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Challenges to large-scale digital organization: the case of Uber

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Abstract

Mobile computing, the so-called Internet of Things, and the rapid expansion of Internet connectivity all over the world are combining to challenge long-standing assumptions about the mission, function, and reach of traditional organizational forms. Uber is a fast-growing company with several unique attributes: its drivers are not employees, the company does not own the majority of its productive infrastructure, and the management is often at odds with local law and custom. Uber's rapid rise to unprecedented scale serves to illustrate the gaps between traditional organizational assumptions and the reach of current technological capability. To address these gaps, we conclude by suggesting four principles for designing large-scale digital organizations.

Keywords: Uber, Coordination costs, Algorithmic decision-making, Designing digital organizations, Organizations as culture processors

Background

Technology innovation has a long history of reshaping the organizational possibilities of a given era. Ink, paper, and movable type challenged the authority of the Roman church in the West and eventually provided the underpinnings of the nation state (Eisenstein 1980). Telegraph lines running alongside railroads helped create the managerial (rather than entrepreneurial) corporation in the late nineteenth century (Chandler 1990b). Interstate highways built both predictable supply chains and consumer demand for US fast food restaurant chains such as Howard Johnson's and McDonald's after World War II (Schlosser 2000). Such common managerial artifacts as line and staff organization, complex reporting relationships (and the organization charts that encode them), and titles to reflect one's status and stature emerged from the twentieth century military and industrial organizations that were built to harness new technological capabilities.

At the same time, that technology creates possibilities for organizations; organizational evolution almost always lags the structural capabilities of its technological underpinnings. When textile mills were powered by waterwheels and later steam power, spinning and weaving machines were driven by leather belts connected to a metal drive shaft in the ceiling of the factory. According to Paul David (David 1990), after decentralized electric motors replaced overhead drive shafts, it took 30 years for mill owners to place machines relative to workflows rather than power supply.

I contend we are in a similar period of lag between the uptake of tools that improve coordination and the birth of organizational forms capable of utilizing the benefits.

Both the decrease in coordination costs and the vast increases in scale characteristic of digital enterprises signal a shift in the benefits of traditional organizational models. To test this idea, I will examine several managerial conventions that, while durable in describing twentieth-century industrial organization, have proven to be problematic when applied to the Uber experience. The company's rapid expansion, extraordinary market valuation, and turbulent relationships (inside and outside the organization) might be a product of the founders' aggressiveness, but I contend that they also are canaries in the coal mine, indicators of future possibilities, and tensions resulting from the new dynamics of large-scale digital organizations.

Key principles underlying traditional organizations

The Internet, mobile computing, and applications that ride on these foundations have combined to alter the need for, shapes of, and side effects from formal organizations of many types. Linux and Wikipedia have been well studied as harbingers of organizational alternatives to conventional co-located hierarchical firms (Benkler 2006). Neither of these exemplars, however, predicted the rise of Uber, Airbnb, or TaskRabbit: the networked desktop personal computer that facilitated distributed work on Linux and Wikipedia is far less capable or flexible than the smartphone ecosystem. Thus, the technologies of the 2000s add to the tools that Wikipedia and Linux mobilized over the past 15 and 25 years, respectively, creating new organizational possibilities that fast-moving young companies have exploited. In contrast, here are three working assumptions that apply to most industrial age organizations:

Working assumption 1: Industrial organizations often create competitive advantage through capital intensiveness, including the administrative and other support structures necessary to keep those assets utilized (Chandler 1990a). Such familiar behaviors as vertical integration, mergers and acquisitions to gain market share and pricing power, and global expansion all increase economies of scale on the supply side: factories, retail outlets, distribution networks, and other assets all can increase the capital base of an enterprise.

Working assumption 2: Organizations serve (among other things) as information processing structures (Galbraith 1974); examples include the Roman Catholic church, an army, or a fast food franchiser such as McDonald's. Moving market signals inward toward core decision-makers, and official doctrine (and, ideally, behavior) toward the edge, comprises a large percentage of the organization's existence.

Working assumption 3: An employee's span of decision-making authority reflects some combination of natural aptitude, business acumen (Luthans 1988), experience, and social capital (Burt 1997). Managers are promoted into positions of increasing responsibility, in some measure based on successful behavior at lower ranks. To some extent, decision-making is the core of a manager's work.

