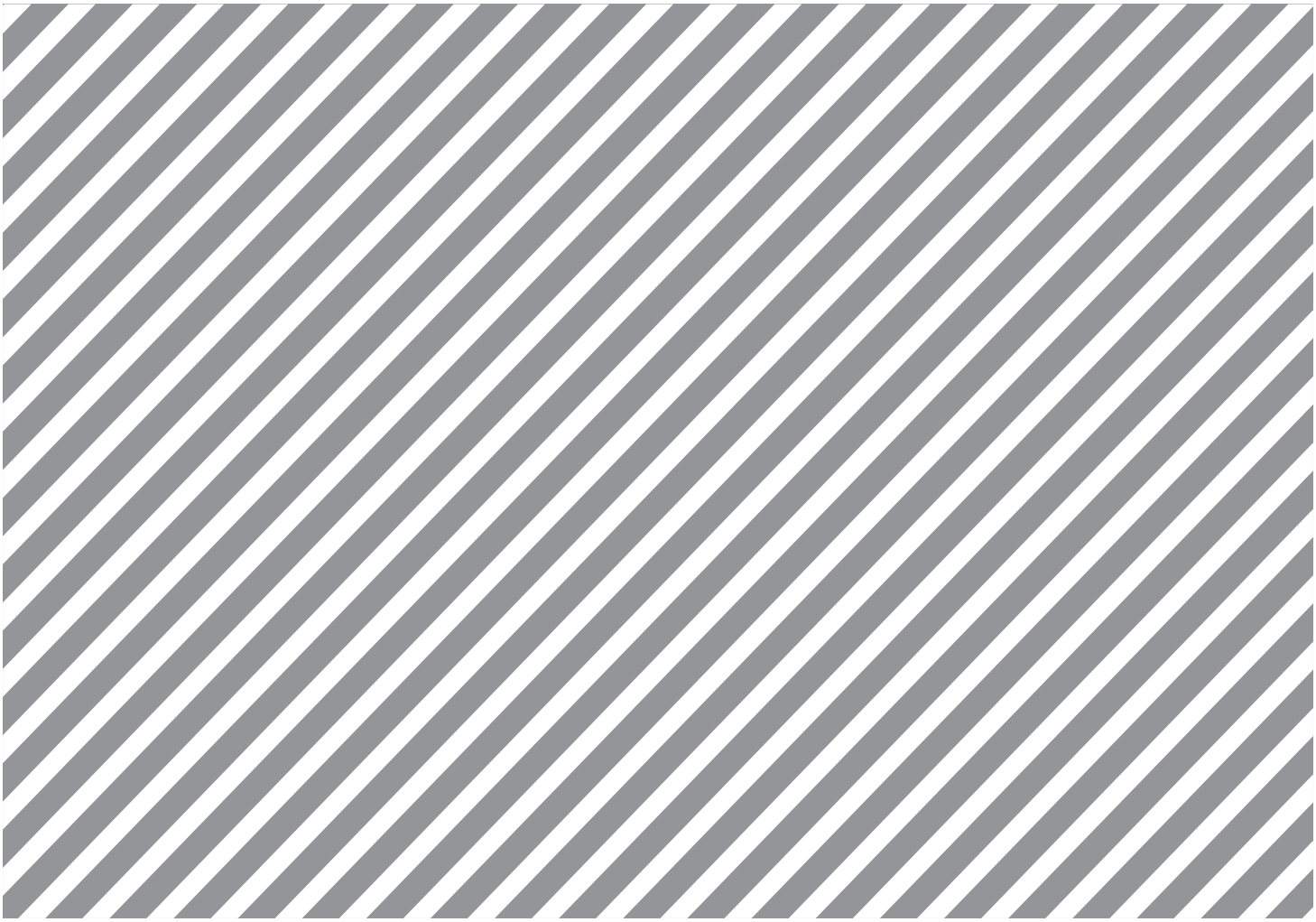
WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

Briefing Paper

Platforms and Ecosystems: Enabling the Digital Economy

February 2019



Authors:
Michael G. Jacobides, London Business School
Arun Sundararajan, New York University
Marshall Van Alstyne, Boston University

In collaboration with Deloitte

World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland
Tel.: +41 (0)22 869 1212
Fax: +41 (0)22 786 2744
Email: contact@weforum.org
www.weforum.org

Contents

除《企业家第一课》、《企业家功成堂》外，其他公众号分享本期资料的，均属于抄袭！

邀请各位读者朋友尊重劳动成果，关注搜索正版号：《企业家第一课》、《企业家功成堂》

谢谢观看！

企业家第一课，专注做最纯粹的知识共享平台

关注官方微信
获取更多干货

加入知识共享平台
一次付费 一年干货

Foreword

Derek O'Halloran, Head, Future of Digital Economy and Society, Member of the Executive Committee, World Economic Forum

Jolyon Barker, Global Managing Principal, Clients and Industries, Deloitte

The Fourth Industrial Revolution is enabled by new digital and physical technologies with almost limitless applicability – and huge implications for the economy and society. New business models are being leveraged not only by emerging organizations but also by traditional entities, which view them as either complementary to well-established models or as potential replacements of their core businesses. The subsequent economic disruption has indeed been revolutionary. In a few short years, the ranking of most valuable companies by market capitalization has totally shifted to being dominated by one business model – digital platforms and ecosystems.

The World Economic Forum has launched the initiative on Digital Platforms and Ecosystems not only because it is a topic on almost every corporate board's agenda, but also because digital platform models already dominate our daily lives and our experiences as consumers, employees, community members and citizens. Considering the implications of platform and ecosystem models for society, as well as the opportunities and risks they could present in the future, it seems obvious to aim for broad collaboration between the public and private sectors, between corporate giants and start-ups, and with consumer-rights groups and civil society.

The topic of digital platforms and ecosystems has been a matter of significant interest at the World Economic Forum. The objective of this briefing paper is to synthesize some of the key points that have arisen during an ongoing set of discussions over the last year. We are very grateful to the three authors who collaborated on this briefing paper, as these academics' professional work and ideas continue to trigger cross-collaboration and action-oriented interaction. We believe the ideas expressed here offer fertile ground for our stakeholders to continue the conversation.

Executive summary

Digital platforms are expanding across economies, reshaping the business models of a wide range of industries, from finance and healthcare to media and retail, while creating fundamentally new divisions of public and private responsibility. The companies driving this trend are diverse and disparate. Some are start-ups, others are giants of the digital economy. Others, still, are traditional firms that are adapting to a more digital world by adopting an active platform and ecosystem strategy.

This briefing paper forms part of the World Economic Forum System Initiative on Shaping the Future of Digital Economy and Society, initiated against a backdrop of complexities brought about by digital platforms and ecosystems. Significant changes have come from diverse angles at the macro and micro levels, affecting commercial and financial models, employment, and societal or regulatory issues. The project examines how digital platforms and ecosystems are created, nurtured, managed and governed, and the intelligence gathered is as critical to the private sector as it is to the public sphere.

The first chapter by Boston University's Marshall Van Alstyne includes a simple chart showing the striking pace of growth of platform-based companies compared to their established competitors. The stories these companies tell demonstrate the myriad advantages of digital platforms. Most striking is the model itself, which rejects traditional paths to scale (i.e. selling more and more for less and less) in favour of one that measures success by the number of users in the community.

This "network effect" inverts the firm, shifting production from inside the firm to outside. In contrast with 20th-century industrial giants, companies with platforms do not merely create value themselves, they orchestrate value creation by outside users. In this inverted model, the platform is more important than the product. The platform value appreciates through repeated and broader use, and it increases with positive feedback, eventually dominating the static or declining value of the product.

Because the users are themselves the producers and the company serves as facilitator, the inverted model redefines traditional public-private interaction models, while calling for an openness that managers raised on traditional competitive dynamics find difficult to grapple with. However, once scale is achieved, the digital ecosystems are extraordinarily powerful.

In the second chapter, Michael G. Jacobides of the London Business School examines how the digital platform is changing the way companies think about how the end customer and private partners deliver policy objectives. Robust ecosystems comprise many stakeholders, including suppliers and producers from the private sector, customers as innovators, and government and regulatory bodies from the public sector.

In this interconnected modular digital world, acting alone is too onerous for most companies. Indeed, working collaboratively – to complement, adjust and support joint efforts – is essential to leveraging digital ecosystems. And tomorrow's public-sector goals reflect broader, systemic needs that require the variety of skills, assets and expertise that ecosystems offer. Since such variables as geography, the regulatory environment and competition affect the ecosystem strategy, the optimal solution often lies in having multiple ecosystems, each tailored to specific local operating needs.

