, a larger fraction of the workforce will not enjoy the natural career trajectory that comes with institutional employment. Perhaps the role of today's post-secondary university will evolve to include this kind of lifelong career planning. But in parallel, a growing fraction of the workforce will have to transition to new professions multiple times during their career. We therefore need new university-like institutions that provide individuals experiencing **mid-career transitions** with structured and pedagogically sound education. This education cannot stop simply at offering retraining or the opportunity to acquire new skills. Rather, it must be accompanied with the creation of a new professional network and access to new opportunities, facilitating

[21] See Sundararajan, Arun. Sharing Responsibility in the Sharing Economy. (Policy Network, November 2014)

[22] I don't mean to suggest that 401(k) plans have solved the retirement savings problem for everyone, but merely that they represent a partnership model that has worked for some over the last decade in providing an alternative to employer-funded retirement benefits.

relocation to pursue a new career more naturally, imbuing workers in flux with a new identity and sense of purpose, and rebuilding self-worth to allow transition with dignity. Seeking this sort of mid-career intervention should be as natural as choosing to go to college after high school, a new rite of passage.

Templates for these institutions are likely to emerge from large corporations managing workforce transitions in the coming decade. However, for this new education ecosystem to truly flourish, the right government interventions may be necessary. While the mix of post-high school education delivered by today's universities may naturally evolve over time in response to market forces, perhaps away from STEM subjects and towards design and entrepreneurship, it is not realistic to expect enough new continuing education institutions to emerge entirely driven by market forces. The managerial revolution of the twentieth century in the United States was made possible in part by the Morrill Land-Grant Act of 1862, which spawned over 100 land-grant institutions that still exist today (and that include some of the country's top educational institutions like Cornell, MIT, Ohio State University and the University of Minnesota). Although these institutions perhaps did not immediately fulfill their stated goal of teaching "agriculture and the mechanic arts," the Act laid the foundations for a nationwide and broadly accessible post-secondary university system.

To summarize, the "sharing economy" represents the early stages of a very significant digitally-enabled transition that will dramatically reshape the American world of work in the coming decades. Timely and forward-looking workforce and education policy is central to the future competitiveness and stability of the country.