Case Presentation

No current organization illustrates the tensions between traditional corporate norms and the unsettled state of digital organizations as vividly as Uber. The company has

emerged as the most prominent privately funded tech startup ("unicorn"), succeeding Netscape, Amazon, Google, and Facebook. It capitalizes on many technology and demographic trends of the moment:

- Smartphone penetration is reaching critical mass in most countries around the world.
- The smartphone platform of phone + messaging + GPS + display screen + social media forces of referrals and reviews (by both drivers and passengers) is ideal for hosting a ride-share app.
- Automobiles are typically utilized only about 4% of their lifespan. Allowing car owners to monetize some of the remaining 96%, on flexible schedules, makes for a low barrier to entrepreneurship, or at least contractorship.
- From Uber's standpoint, serving as a matchmaker between riders and cars allows the business to run light on assets, much as eBay holds zero retail inventory.
- Many millennials are moving to cities and not buying cars for reasons of expense and convenience.

How Uber works

Unlike a traditional seller of products or services, Uber serves as an intermediary between two different markets: riders and drivers (who own cars) (Eisenmann et al. 2006). In this position, Uber requires minimal capital and takes a cut of every transaction facilitated by its smartphone app. Two-sided platforms have the property of being able to scale extremely well through a flywheel-like virtuous circle: more riders attract more drivers, which attract more riders, which attract more drivers, etc. Uber grew at an unprecedented rate for a physical (as opposed to purely virtual) business (Lien 2015). At the same time, the company is reported to not yet be profitable, with customer acquisition costs being suspected as the main imbalance between revenues and expenses (Rogowsky 2017). Competition is also intense, forcing Uber to exit the Chinese market; Lyft (another US-based ride-share startup) is also growing rapidly after heavy investments—including from Chinese investors and General Motors—and powerful partnerships with Delta airlines, Starbucks, Google's Waymo self-driving car subsidiary, and others.

In its 7 years of operation, Uber has altered the business landscape. Some traditional taxi companies have declared bankruptcy, well more than a million drivers worldwide are engaged as contractors, and the company continues to expand its service offerings: riders can now choose from solo or shared rides across a variety of vehicle types (economy car, SUV, van, and luxury vehicle). One subsidiary has experimented with funding vehicle purchases by drivers, another works on self-driving heavy trucks, and the UberEats business uses the drivers for meal delivery in selected markets. The company innovates and grows rapidly, driven by an intensely competitive culture that has also exhibited numerous downsides.

Uber's culture of misbehavior

Uber can obviously be compared to Airbnb, which shares people's residences or spare rooms rather than cars, but the companies have behaved very differently to date. Part of these differences relate to Uber's notorious culture, in which rider privacy was routinely violated, women employees were treated poorly based on their gender, and

local political and regulatory officials were blatantly disregarded. Consider these public examples, which raise a key question: *how much does Uber's corporate misbehavior reflect a given executive team, and how much do these episodes relate to the company's pioneer status as a new type of company and organization?*

- Male riders who took a car to a residence other than their home address early in the morning were deemed to be taking a "ride of glory." Uber data scientists analyzed the patterns of when these rides occurred (and presumably to whose addresses) and publicly posted the aggregated results as an example of big data analytics (Harris 2017).

- In "God view," Uber headquarters can see all current riders and waiting users. Reports have surfaced that the technique was used without anonymization during at least one launch party and that journalists who had published critical stories about the company were also tracked (Hill 2017). In August 2017, the company agreed to 20 years of audits to prevent future violations of customer privacy, to be conducted every 2 years by an outside entity.

- In February 2017, two former Uber employees posted long blog posts detailing their repeated experiences of sexual harassment and repeated failures of HR executives to address the issues (Fowler 2017). Shortly afterward, the company's senior vice president of engineering was fired, in part because he did not disclose that he had been fired from Google in relation to sexual harassment allegations (Burns 2017).