This level of complexity has its downside. Digital ecosystems can mimic organic organisms by growing in unpredictable directions, depending on where they find the most nourishment. Containment is necessary through strong frameworks to ensure that the broader societal implications receive appropriate consideration.

The third chapter, by New York University's Arun Sundararajan, delves deeper into the shifting landscape of trust and the fundamental redefinition of institutional and societal governance. Never before has the public been asked to place so much confidence in corporations; correspondingly, the reliance of global trust models on vast streams of unfiltered consumer inputs is also unprecedented. This evolving dynamic is causing a radical redefinition of boundaries between the public and the private, between regulators and the regulated, and between citizens and their governments.

In this time of transition, reflecting a progression from top-down or vertical trust to horizontal or peer-to-peer trust, the governance of digital platforms is determined as much by the broader user communities (with some help from artificial intelligence) as it is by overseers. The public-private landscape is reshaped radically and, as complexity grows, the policy framework evolves. The blossoming of new opportunity reflects greater societal responsibility for private and digital actors. The chapter highlights six critical choices, from neutrality, oversight and transparency to fairness, data rights and due process, each a central determinant of whether platforms and ecosystems can retain public trust over time.

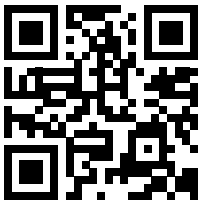
Finally, the fourth chapter considers the recurring theme – how digital platforms redefine public and private relationships and responsibilities – in a co-authored section by our business school academics. As digital progress increasingly melds the public and private spheres, platforms and ecosystems bring a dynamic set of complementors from the private sector to engage with the public sector.

The existing and emerging fields in which platforms can define and demonstrate the efficacy of the new public-private liaison are numerous. The most promising include managing mobility, providing healthcare, renewing infrastructure, regenerating urban areas and countering

the consequences of climate change. Such areas of opportunity can be fully leveraged only through strong cross-collaboration aimed at establishing sustainable foundations for all future work in the space of platforms and ecosystems, highlighting once again the importance and urgency of public-private partnerships.

Realizing the benefits of these potential partnerships requires a shift in the way the public and private sectors view each other. The chapter concludes with a glimpse at new partnership models (including data-driven delegation) and their implications for both governments and industry.

Read the detailed case studies on
digital.weforum.org



1. The opportunity and challenge of platforms

By **Marshall Van Alstyne,** Boston University

Markets have existed for millennia, yet properties of platforms seem new. Where product firms, like diamond mines, protect their profits with barriers to entry, platform firms make profits by lubricating the entry of drivers on Lyft and merchant shops on Alibaba. Where product firms' best supply chains use just-in-time inventory, platform firms beat that model selling goods and services whose marginal costs they do not incur. Market boundaries blur and new paths to dominance emerge. Pioneers ranging from Amazon to Lyft and Zillow and from Airbnb to Klöckner and ZBJ are disrupting the retail, healthcare, real estate, banking, lodging and steel industries, and labour markets. Incumbent firms must grapple with predicting change and comprehending network business models in order to shape their own platform strategies. Comprehension and strategy begin with a new logic.

A. Changing the nature of the firm: Inversion

Platform firms do not behave like product firms. They innovate faster. They operate with fewer employees, often by an order of magnitude. Many are young yet achieve higher market values than their well-established competitors (Figure 1). These new firms play by new rules that pose challenges to traditional firms that operate by old rules. Platform firms with fewer employees beat incumbents despite having started later.

Figure 1: Market values of digital platform firms vs comparable traditional firms, 2018

Firm	Start year	Employees	Market capitalization (billion $)
BMW	1916	131,000	51
Uber	2009	16,000	76
Marriott	1927	177,000	39
Airbnb	2008	10,000	38
Walt Disney	1923	199,000	163
Facebook	2004	35,000	473

Source Author

The challenge for comprehension is that today's change in organizational form is as significant as the change from trade crafts to industrial firms a century ago. Both shifts yield vast firms, but 21st-century monopolies are arising for a different reason opposite that of the late 19th and early 20th centuries. Industrial-era firms were driven by *supply* economies of scale, with high fixed costs and low marginal costs, and could increase volume and lower prices. This led to dominance in the oil, steel, electricity, railroad and automotive industries. By contrast, internet-era firms are driven by *demand* economies of scale, known as "network effects", where users create value for users, which attracts more users, which in turn creates more value, which attracts more users, etc. This has led to dominance in search engines, social networks, operating systems, e-commerce and mobile technology. It will lead to dominance in architecture, the automotive industry, finance, healthcare, industrial internet and in numerous industries in the future. How does an executive know which industries will transform and how to respond? The answer lies in understanding the "inverted firm", a prize-winning idea that explains the transformation and process for managing it.[1]

Network effects cause firms to "invert" shifting production from inside the firm to outside it. Network effects cannot scale inside as easily as outside. There are simply more customers than employees. If users are to create value for other users, then they must be aided and rewarded for doing so. This means firms shift from vertical integration to open orchestration. Platform firms do not merely create value themselves, they orchestrate value creation by outsiders.

The inverted firm hypothesis simultaneously explains several puzzles:

- **Why platform firms scale so fast** – Shifting production outside, they can have zero marginal costs. Uber does not own its cars. Airbnb does not own its rooms. Facebook does not produce its own content. Not incurring the costs of production, they can scale as fast as they can add partners.
- **Why platforms beat products** – Network effects imply that platform value appreciates through use whereas product value depreciates through use. An increasing value proposition, based on positive feedback, overtakes any static or declining value proposition.
- **Why platform firms have high market capitalization but so few employees** – They harness users as producers, representing an external labour force, not counted among the traditional workforce.
- **Why the shift in executive mindset is so hard** – Executives familiar with managing vertical integration must transition to managing open orchestration, from resources they control to resources their partners must volunteer.

> **Alibaba's mission is to make it easy to do business anywhere. With our platform model, we are bringing buyers and sellers from all over the world together, and are best placed to partner with them to meet the needs of the nearly 700 million users on our platforms.**

Terry von Bibra, General Manager, Europe, Alibaba Group, Germany

The inverted firm is distinct from the Fourth Industrial Revolution, which is characterized by blurred lines between the physical, digital and biological spheres. It is also distinct from the Second Machine Age effects of artificial intelligence (AI) and digitized work and the economy. Instead, platforms based on inverted firms represent a change in organizational form through a distinctly predictable and manageable mechanism. Yet, similar to these other phenomena, firm inversion causes large-scale disruption. This has significant implications for trust and ecosystem governance – factors explored later in this briefing paper.

B. Predicting change

Not every firm will become a platform. How does an executive predict this change? It is a matter of asking which firms will invert by moving production from inside to outside. At least four factors help to predict the ease of shifting.

Community and information intensity

A higher proportion of value added by information means that a community of users can more easily share value with one another. Information scales and propagates at zero marginal cost. The community that provides this information is also valuable because it forms the basis of the network from which network effects arise. Information can be explicit, as in user-generated content, or implicit, as algorithms uncover consumption patterns that the platform's recommender systems can spread to other users. Looking at this from the opposite angle predicts non-transformation. Heavy-asset industries, like mining and construction, have a lower proportion of value in information, making them harder to transform.

Modularity

Precise modular output – a ride, a tweet, a search, a stay, an app – simplifies third-party supply. Just as importantly, modularity simplifies third-party quality certification. Firm inversion requires that outsiders know how to produce and consume, and that communicating high versus low quality is obvious. These are easier the simpler the unit of value transferred among users. In the case of Facebook and Twitter, the modular output is so simple that users can shift rapidly from consumer to producer and back. The opposite, again, predicts non-transformation. Highly complex, tightly integrated products, such as an aircraft or Android smartphones, are challenging to produce via crowdsourcing.

Fault tolerance

Lightly regulated, fault-tolerant industries transform to platforms more readily because they also facilitate third-party production. It is both safe and permissible for third parties to serve the demand for apps, videos and e-commerce. By contrast, opening application programming interfaces (APIs) on pacemakers or nuclear power plants creates extreme risk. When accidental or malicious experimentation can lead to disaster, firms vertically integrate to guarantee quality control. That is why regulated healthcare industries have not yet transformed, despite having a high proportion of value in community and information.

Capacity utilization

The greater an industry's spare capacity, the more compelling are the efficiency gains from creating an external market in that capacity. Most car owners use their vehicles less than two hours a day. Most property owners use their guest bedrooms less than two weeks a year. It makes enormous economic sense to create a market for third-party use of this spare capacity via Uber and Airbnb, rather than let it sit idle. In a business-to-business (B2B) context, Amazon Web Services launched after creating enough spare capacity to serve both internal and external demand. By this logic, considerable spare capacity in the energy grid predicts transformation to a platform smart grid, despite the fact that energy is a heavy-asset industry.

These four factors – community and information intensity, modularity, fault tolerance and capacity utilization – balance one another, yet all enable either network effects or inverted firms, which portend platforms.

C. Building and opening platforms

A platform is an open architecture with rules of governance designed to facilitate interactions.[2] Each component matters. The open architecture allows third parties to participate. The rules of governance motivate their participation. The interactions are the sources of value. Each positive interaction, whether between a person and a ride, a person and web content, or a person and another person, represents the moment when partners create new value. These factors, which promote externalized interactions, then represent the levers of platform design.

Interaction

The starting point of platform design is the interaction itself, since this is the source of value. This can be a "transaction", which involves a fully compensated economic exchange, or it can be simpler, an "interaction" that involves only time and attention as reward. One firm's purchase of steel from another firm on steel company Klöckner's XOM marketplace represents a B2B transaction. One user's visit to Twitter to read another user's post represents a consumer-to-consumer interaction. The simpler the interaction, and the lower the friction to participation, the easier scaling becomes. This also explains why the launch of simpler two-way interactions scales much more easily

than three- or four-way interactions. Brightcove, which launched one year before YouTube, envisioned four-way interaction between TV networks, content producers, advertisers and consumers, and had a much harder time scaling than YouTube.[3] Each additional element of complexity adds a new point of potential interaction failure.

Focusing on the interaction provides a further decision metric, guiding where to start. The platform designer must estimate both the value and the volume of a set of interactions. A single internet search has trivial value but trillions of occurrences. By contrast, a single stay at Airbnb has far more interaction value but far less frequency. A bank choosing to build a platform based on different interactions might choose among commercial loans, consumer loans, bond markets, payments, etc. Likewise, a telecommunications provider launching a platform might start by entering markets for wearables, home hub devices, drones, virtual reality and immersive media. The starting point for platform entry should hinge on how much net value an interaction has in the target market and how repeatable it is at scale.

Architecture

Platform design involves careful trade-offs in a narrow versus broad focus and an open versus closed architecture. Building a broad architecture offers ecosystem partners more platform real estate on which to build, with greater chances of success. Yet, focusing resources narrowly increases the chances that a critical interaction will succeed. Most successful platforms start in a niche market, where they can gain traction before opening more broadly. Facebook launched at Harvard. Lyft launched intra-city rides in San Francisco rather than in 10 cities at once.[4] Alibaba failed in its efforts to offer broad enterprise services, then succeeded when it narrowed its offer. The fundamental flaw in Alibaba's first effort, when launching Alisoft enterprise software, was offering a "complete infrastructure that was unable to deliver specific … customer value. There was no killer app…".[5] Once it offered a strong vertical value proposition, it succeeded. Then it could expand horizontally.

The choice of an open versus closed platform is a challenge. Opening too little means that third parties cannot participate and add value. Opening too much means loss of control, inability to steer the community and inability to monetize. The most successful platforms start with a few key partners, who build critical apps on top, then open more over time. The German chemical and consumer goods company Henkel stepped back from its own interests and brought in partners based on "who would benefit the marketplace most".[6]

Governance

If open architecture allows third parties to participate, just governance motivates them to do so. "Where firms might once have furnished design specifications to a known supplier, they now tap ideas they haven't yet imagined from third parties they don't even know."[7] Getting strangers to bring their ideas to the platform or independent companies to invest means rewarding them for the value they create. It cannot be the case that, just because the platform owns the infrastructure and makes the rules, it keeps all the value for itself. If this were true, third parties would not create value simply to have it taken away. Shared value is the essence of motivating third parties whom the platform sponsors have never met.

Governance provides the rules of who may participate, how they create and divide value, and how to resolve conflict among ecosystem partners.[8] Yet, deciding who may participate requires a bigger shift in mindset than most leaders realize. Klöckner's successful launch of XOM needed more open minds at two levels. Sales and marketing staff saw cross-selling by alternate suppliers as a direct threat to their control over the sales channel. Top executives understood selling complements but rejected selling substitutes. They feared competitors would cannibalize business. In both cases, greatly expanded opportunity overcame the main objections. XOM now makes more money selling third-party products than selling Klöckner products. It captures relevant data and has forestalled platform entry by competitors who otherwise would have been denied market access. Software company SAP has built the largest European platform by offering its products where they are the best while ceding portions of the market to third parties where others' are better.

Good governance also means balancing the interests of ecosystem partners. Uber struggled initially to balance the interests of drivers and consumers. Good governance means being a fair ombudsman for the ecosystem's various conflicting interests.

> "[Executives] understood that it makes sense to sell complementary products from third parties through our … platform. But, even if they rationally understood …, emotionally, they could not support a platform where our fiercest competitors would also sell their products."
>
> **Gisbert Rühl**, Chief Executive Officer, Klöckner, Germany

D. Monetization and revenue

Nowhere is the shift in mindset more important than in understanding platform revenue. The forces that make it easier to capture value from an ecosystem make it harder to recruit and retain members.[9] The first question of finance, "*How do we make money?*", must instead be preceded by, "*How do we create value?*". Only after determining how to help others to collectively create value is it possible to monetize by asking, "*How do we share in that value?*" The problem that traditional finance introduces is that starting from the money question puts friction on third-party engagement but, without others engaging and creating value, a platform has no value to monetize. Reversing the order, focusing first on engagement that drives value creation, then on capturing a fair share of that value, leads to successful monetization. Put simply, executives first use monetization to drive network effects. Then, after achieving critical mass, they use network effects to drive monetization. Alibaba, Facebook, Amazon and Google all succeeded following this logic. AOL Instant Messenger and MySpace failed by ignoring this logic.

Monetization involves control over three flows: the product or service flow, the data flow and the revenue flow. The deal flow should occur on-platform wherever possible. If these flows occur on-platform, as they do on Lyft, XOM and Alibaba, matching people to products improves and the platform can take a transaction cut or advertise "in-stream" more easily. If the deal flows occur off-platform, as they do on OpenTable and eHarmony, ads are limited and revenue derives from access fees, not transaction volume.

A further subtlety is that, unlike products, platform pricing is often "two-sided".[10] One ecosystem partner gets free or subsidized prices while a different partner pays. Users get free search and free social networks while advertisers pay. Consumers get subsidized credit cards while merchants pay. This form of free offering differs from razors and blades and from cell phones and minutes because these are tied goods. Under tied pricing, the same person buys both items, only paying at different points in time. By contrast, two-sided pricing connects two different parties, with one party paying and the other riding for free. To decide which partner gets the discount and which one pays, it is necessary to consider which party attracts interactions more strongly or creates more value. Differential pricing by type can raise questions of regulatory fairness and equity, which is addressed later in this briefing paper. The main point is that, in order to monetize, value creation must precede value taxation.

> **A 'platform' is a system that can be programmed and therefore customized by [outsiders]... and, in that way, adapted to countless needs and niches that the platform's original [designers] could not have possibly contemplated.**

Marc Andreessen, Co-Founder, Netscape; General Partner, Andreessen Horowitz, USA

Source: Management Science

Revenue is just one measure of success for digital platform companies. Figure 2 illustrates other important indicators of success.

Figure 2: Measures of digital platform success

Metric	Companies that use the metric
Revenue	Booking.com, SAP, Uber
Funnel of transaction/transaction volume | number of people travelling	Booking.com, BlaBlaCar
Profit and market share	Uber
Number of participants (consumers, suppliers) | "gravity of the platform", e.g. how many complementors | number of active users	Booking.com, SAP, Deutsche Bank
Quality (customer satisfaction ratings, surveys)	Booking.com, Door2Door, SAP
Supply – number of rooms and number of properties	Booking.com
Customer adoption rate | customer engagement | customer experiences and outcomes | customer health score | customer acquisition costs	SAP, Deutsche Bank, GE Digital, BlaBlaCar
Prevalence of multi-homing	Lyft
Killer application	Alibaba
Culture and talent – talent adoption – "integrated talent management score"	GE Digital
Share of revenues from digital sales	Klöckner
Membership	BlaBlaCar
Utilization rate	Door2Door
Share of ecosystem revenue captured by partners, share captured by platform	Alibaba, SAP
Share of organic new users to paid new users	Uber, Lyft
Match rate	Alibaba, Uber, Lyft

Source: Deloitte analysis and author

2. Designing digital ecosystems

By **Michael G. Jacobides,** London Business School

A. From designing products, services or organizations, to designing digital ecosystems

Rising interest in "business ecosystems" has prompted exponential growth in research into "ecosystems",[11] often – though not always – drawing on digital platforms. With the stock market valuation of tech giants, proud sponsors of a myriad of ecosystems, still sky-high, the excitement over digitally enabled ecosystems has been relentless. But what lies behind this explosion of interest? What is new here, other than a captivating metaphor?