- Uber has been working to develop self-driving car technology. In February 2015, the firm signed an agreement with Carnegie Mellon University to explore the technology; that May, Uber poached 40 members of the team (Ramsay and MacMillan 2017). Later in 2015, Uber is said to have spoken to a researcher on the Google self-driving car team about switching companies. The employee subsequently downloaded 14,000 files (nearly 10 GB of project data) and likely moved it onto a USB drive. In January 2016, the employee downloaded more confidential documents, then shortly thereafter met with Uber. He quit Google, founded a self-driving truck company (Otto), took no venture funding, then sold the company to Uber for $680 million in August a few days after receiving his last (deferred compensation?) payment from Google (Waymo LLC, Plaintiff, vs. Uber Technologies, Inc 2017). Google's spun-out autonomous car subsidiary, now named Waymo, filed suit against Uber in early 2017.

- Uber launched trials of the self-driving cars in Pittsburgh and San Francisco, the latter without proper regulatory approval. Uber cars were subsequently filmed making illegal turns across bicycle lanes and running red lights. The state of California revoked the autonomous cars' registrations, effectively ending the experiment in running trials without the standard permits (Kendall 2017). In multiple cities, Uber has clashed with taxi regulators, usually successfully. In other cities, Uber deployed technology to identify and deny service to municipal code enforcement personnel who might have tried to run "sting" operations against semi-legal or unlicensed ride-share companies (Isaac 2017a).

- In February 2017, Uber CEO Travis Kalanick was videoed in an Uber car as he berated the driver who had complained about the company's shrinking payments to drivers (Newcomer 2017a). Public statements by the ride-sharing company about potential driver earnings have long been viewed with suspicion. In 2017, the firm paid a $20 million fine to settle Federal Trade Commission charges related to

inflated earnings claims (Huet 2017) and was found to owe New York City drivers at least $45 million in miscalculated fare splits (Newcomer 2017b).

In short, Uber stands accused of violating the privacy of its riders, overpromising and underperforming on drivers' estimated earnings, stealing trade secrets, breaking state and local laws, and systematically mistreating female employees. (Airbnb has few of these problems, apart from the parallel fight with hotel interests and taxation authorities, with one exception: some homeowners will not rent to people of certain ethnic backgrounds. Unlike Uber, Airbnb's management has been *fighting* this illegal behavior rather than encouraging it (Lee 2017).) In addition to Uber's aggressive corporate culture, the difference between sharing one's car with a rider and sharing one's home with a sleepover guest is considerably different. Airbnb reacted aggressively to newsworthy stories of renter abuse of hosts' property with new policies, procedures, and liability insurance (Ngak 2012). Uber has never admitted any similar gap in its business practices, although CEO Kalanick stated that he needed to "grow up" after his embarrassing video surfaced in early 2017. Later in the year, he resigned as CEO under pressure from investors. A new CEO was brought in from the outside, with Kalanick retaining his board seat, pending a lawsuit from investors claiming he defrauded them (Isaac 2017b).

Uber's importance for organizational design

Uber raises fundamental questions for organizational design. What is the appropriate shape for an app-driven matchmaker between car owners and those who might share their automobile? What is the relationship among corporate HQ, the drivers, and the riders? In a similar fashion, eBay has assiduously courted sellers, building many tools for small business-people to launch and manage virtual "storefronts." Uber has experimented with car loans to its drivers, but overall, the company provides drivers with fewer resources than eBay gives auction sellers. This arm-length relationship with capital has its benefits—rapid scalability—yet the company is widely believed to lose money on every ride even with relatively few assets. (And while the company could profit from not having to share fares with drivers, the balance sheet implications of owning thousands of self-driving automobiles could make the company's financial model less attractive to investors.)

What is a manager, a facilitator, a software developer, a customer service representative in the Uber model relative to Yellow Cab, Ford, Hertz, or Amazon? What constitutes the workplace in these scenarios? What do such common concepts as debt, equity, ownership, authority, and recognition mean in these new models? In short, how does the executive team organize more than one million drivers who are not employees, work in their own vehicles, and serve as the face of the company in the many countries in which it operates? No existing hierarchy serves as a useful precedent; the company is a pioneer, with all that term implies.

Let us return to the three conventional ideas about organizations, holding them up against the Uber evidence.