To understand the rise of ecosystems, a look at the process of industry transformation is needed. For a very long time, societies the world over organized economic activities by granting special privileges to particular groups (guilds, castes, professions) who, in exchange for their privileges, would ensure that the activities under their purview would be efficiently performed, aided by regulation. Sectors, from banking to healthcare, were fairly rigid and static, and it was hard to change how business could be organized. Yet, the last few decades have heralded a more adventuresome spirit of experimentation for regulators, and the growth of digitization has created a more interconnected world. The digitization of workflows in product and service companies has made it easier to change the scope of the offerings to match both the final customers' desires and the different industry participants' interests. Add globalization to this, and the fact that digital data flows can be transferred instantaneously at very low cost, and these forces are redefining the entire architecture of sectors.[12]

> **Our approach has always been to work with partners. It probably helped set the company's DNA to say 'the partner is who you enable' as opposed to 'I need a partner, I need a brand, I need a supplier so I can serve the end consumer'. We are true believers that a conscious partnering model is the best way for us to pursue our mission.**
>
> **Terry von Bibra**, General Manager, Europe, Alibaba Group, Germany

If starting from scratch, designing the economy to make it most efficient would not start with the sectors existing today. Rather than taking products and services for granted, executives should ask, "*What does the (final) consumer want to do?*", and reorganize accordingly. Digital technology allows going beyond designing products, services, customer experiences or organizations. It allows redesigning whole industries, and leveraging digital technologies to create "business ecosystems", like Uber and BlaBlaCar, which have helped shape the "mobility ecosystem". This is causing excitement and ferment, but it is also raising new strategic, managerial and policy challenges, especially in balancing individual entrepreneurship and private benefit with public good.

> **[As you drive innovation] you can decide you want to do it in parallel to other players or you [realize that] most likely those players will remain crucial in the market, so how about partnering with them? How about looking at how one can leverage what they do to enable them to make even more use of their position?**
>
> **Tom Kirschbaum,** Co-Chief Executive Officer and Founder, Door2Door, Germany

B. What are digital ecosystems and how can they be leveraged?

"Ecosystem" is a term used inconsistently. The organic, widespread interest in the term reflects structural changes and emergent strategic opportunities that are not covered by the existing analytical arsenal, so paying closer attention can yield significant benefits.

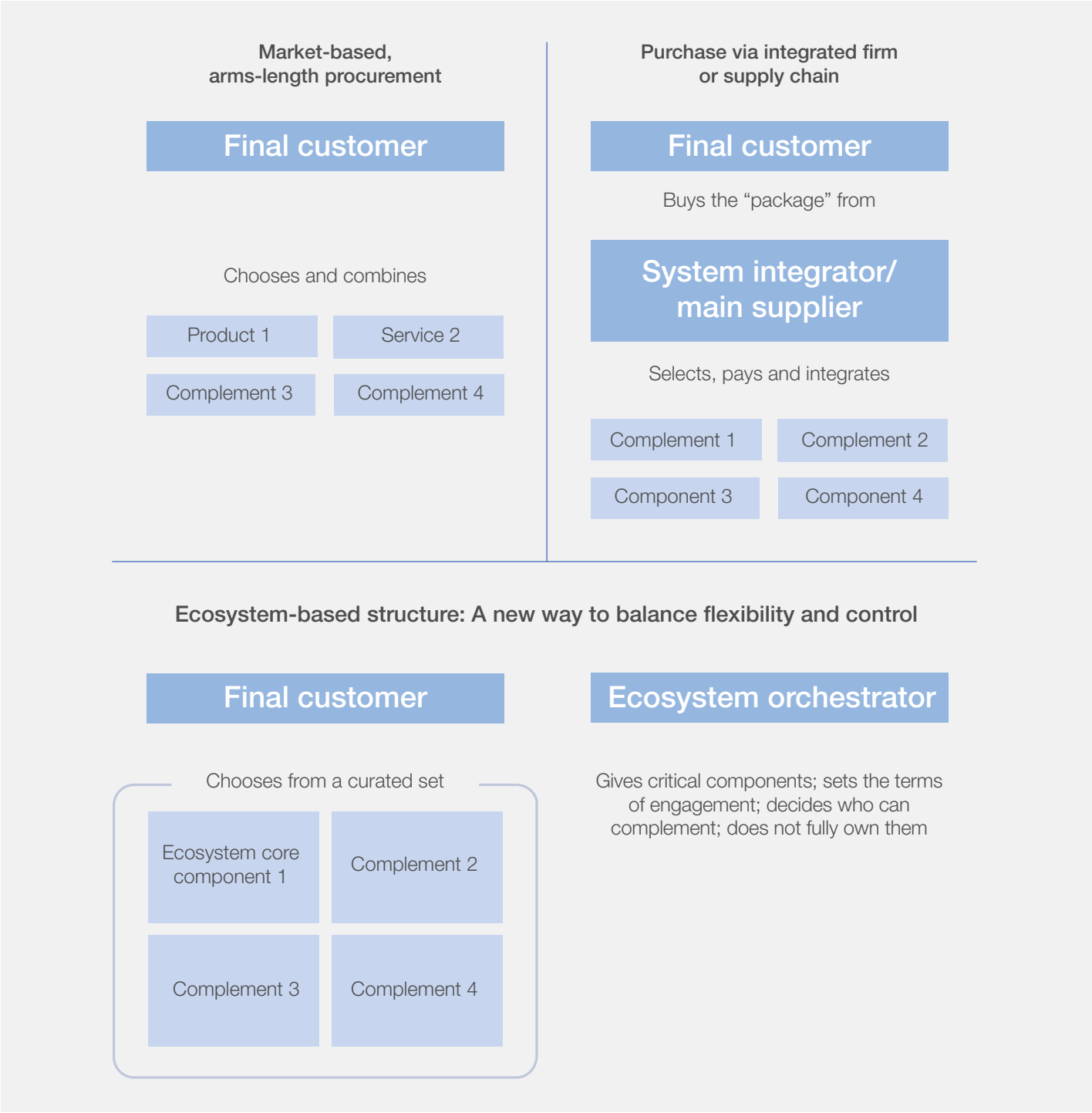
Ecosystems writ large can encompass any set of interacting producers, suppliers, innovators, customers and regulators that shape a collective outcome – sometimes geographically bound (e.g. the "Silicon Valley entrepreneurial ecosystem"), while at other times focusing on a sector (the "mobility ecosystem"). Yet such loose definitions, by encompassing everything, can engender more confusion than clarity. Focusing more narrowly on *digital* ecosystems – which consist of interacting organizations that are digitally connected and enabled by modularity, and are not managed by hierarchical authority (like in a supply chain) – may be better. In designed ecosystems, organizations come together by co-specializing with each other, creating bonds that engender collaboration, without excluding competition.

> **We have multiple participants in the ecosystem – close to 1,000 targeted and managed participants. They are typically technology partners, system integrators, independent software vendors, channel partners. We also see a lot of our customers themselves innovating on top of our capabilities by writing extensions at the application layer or new capabilities at the platform layer to fill out their own solutions. People tend to play multiple roles within this ecosystem.**
>
> **Karthik Suri,** Senior Vice-President and Chief Operations Officer, GE Digital, USA

Why do ecosystems come about? They emerge because, as a result of digitization, it is now possible to connect a broad set of firms to deliver a customer solution. Rather than focusing on one segment at a time, firms increasingly want to offer a solution for a broad set of needs. Not content with offering a drug only, pharmaceutical companies want to offer wellness solutions, which include monitoring and real-time adjustment to the patient, and a preventive package. To do so means moving beyond their traditional remit into diagnostics, AI, secure data transmission and response. Allianz's and Deutsche Bank's ecosystems are examples, as is consumer products company Henkel's. Other firms, like Klöckner, turn to creating digital ecosystems in such traditional areas as steel to find new ways to add value for their customers, both to support their own sales and to enhance value added.

So as firms move from the historically narrow to ever broader provision of products, services or experiences, the need to find complementors who can offer their services where the focal firm is not active becomes apparent. This is relevant for firms operating multisided platforms (see the previous chapter), like Alibaba or OLX Group; it is also the case for big industrial giants like GE, or device manufacturer Huawei, keen to enlist AI-enabled complementors. Ecosystems represent a new way to organize economic activities. Rather than relying either on the buyer to integrate goods and services themselves, or to buy a bundle from a single source, where a firm acts as a system integrator, they allow final customers to have some choice but pick from a limited menu, which is in turn curated and managed by an ecosystem orchestrator. Ecosystems thus become new ways of organizing complementary goods and services that involve many companies collaborating and competing to offer a complex good or service, as Figure 3 illustrates.