Working assumption 1: capital intensiveness
New realization
Capital can be dispersed, as with personal computers that replaced newspaper printing presses, CD pressing plants, and movie theaters, or 3D printing machines that can

replicate much larger capital equipment. In other scenarios, "demand-side economies of scale" as at Instagram or other social networks mean that the key asset becomes the user base as opposed to employees and the firm's economic capital. As Kodak's bankrupt history of heavy investment in headcount, plant, and R&D suggests, some digital companies can operate with lighter capital bases because so much value is created by the demand side of the platform: what, really, does Facebook produce except for blank pages for its users to communicate with each other? Kodak assumed customers wanted to *have* photographs and invested in quality of reproduction; Instagram and Facebook found instead that people much preferred *sharing* images and invested in photo-based social networking.

Organizational implication

When assets can be shifted outside the firm, whether through third party logistics contracts, cloud computing, or software as a service, the shape of the managerial framework changes, sometimes dramatically as at Li and Fung: the longtime trading company has become the orchestrator of a vast network of supply chain assets, doing everything from design to sourcing to manufacturing to logistics for such customers as Tommy Hilfiger, which has become the brand face of a virtual clothing company (Li and Fung's strategy to make the maths work 2017). At powerful platform companies, much of the competitive advantage derives from the ability to mobilize resources outside the four walls of the firm, whether with Amazon customer reviews or vendor partners, Apple's app developer network, or Google's advertising ecosystem. In addition, decentralization of the asset bases—whether via streaming media, lightweight content companies such as Buzzfeed, or 3D printers—opens new possibilities for small players with little in the way of organizational structure to enter market niches.

Uber lesson

The company's current approach to physical assets is a bright example of capital moving from the core to the edge of the network: drivers, who most emphatically are NOT employees or investors, own the cars. Traditionally, owners of capital were themselves the bosses before companies grew large enough that capital-providing shareholders hired managers, but neither scenario applies here.

Working assumption 2: organizations are information processors

New realization

Today, information can travel extremely fast and widely—Twitter notified the US eastern seaboard of an earthquake emanating from southern Virginia faster than the earthquake itself, supplementing expensive government seismic detection systems (Earle 2017). In such an environment, workers and other shareholders can get information from both enterprise tools like ERP systems, Slack, or Yammer and external social media including Blind (Blind: anonymous work talk app by Teamblind Inc 2017), Glassdoor, and LinkedIn. In many instances, bureaucratic norms and behaviors *impede* information flow (Mohamed et al. 2006), making the organization vulnerable to changes in the external environment.

Organizational implication

If social media and related technologies move *information* better than the formal organizational systems, that formal organization may become more important as a

mechanism for forming, distributing, and reinforcing organizational *culture and values.* These attributes are at once more intangible, more lasting, and more powerful than formal policies, structures, and procedures, particularly considering the trends toward decentralization noted above.

The concept of a company as a culture-processing vs. information-processing structure applies neatly to Uber. The company is unique in its scale: at between 1.5 and 2 million drivers, Uber is three to four times the size of Kelly Services, the temporary services agency that is the closest equivalent to a large-scale "gig economy" company. Uber also achieved that size in under a decade, whereas Kelly was founded in 1946. The combination of distributed capital base, flexible work arrangements, and distance from management to the front lines of customer service (via an independent third party) means that traditional managerial tools and structures cannot apply.

Uber lesson

At a time when emergency room teams study Formula 1 pit crews, retired Navy SEALs are in high demand as workshop facilitators, and improv comedy companies run business consulting divisions, who can Uber look at to learn organizational behavior? No organization except a military (and, tellingly, Facebook, in some ways) has ever run a business so large, and none of these was so disconnected and decentralized. Uber must find ways to insure that riders get good, consistent service without a traditional chain of command or conventional sanctions and incentives. New organizational forms, structures, and processes will have to be invented, and these will likely rely much more on cultural values than strict procedural discipline. The company's historic culture of misbehavior, however, makes doing so especially difficult.

The ride-share company is defined to a considerable degree by riders' experiences with drivers, who are not employees, do not wear a uniform, and are free to speak their minds with no managerial oversight (Uber does, however, collect rider reviews, which are tracked closely). The founding CEO in particular set many corporate/cultural norms at the top of the org chart, but they were especially problematic for the company at large: given the need for the model to scale, and given the vast number and global variety of driver-rider interactions, it is difficult to instill customer-facing behaviors in the same way McDonald's trains counter clerks or Wal-Mart hires greeters. Instead, organizational practice at Uber flows to a considerable extent from the periphery (where policies, norms, and procedures are hard to mandate) *inward*. Balancing the need for organizational performance at a very large scale with a nearly complete absence of managerial oversight at the driver level is proving to be a significant challenge: improving relations between drivers and the company will need to be a main focus of the new CEO.

Working assumption 3: human managers make decisions
New realization

Algorithmic systems are more consistent, impartial, and faster than humans in particular arenas. To date, general machine intelligence is a long-range goal as these systems do not usually cross domains: weather prediction cannot fix a retirement investment portfolio, nor can advertising placement algorithms play chess.[1] That caveat noted, these systems are being applied in more and more decision-making domains, including

radiology interpretation, credit scoring, fraud detection, industrial design, and the intelligence and security communities (McAfee and Brynjolfsson 2017).

Organizational implication

How do humans claim credit (in part, to be promoted) for positive business outcomes when the key decisions were generated by something vaguely referred to as "artificial intelligence"? What happens to chains of command, risk mitigation, and consensus decisions as algorithms drive more and more operational, and soon strategic, processes? Will improved feedback loops (made possible in part by extensive sensor instrumentation of the physical world) give us better "grades" of more decisions (both human and machine) after implementation? What is the appropriate ratio of overhead functions to customer-facing personnel when building a company?

Uber lesson

Algorithms run most everything at Uber: how drivers are hired and retained (via rider ratings), pricing (including the controversial "surge" increases), driver dispatch, advertising, and, it can be assumed, global expansion planning. The fundamental belief in algorithms also helps explain Uber's commitment to self-driving cars and trucks. Relative to its global scale, the firm is lean at the corporate level, without the need for human dispatchers or interviewers, a large marketing organization, or a gigantic HR department to manage drivers as employees. But algorithms cannot set cultural norms, inspire loyalty, or create solutions: only humans can. How Uber strikes this balance between optimization and leadership will be watched by many companies, both conventional and digital.

Implications for designing the large-scale digital organization

How will organizations of the future look different? As the loci of work, the customer, and the asset base migrate, and digital organizations operate at unprecedented scales, organizational design will encounter new possibilities and challenges. Let us begin with the latter first:

- What is a boss? What constitutes seniority or superiority in an organization? How will millennials (informed via social media about salary, perks, and other discrepancies within or among organizations) adapt to assumptions of structural inferiority at work?
- How will organizational design accommodate new modes of coordination that do not depend on concurrent physical presence in a factory, office, clinic, or other structure?
- How will organizations adapt to new limits to institutional authority, whether logistical (the contractor status of Uber drivers), geopolitical (globalized workforces outside a direct chain of command), or cultural (the resistance to received wisdom by Internet populations)?
- How will formal organizations respond to competition, for both customers and talent, from new kinds of social assemblages?
- How will organizations that previously held a monopoly on certain kinds of information, such as salary data, respond when social networks routinely make that information (in this example, offers and raises) visible?

- How will traditional organizational models accommodate new behaviors—some previously unimagined or culturally unacceptable, such as trolling—of people alone and in groups?
- How can organizational design react to these changes in something close to real time rather than on the timetables of academic research and HR practice that have historically been measured in years or even decades?
- How will organizations balance the timeless tension between efficient centralization and responsive decentralization given the speed and reach of large-scale digital organizations?

The good news is that entrepreneurs, managers, and other designers of these new organizations have at their disposal a rich toolkit of technologies, skills, attitudes, and examples to build with. Four broad responses have shown to be effective, and many would appear to apply to Uber's current state of corporate limbo (at the date of writing, the company is in court on multiple matters, has many unfilled leadership positions, and faces uncertain futures in many geographies that have banned the service).