Figure 3: How ecosystems compare to production in firms vs procurement in the open market



Source: Author, adapted from Jacobides, Carmelo and Gawer, "Towards a Theory of Ecosystems", *Strategic Management Journal*, vol. 39, no. 8, 2018

From the firms' perspective, it is not impossible to have all the potential complements in-house. From the customers' perspective, the desire for variety and the ability to choose are critical. Apple doesn't dictate which apps to buy, but Apple's decisions, in terms of how many complementors can provide apps and what their rules of engagement are, define the boundaries of the basket from which final customers choose. The thirst for feature variety and the corporate desire to not have to foot the bill for all the complements needed underpin the merits of ecosystems.

More important, perhaps, (digital) ecosystems have now become a new way of organizing economic activities. While technologies are much more modular and it is much easier to create interdependent sets of offerings that can add value to the final customer, a fair amount of coordination is still needed to ensure that interdependencies are dealt with and common objectives are met. From SAP's space ventures to OLX Group's new platforms, ecosystems often require complementors to both adjust and adapt to each other, and to invest specific capital to the needs of the ecosystem. And, as they do so, ecosystems become a new way of organizing, distinct from both firms and markets, supply chains and hierarchies. They each have their space, merits and shortcomings.

C. Building new ecosystems: The business challenge

While the popular discussion on ecosystems has grown considerably, it tends to be somewhat lopsided, focused on particular types of platforms, and usually directed at "the few" (who often hardly need advice) rather than "the many" (complementors, often interchangeable and powerless, occasionally in the millions for every one orchestrator). The canonical examples tend to be Google, Apple, Facebook and Uber, companies that have traits in common, including their very strong brand name and superior capabilities in delivering products and services. These examples reflect markets with network externalities, where the value in participating in a platform or being part of an ecosystem is a function of how many others participate in the same platform or ecosystem (as explained in the previous chapter). Under such conditions, "winner takes all" dynamics emerge that make life considerably harder for those entering late in the game.

> **The battle of devices has now become a war of ecosystems, where ecosystems include not only the hardware and software of the device, but developers, applications, ecommerce, advertising, search, social applications, location-based services, unified communications and many other things. Our competitors aren't taking our market share with devices; they are taking our market share with an entire ecosystem. This means we're going to have to decide how we either build, catalyse or join an ecosystem.**
>
> **Stephen Elop,** Chief Executive Officer (2010-2014), Nokia, Finland
>
> Source: The Guardian[13]

Yet, not all settings are characterized by such network effects, and there is scope for the right strategy to shape the outcome. Even in markets where one might expect network externalities, early, dominant platforms and ecosystems often lose out. In the operating system world for mobiles, Symbian, with 66% of the market in 2007, did not manage to maintain domination and folded, while Android edged its way from irrelevance to dominance. Uber's early lead in the South-East Asian ride-hailing market, and the fact that it was part of a global powerhouse with bottomless funding, did not secure it a spot; it had to fold and exit the market, selling to local tech company Grab, while Indonesian start-up Go-Jek dominated its market. Early platform and ecosystem size and age are not determinants of success; if anything, the unique features of those who dominate might explain their success and expansion, rather than the other way around. Amazon's dominance in retail is not just the result of its size, but also of its superior fulfilment capabilities and intimate knowledge of the customer, consciously developed as the company grew. It demonstrates that strategy can drive success and dominance is not unshakeable.

So, in an emerging field shrouded in myths more than in facts,[14] what can corporate players be advised to do? They need to understand that they probably will not engage with one but, rather, with many ecosystems. Much as "an alliance strategy" or an "M&A strategy" does not focus on one alliance or one deal, a "platform and ecosystem strategy" will focus on the increasing variety of platforms and ecosystems. Starting with the "business" level, firms need to decide what their engagement in ecosystems may be. A very few may build their own, but it takes special skills, a strong position and a compelling reason that appeals both to the final customer and complementors. Others will be well advised to *participate*, whether as strategic partners or as complementors, in a variety of platforms and ecosystems, and have a strategy that allows them to improve their plight, rather than try to take a pole position that may never materialize, leading to a significant waste of resources. They will also want to adjust their offerings and strengthen their connections to complementary actors, and possibly look into gradually moving closer to the centre of an ecosystem; as they do so, they need to obsess about the needs of final customers and complementors alike.

The good news is that it does not take Google's resources to set up a successful ecosystem. The companies that are now global powerhouses interviewed in the context of this project – from Booking.com to Alibaba – started humbly, obsessed about finding new ways to add value, and ultimately gained influence and power. Today, with the use of creativity, business flair and strong execution, upstart firms like Traipse and Velocia are building their collaborative value propositions, which help link actors in a new way. Their business model adjusts as their ecosystem evolves, and the root of their success is their ability to sense, respond and, if needed, pivot. Consider, for instance, Traipse, which, in the process of developing a reward system for its geolocation game, realized that there was even more value to local partners from helping introduce a local currency, and morphed into MyLocalToken, which aims to offer a cryptocurrency-based solution to the age-old problem of supporting local consumption.

D. A guide for navigating a world of digital ecosystems

The growth of platforms and ecosystems leads to a fascinating new set of strategic questions and opportunities.[15] It also leads to a world in which static descriptions and frameworks are an impediment for success.[16] Ecosystems can be the tool to dislodge established incumbents and change the very definition of a sector, but they can also offer the means to reorganize, and to protect incumbent firms that find themselves under immense pressure to offer far-reaching solutions that encompass an ever growing gamut of potential complementors. Younger and more established participants alike are keenly aware of the desirability to offer a "one-stop

shop" solution to cover all customers' needs. While Uber and Grab are moving to food delivery and travel management, Booking.com is expanding into travel, Ping An from insurance to healthcare, and Deutsche Bank and Allianz from banking to a broad suite of services.

As the opportunities to offer new bundles of goods and services increase rapidly, aspiring disruptors but also entrenched incumbents will find that their understanding of the customer is crucial. Getting the right customer data and superior capabilities can help to structure the right offering and ecosystems.

Figure 4: Questions for executives navigating in a world of digital ecosystems

- **How is my sector being transformed as a result of the new opportunities available through current or developing digital ecosystems?**
- **What pain point am I resolving for the final customer from this ecosystem? How does my offering compare to others', seen from the vantage point of my complementors?**
- **How can I make sure that I am forming a true ecosystem rather than constructing an ego-system, which places myself in the centre?**
- **What role should I play in each of the ecosystems being considered?**
- **What is the ultimate goal of my overall ecosystem participation? What do I seek to achieve in terms of the overall corporate objective?**
- **What data and analytics capabilities must I develop to better serve the customers of my ecosystem? How will they inform the question of who the right ecosystem members are, and what bundles to offer?**

Source: Author

> **What keeps ecosystems from developing is, first, issues with the willingness of companies to partner as most are focused on protecting versus growing the playing field. So, creating the awareness around change and highlighting the benefits of cooperation are needed. Second, even for those who are open to explore, they're reluctant to take risks and are short-term focused – they ask 'To justify any contribution, what is the expected ROI in the near future?**

Marius Swart, Lead, Digital Acceleration, Operations and Strategy, Henkel, Germany

E. From private benefit to public good

Along with new opportunities come new challenges, not only for firms but also for society overall. New platforms and ecosystems challenge incumbents and offer new sources of value added to customers as well as private benefits to those orchestrating them, but they can also accentuate inequality in terms of rewards. To complicate things further, the traditional analytical arsenals of regulators are not well equipped to consider how platform sponsors and firms at the heart of ecosystems exert control and span across previously delineated industry sectors. Antitrust's peg of competition to "consumer welfare", defined as short-term price effects, in particular, appears unequipped to capture the essence of power in platforms and ecosystems.[17] To do so, consideration needs to be given to the impact of changing architectures in a sector – and ecosystems are part of it. Policy and regulation have so far shied away from looking at the impact of the transformation of business models.[18] For all the concern about the power of "Big Tech", a robust framework to guide policy for this changing world is still lacking.

Many of the orchestrators are conscious of their impact on their complementors (and the broader public) and are careful to avoid both exploiting weaker complementors and poisoning their own well of success.[19] A formalized framework is needed to better assess when platform and ecosystem players are abusing their position, as opposed to taking advantage of business opportunities.

A better framework to guide firms that engage in or build ecosystems is also needed. Beyond tackling trust and ensuring good ecosystem governance, the rules of engagement should be considered, with an eye to encouraging true customer and complementor choice and leading to an *evolvable* set of ecosystems.

Figure 5: Strategic questions in designing a digital ecosystem

- **How should the additional benefits for consumers be balanced against the risk of strong orchestrators who exercise control over their complementors?**
- **How do the strengths of the traditional intermediaries (e.g. retailers) compare against the strengths of multisided platform resellers, since they engage in similar activities?**
- **How can the relative power of orchestrators be assessed? What practices in the way ecosystems are governed offer examples to replicate?**
- **Are there any downsides to ecosystems that provide a web of services to the final end customer, given the propensity for customers to stay inside an ecosystem? Is there *de facto* "ecosystem entrapment" that reduces choice and competition? If so, what can be done to restore balance?**
- **What key metrics should be considered in ecosystem power distribution, and what are the most effective ways of formulating policy?**
- **Since many of the key digital platforms and ecosystems are global, how should the regulatory apparatus, which still focuses on these dynamics one country at a time, be adapted?**

Source: Author

In considering the role of digital ecosystems, the nature of data and their ownership will be paramount. Digital ecosystems work best when they make it easier for the consumers to have all their needs met; but to fulfil various kinds of needs, aspiring firms with multiple, connected ecosystems must know a lot about them and must be able to act. It is no surprise that the most far-reaching, integrated ecosystems are in China, where there is less focus on the use of customer data. As such, the feasibility and desirability of having a broad ecosystem will depend on society's views concerning the ownership and use of data and the requirements in terms of customer consent. And, as the IT company CliniVantage has demonstrated, finding ways to balance technological feasibility with data ownership and use limitations, possibly by creating new platforms and ecosystems, may be a catalyst for leveraging the technological opportunities in sectors such as healthcare.

Digital platforms and ecosystems are here to stay. Their arrival has heralded tremendous new opportunity, but also new dilemmas, challenges and questions for businesses (established and aspiring), policy-makers and polity at large. Beyond the excitement generated by new offerings for final consumers, and the potential concerns of market power, much can be achieved by a thoughtful, forward-looking approach that leads to the right questions and identifies areas of opportunity. It also helps revisit the links between the public and private spheres, brokering structures that can improve the state of the world.

3. Blurring boundaries: Managing platform trust, responsibility and governance

By **Arun Sundararajan,** New York University

A. Platform trust: A peek under the hood

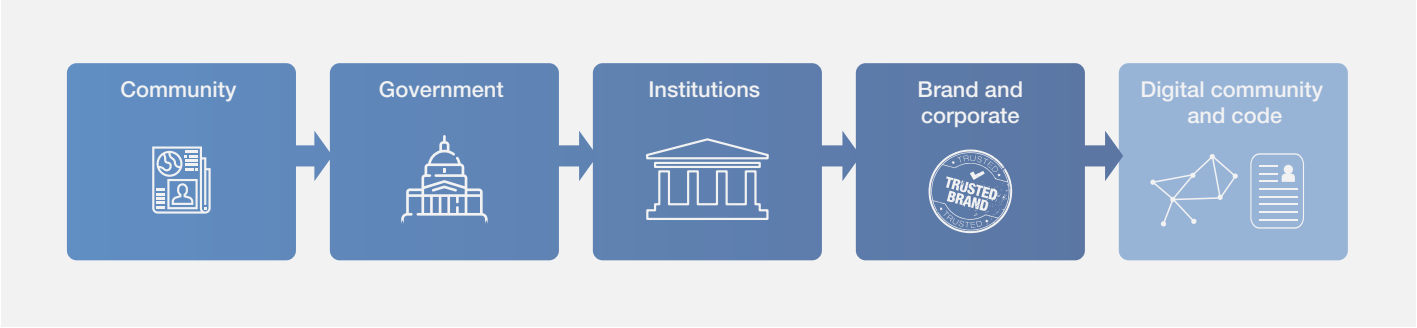
As platform models and strategies are embedded more deeply into the fabric of global commerce, new questions related to trust and governance are emerging. Platforms are based on a new generation of commercial trust, signalling the twilight of many institutions that came of age during the managerial revolution of the 20th century, while redefining the boundaries between the firm and the market, between corporations and government, and between the public and private sectors. Mirroring the late 20th-century preoccupation with creating appropriate corporate governance, a robust dialogue is expected in the 21st century to define models for platform governance. This chapter includes a framework to help guide corporations, governments, regulators and other stakeholders in the right direction.

To establish trust – a willingness to commit to a collaborative effort before knowing how the other party will behave – trading parties often look for assurance on four dimensions.[20] The first involves establishing *authenticity* – is the counterparty real and who they say they are? The second involves evaluating *intentions* – are they aligned with making the exchange productive, or is there criminal or other pernicious intent? The third step involves assessing *expertise or quality* – for instance, what do the certifications from intermediaries that set standards and assess expertise reveal? The fourth involves *lowering risk* – what insurance contracts, or other means, are available? Each of these reduces the likelihood of *market failure* – the inability of trading parties to engage in market-based commercial exchange despite the possibility of gains from trade – and thereby expands economic activity.

The progression of commercial trust (Figure 6) shows that while its primary sources have shifted over time, each continues to play a role in facilitating modern-day exchange.[21] As 20th-century hierarchical corporations cede way to an economy whose activities are organized via platforms and ecosystems, the burden of facilitating trust and governing commercial conduct shifts *onto the platform*. A new basis for commercial trust – *digital community and code* – reflects a heightened reliance on digitally-encoded community signals of trust and the encapsulation of different forms of standardization and contracting into computer code.

> **The building block of society – interpersonal trust – has been transformed from a scarce to an abundant one. Our potential to create value is also transformed.**
>
> **Frédéric Mazzella**, Chief Executive Officer, BlaBlaCar, France

Figure 6: The five phases of commercial trust that have emerged over time



Source: Author

Although many facets of trust via digital community and code are indeed new, others are digital extensions of familiar trust institutions. The common trust cues fall into three broad groups:

Digitized participant feedback: Pioneered by eBay in the mid-1990s and adopted by most modern platforms, peer review systems have become synonymous with many people's notion of "online reputation". A critical differentiating factor of peer feedback on today's commerce-focused platforms is that, unlike on open review platforms like Yelp, every review is typically from an authentic user and a verified transaction.

> **We have invested in a huge amount of technology and resources [into our customer review system] because we believe our estimated 180 million customer reviews are an absolutely essential part of the business. If we were to switch off our reviews on the website, bookings would probably go down dramatically because people count on having this essential factor.**
>
> **Rob Ransom**, Vice-President, Strategy and Corporate Development, Booking.com, Netherlands

Digitized social capital: A second class of trust cues comes from platforms such as LinkedIn and Facebook. These platforms contain digitized representations of our physical-world, real-world social capital[22] – a powerful cue of authenticity, reliability and intent. The potential of digitized social capital as a trust enabler is especially significant in the business-to-business rather than consumer context, and will expand over time as platform models permeate industrial and professional exchange.

Digitized real-world authentication: Many consumer platforms rely on making a range of real-world authentication systems digitally available. For example, governments have invested heavily in creating national IDs for residents and companies like Jumio, used by platforms ranging from Coinbase to WeWork, that allow platforms to authenticate a user by digitally verifying one or more of these forms of ID. Similar technology is used by Airbnb's Verified ID badge, a feature BlaBlaCar offers in India as well.

> **When Lyft first launched, we knew that we were literally asking people to do what their mother always told them not to do: to get into a stranger's car. Sure, people had been doing this for decades every time they got into a taxi, but there was a social norm with taxis that we had to quickly establish with ride-sharing. We realized that the best way to do this was to eliminate the anonymity that was always part of the typical 'vehicle for hire' ride, and to enhance the accountability that had previously been absent in the for-hire industry.**
>
> **Joseph Okpaku**, Vice-President, Public Policy, Lyft, USA

Figure 7: The DREAMS trust framework of BlaBlaCar[23]

- **Declared** – Declared identity including name, photo and bio
- **Rated** – Peer-to-peer ratings based on members' prior activity
- **Engaged** – Financial commitment to the journey via prepayment
- **Activity** – Information on a member's frequency of activity and level of responsiveness
- **Moderated** – Content exchanged by members moderated and verified by the platform
- **Social** – Existing online social identity (Facebook or LinkedIn) connected with profiles

B. Striking the right balance between institutional and digital trust

Platform activity is enhanced dramatically by *stand-alone trust systems* that aggregate cues from a range of sources while also giving participants control over the data in their profiles. An effort compliant with the EU General Data Protection Regulation (GDPR) that is gaining traction in Europe is Verimi, backed by a consortium of investors and customers that includes Allianz, Daimler, Deutsche Bank, Samsung and Volkswagen.