First, the trend toward "flatter" organizations appears to be proving effective as technologies of coordination reduce the need for managerial layers. Uber drivers have considerable autonomy, despite (and sometimes because of) their contractor status. Tight scripts for customer contact have given way toward broader leeway for customer-facing service providers to empathize, problem solve, and own both problem and remediation. Smartphones, social networks, and other tools give the person on the street access to information that is often better than that in enterprise systems. United Airlines recently nodded in this direction by giving gate agents authority to offer up to $10,000 for passengers to give up their seat on an oversold flight—a 10× jump from previous practice.

Proposal 1: Increase agency at the edge of the network.

Second, many companies are localizing operations, such as building shorter supply chains, to reduce the scope of operations. Rather than integrating the acquisitions into corporate "best practices," AB InBev, the world's largest brewer, has organized a group of microbreweries it has acquired in a separate high-end portfolio that appears to be maintaining considerable local autonomy within the giant parent corporation. Many sourcing operations of multinationals have devolved to the regional or local level rather than being consolidated at global headquarters (The retreat of the global company 2017). And despite an overall increase in US manufacturing activity over the past decade, exports (apart from aircraft and related goods) comprise a small percentage of overall activity: when Kubota or Honda or Siemens opens a US factory, it is to serve the US market better. For Uber, localization should help reinforce particular cultural norms.

Proposal 2: Limit scope of operations to particularize context.

Third, retrofitting big data and algorithmic decision-making onto old organizational forms can be problematic. In automated trading on financial exchanges, and even at Amazon (Mims 2017), algorithms can get locked into loops with each other and produce illogical and sometimes harmful outcomes, as with the "flash crash" on the New York Stock Exchange in May 2010. Humans can write code that does things nobody desires or understands, especially in conjunction with other organizations' code.

Building algorithmic competence into the organization is likely easier at a hedge fund than at John Deere, but even the farm equipment manufacturer is embedding digital processes in its products (and in some cases sending remote messages to "kill" tractors whose owners are performing non-Deere-approved modifications (Koebler 2017)). Rather than chasing the algorithmic future, organizations will need to design toward it on the shop floor, in customer service, in forecasting, and elsewhere.

Proposal 3: Data and its manipulation will be the basis for more and more business decisions, including automated ones. Digital literacy will be essential for organizational agility and survival.

Finally, rather than attempt to codify behaviors, many successful organizations focus instead of group cohesion through shared values; they emphasize the *why* rather than the *what*. Elite military units have long recognized this lesson, albeit after intense training in fundamental techniques. Jazz improvisation offers similar lessons: rather than making things up, jazz musicianship stresses shared but unwritten rules, a knowledge of the songbook, and a careful listening to the other players (What Leaders Can Learn from Jazz 2017). Like the military's high-performance teams, jazz combos only function after achieving command of basic and advanced techniques; these are not entry-level options. Countless examples of what Dan Pink calls "the purpose motive" (Pink 2011) can be found in many domains, from Alice Waters' Chez Panisse restaurant in Berkeley, to Tom's Shoes' founder Blake Mycoskie's social entrepreneurship, and to the Kiva crowdsourcing effort for economic development. Generating a compelling narrative for his drivers would be a major win for the new Uber CEO, Dara Khosrowshahi.

Proposal 4: Motivate people with a simple, compelling mission, but only if they hold the essential skills.

Conclusions

Uber illustrates many possibilities for future organizations: global reach without organizational mass, new market niches for value-adding digital matchmakers/middlemen, and business model evolution to autonomous vehicles, package or meal delivery, or trucking. The way Uber has organized resources en route to a formidable market valuation does not resemble any existing public companies' structures, so the startup has served as a crash test dummy for new notions of worker autonomy, app-driven channels to market, and management of both public perception and existing law and custom. If the company is to survive a public offering, it will need to balance its innovativeness with the kinds of predictability and trustworthiness securities law and market sentiment demand. Uber also needs to create a corporate culture to bind together—or at least relate to—its disconnected, far-flung network of contractor drivers. Other more conventional companies can learn from Uber's successes and missteps alike as more organizations will become more digital and share attributes with the ride-sharing firm in the years ahead.

Endnotes

[1]Google's DeepMind team that built the software that beat a Go grand master did use similar algorithms to achieve 40% reductions in power consumption at

Google's data centers. https://www.theverge.com/2016/7/21/12246258/google-deep-mind-ai-data-center-cooling

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