> **Only the responsible handling of customer data opens the door to digital business models in the long term.**

Markus Pertlwieser, Chief Digital Officer, Deutsche Bank, Germany

Trust expert Rachel Botsman describes the ongoing transition as moving away from *centralized* trust that flows *vertically* upwards through institutional authorities and towards *decentralized* trust that flows *horizontally* between trading partners within a community. And Jeremy Heimans and Henry Timms note that the challenge with this "new power" is not to hoard it but to harness and channel it.[24] Nevertheless, even in today's world of new power, horizontal flows and blockchain-based smart contracts, digital trust systems must be backed by traditional institutions, robust human intervention and a trusted organization.

On Airbnb, for example, exchange relies extensively on *digital* ratings and the use of machine learning to weed out bad actors; *government*-backed trust systems manifest, for example, in the company's Verified ID system; economic *institutions* back the insurance contracts that provide host reassurance against property damage; and Airbnb's *brand* promises safe and reliable accommodation.

> **Real, lasting trust must be earned, and while it's not easy, it is essential. We have powerful technology that helps facilitate trust, but technology alone isn't enough. The fact that there are real people and an entire company standing behind what we offer makes all the difference in our ability to earn, keep and, if necessary, rebuild our community's trust.**

Nick Shapiro, Global Head, Trust and Risk Management, Airbnb, USA

Thinking beyond digital technologies is especially important when considering the decentralized markets, smart contracting and reputation technologies associated with *blockchain* systems. Such technologies by themselves will not create new trust institutions that are sufficiently robust unless the ecosystem itself is trusted and its governance rules laid out clearly. Put differently, creating trust within the system has little impact if the system itself is not trusted.

C. Six governance choices that can make or break a platform

The scaling of platform models reflects their ascendance as one of society's main custodians of the public trust. Their governance choices define the "rules of the game" for participants, akin to the role economic institutions play in nation states and the industrial economy. As Nobel laureate Paul Romer has noted, "Institutions are the rules – the rules of the game that structure what everybody does in the nation."[25] And it is the *hybrid* between centralization and decentralization in the platform world that creates the most important governance choices.[26]

Getting governance right involves effective choices along six key dimensions:

(I) Define the neutrality and independence: Platform owners must decide whether their platform will be neutral and open, or whether they require exclusivity and exert control over access. For example, the emerging Klöckner XOM platform has explicitly chosen to be open, allowing competing steel manufacturers to list alongside and compete with Klöckner. In contrast, the Apple iTunes platform is tightly controlled, with permission required from Apple before an app can be listed.

> **From the beginning we have been an open platform, so if you comply with our guidelines then you can be in our marketplace. Booking.com has never believed in the business model to have exclusive relationships with listing providers, saying you can work with us but only if you don't work with somebody else, or you don't work with them in a certain way.**

Rob Ransom, Vice-President, Strategy and Corporate Development, Booking.com, Netherlands

Similarly, a platform may be agnostic about its participants multi-homing[27] or may demand that each of them commit to an exclusive relationship. From the perspective of Booking.com, non-exclusivity is central to its platform governance philosophy, so long as a participant complies with a transparent set of standards and guidelines. Of course, one must take antitrust issues into consideration. According to Gisbert Rühl, Chief Executive Officer of Klöckner, the company sought and received approval from the German cartel (who paid close attention to this case as a pioneering business-to-business platform effort in Germany) prior to choosing an open governance model.

Neutrality has many other dimensions. The Amazon platform features millions of products and sellers who compete with Amazon for customer demand. Amazon is explicitly non-neutral by frequently highlighting a product as "Amazon's Choice", and possibly ranking its own offer above others whose prices may be lower. In contrast, the Klöckner XOM platform has explicitly chosen to be neutral in its ranking. Similarly, Allianz, which is Europe's biggest insurance provider, is committed to neutrality. Putting aside concerns about competitive advantage and cannibalization, history teaches us that openness is generally likely to trump control in the long run – growing the ecosystem is a better investment than protecting one's turf.

"

We must acknowledge and understand that platforms are predominantly here as marketplaces in the digital economy and, like an exchange, they should follow certain rules; a very important one would be that they should, in principle, not give preference to their own product – that is, adhere to the idea of neutrality.

"

Henning Schult, Senior Manager, Strategy and Regulatory Affairs, Allianz, Germany

(II) Assess the scope of compliance oversight: How much should a platform ensure compliance among its participants with non-platform rules, including those dictated by the laws of the countries in which its participants operate? There are many reasons for choosing a level of oversight that is different from what is minimally required by law.[28] Google's YouTube platform has embedded a range of censorship rules into its algorithms, well beyond legal requirements, defining what it believes is in the best interest of the ecosystem as a whole. Uber and Lyft both watch and listen as the public and regulators discuss issues concerning the ride-sharing industry, trying to be the earliest adopters of regulations.

(III) Choose the level of transparency: A platform is often called on to make its "rules of the game" transparent. Societal arguments that favour transparency stem from the close connection between democratic government and transparency in governance.[29] The argument is also made well by the general principles laid out by the Institute of Electrical and Electronics Engineers (IEEE) in its Global Initiative on Ethics of Autonomous and Intelligent Systems, that "... the complexity of autonomous and intelligent system technology will make it difficult for users of those systems to understand the capabilities and limitations of the AI systems that they use, or with which they interact. This opacity, combined with the often-decentralized manner in which it is developed, will complicate efforts to determine and allocate responsibility when something goes wrong with an AI system. Thus, lack of transparency both increases the risk and magnitude of harm (users not understanding the systems they are using) and also increases the difficulty of ensuring accountability." [30]

For platforms operating in the European Union, there are a wide range of transparency requirements, encapsulated in the 2018 GDPR. The law notwithstanding, greater transparency may seem like a natural choice, democratic and fair, consistent with a philosophy of doing right by one's ecosystem. However, a platform must consider many caveats. A higher level of transparency may have adverse competitive implications for the platform itself, a requirement of transparency may lower innovation incentives and transparent systems are more susceptible to gaming by users.

"

It is very important for us to be very transparent with our customers and our partners in terms of what we are doing [with the Predix platform], how we are doing things, and the right level of auditability for each of these things.

"

Karthik Suri, Senior Vice-President and Chief Operations Officer, GE Digital, USA

(IV) Minimize the algorithmic bias: Platforms rely on a range of algorithms for their effective functioning, and these are susceptible to bias. Such bias arises more frequently if the implicit values of the people involved in creating or training the algorithm (or values represented in the associated training/test data) are reflected in its subsequent functioning, or when design choices are automated through the large-scale use of A/B testing (testing multiple versions of a user interface to determine which one performs the best) followed by automated feature creation. [31]

Many jurisdictions have explicit laws prohibiting discrimination of different kinds, and algorithms that do not comply place the platform in legal jeopardy.[32] Legal compliance alone is insufficient, however; a platform faces reputational risks and a loss of faith from its participants from any revealed bias in its "rules of the game." Bias can also lead to missing a market shift in a rapidly evolving business landscape.

Detecting algorithmic bias starts with recognizing that it typically has four different sources. The algorithm may have been trained on a non-representative sample of the population, as seen in facial recognition systems. The activity levels of the population may be biased in a way that causes the algorithm to favour one group over another. For instance, greater data volumes from wealthier individuals on account of their more extensive shopping activities can bias an algorithm against people of lesser means. The algorithm may have a (potentially unintentionally) flawed objective function. Finally, the implementation of the algorithm can have a reinforcing effect that exacerbates existing inequities.

Beyond aggressive detection, good governance involves choosing the right benchmark to measure bias against; creating a culture of pretesting, testing and auditing for bias; bringing humans into the decision loop; and monitoring a shifting legal and regulatory landscape actively.

(V) Set data property rights: Although consumers who create data on a platform frequently have no default claim of ownership over these data, and little or no authority to determine how they are used by the platform, it is anticipated that a confluence of forces will return some of this authority to platform participants. Regulation around the world is likely, *de jure*, to redefine the division of data ownership between platforms and participants. For example, the GDPR notions of "consent" and its language on the right to access lay out some elements of user property rights. Simultaneously, the emergence of robust third-party trusted data intermediaries like Verimi will shift the *de facto* norms on data property rights in favour of the user.

A very different data rights landscape is anticipated as platform business models make deeper inroads into business-to-business commerce. Some platform companies like Huawei clearly see the default data property rights as resting exclusively with the participants. Others like Klöckner's XOM and Allianz see clear data property rights for participants in their business-to-business platforms as being a strategic necessity to gain trust.

(VI) Create due process: After setting the "rules of the game," it is equally important for a platform to provide its participants with a system to seek recourse when things go wrong, with aspects like advance notice, a fair hearing, and some sort of peer review or arbitrated resolution. This is especially important for platforms whose participants rely on the ecosystem for their livelihood. Many YouTube users who generate income from advertising and whose content may be blocked by YouTube's censorship algorithms complain of a lack of due process in the resolution of these decisions made by their "algorithmic bosses".

Greater clarity into how algorithms make participation decisions allows participants to recognize when they have been unfairly treated and can minimize unnecessary perceptions of unfairness. Bringing humans into the loop can also help. The trial system set up by Uber in London, where a "jury of driver peers" deliberate driver deactivation decisions, is a good supplement to its algorithmic approaches.

Executives and policy-makers who consider these six choices will also realize that the lines between platforms and governments are blurring,[33] making the regulatory boundary between public institutions (government agencies, regulatory bodies) and private institutions (platforms, corporations, trade bodies) increasingly permeable. As society embraces the emerging role of platforms as custodians of the public trust, new opportunities for public-private collaboration will also emerge.

4. How digital platforms and ecosystems can reinvigorate public-private collaboration

By **Michael G. Jacobides,** London Business School**; Arun Sundararajan,** New York University; **Marshall Van Alstyne**, Boston University

Platforms and ecosystems represent a new way of organizing that can yield significant benefits for society. New products and services create citizen value, while new operating models achieve public objectives, from urban regeneration to the development of clean mobility to healthcare improvements. Most saliently, digital ecosystems have the ability to help redefine the boundaries between the public and private spheres, creating new models of "invisible infrastructure" while allowing entrepreneurs to provide the "scaffolding" for new products and services. The true potential of such collaboration will be realized if the technological, operating and regulatory innovations proceed in lockstep, rather than in isolation.

At the most basic level, government procurement can be transformed through the use of ecosystems. To illustrate: the UK's National Health Service (NHS) recently announced an ecosystem effort that empowers entrepreneurial ventures to connect to the NHS for the provision of services ranging from the mainstreaming of remote consultation and the use of "smart inhalers" to monitor patients remotely, to the use of AI to interpret CT and MRI scans. Changing how public services interface with new technologies can save significant costs and avoid the headaches of massive IT projects.[34] It can also provide external impetus for change to the public sector itself, going hand-in-hand with the organizational redesign of the administration.

Today's platforms, ranging from Uber, Lyft and Didi Chuxing to Airbnb and BlaBlaCar, have already demonstrated how the private sector can provide a new and "invisible" form of infrastructure, a new market-driven form of crowd-based public-private collaboration. The market mechanism "switches on" capacity in response to spikes in demand, at a fraction of the investment associated with high-fixed-cost infrastructure. Airbnb provides an alternative to massive development projects prior to the Olympics or the World Cup. BlaBlaCar has created a global transit network without spending billions on steel and concrete. Uber and Lyft provide an order of magnitude more rides from the outer boroughs of New York than government-driven taxi services. UK-based JustPark converts thousands of individual personal parking spaces into commercial parking lots that can reduce the need for ungainly parking structures around stadiums and neighbourhoods with time-varying traffic.

> **Some of the most interesting problems our societies face – like transport and mobility – cut across different policy areas, and link the private and public sectors in new and exciting ways. Velocia's purpose is to create an open ecosystem that rewards the positive behaviour of urban commuters, who respond to the inducements that both public- and private-sector organizations can offer. Our job is to provide a platform that connects the players, incentivizes collaboration and improves urban mobility.**
>
> **Hamid Akbari**, Chief Executive Officer, Blanc Labs, and Chairman, Velocia, Canada

These platforms are largely private-sector entities that are subsequently subject to public oversight, often in a reactive rather than planned manner. To realize the value of such private infrastructure, technology and operating and regulatory innovation must aim to move in lockstep. Platforms must not be viewed as the target of regulation, but as regulatory partners. There are many partnership models, including peer regulation, creating industry consortia and data-driven delegation.[35] A key question, one whose resolution is central to the success of market-based public-private collaboration, is when to *decentralize* regulatory execution to a private platform, and when to retain *central* government oversight and control. Numerous factors define the right balance, including whether market failure is due to information asymmetry, externalities or both, and how data availability affects regulatory effectiveness, as well as issues of privacy, timeliness, execution cost and variety.[36]

More exciting yet is the possibility that digital platforms and ecosystems can emerge as explicitly public-private collaborations, allowing private initiative to work with government and achieve public goals. For example, consider Traipse, a budding venture that provides a set of themed tours of a historic business district with stops along the way to engage the user to learn interesting facts and complete riddles, brain-teasers and other puzzles based on the surroundings; a "gamified" experience allows a demographic of curious, tech-savvy, riddle-loving tourists to explore and connect with a city. It also allows local businesses to provide discounts as rewards for solving brain-teasers, engaging select, local and environmentally responsible businesses as part of a managed, designed ecosystem aimed to regenerate historic downtown areas. Costs are defrayed by the local authority or chamber

of commerce, and rich local ecosystems are created. Traipse's sister company, MyLocalToken, took this a step further, providing the infrastructure for local authorities to create web-enabled local payments that can help stimulate local economies, one focused ecosystem at a time, using private enthusiasm and entrepreneurship to support policy needs in the United States.

> **Our goal is to build new ecosystems that help reinvigorate local economies and downtown districts, bridging a sense of mission with the ability to create a genuine sense of excitement to a diverse set of ecosystem participants in the public and private sectors. Ecosystem design, such as the one both Traipse and MyLocalToken offer, helps to blur the distinctions between the private and the public and infuse entrepreneurial spirit in the pursuit of public goals.**

Darren Smith, Founder and Chief Executive Officer, Traipse, USA

Some foresight and creativity in platform-based collaborations can expand the possibilities even further, bridging old infrastructure with new to create public good. A prime example is that of Didi Chuxing, whose platform software is used by cities ranging from Xi'an to Chengdu to optimize mobility flows in an unprecedented manner. The city government connects IT systems that power its public infrastructure, from traffic lights to mass transit systems, with the Didi platform. Integrating these with knowledge of traffic patterns and newer ride-hail and bikeshare infrastructure – coupled with the power to implement dynamic and subtle changes to the timing of traffic lights and subway trains, even the capacity of highway lanes using "road zippers" – yields a global view that optimizes the flow of people and cars in a manner never done before. A newer and analogously exciting development is of Velocia, a MaaS (mobility as a service) platform that incentivizes and rewards transportation choices by pairing its app with transit services, such as car sharing, bike sharing, taxi services and mass transit. When people use Velocia to order a paired service (and agree to share their data), they earn points redeemable for rewards. The use of this gamified loyalty scheme generates data that can guide a multitude of decisions, from where to put bike-share stations to how to program traffic lights.

Such efforts help address key public needs, but both the specific solutions and their implementation are driven by individual entrepreneurial action, bridging public and private objectives in an innovative way. It is this new bridge between the entrepreneurial spirit, public mission, public authorities and private firms that offers exciting opportunities to rethink the link between the private and the public.

Appendix: Key lessons in building a digital platform and ecosystem

In developing this briefing paper, interviews were conducted with senior executives of 15 leading digital platform and ecosystem firms across various business-to-business and business-to-consumer industries (see the Acknowledgements). While each story is unique and rich in the insights from their journey, some key lessons can be highlighted.

1. **Clearly define the platform.** It may seem simple, but among the challenges is to determine the exact value proposition of the platform and ecosystem in addressing a current void in the market.

2. **Build supply in proportion to demand.** In designing the digital platform and ecosystem, stay laser focused on the needs of customers. Yet, also focus attention to building relationships with suppliers in the ecosystem. Keep demand and supply balanced.

3. **Take a staged approach.** Building an ecosystem may take longer than initially thought. To scale more quickly, focus on reducing the onboarding time for complementors/partners in the ecosystem.

4. **Accelerate success with the right talent.** Adopt a different talent model – one that builds on existing core competencies. Identify a targeted set of skills and either buy them into the company or engage experts from outside to supplement internal capabilities.

5. **Shift the mindset and be agile.** Platform businesses require a different way of thinking – a mindset shift that necessitates trying things and being ready for several ideas to fail before succeeding. It also requires building the digital IQ of the team to challenge the way they think. Cultural change can be one of the biggest hurdles in the beginning. It takes ongoing communications with key stakeholders and creating a culture of experimentation.

6. **Value word of mouth.** To build awareness and attract new users, word of mouth through the voice of existing customers can never be underestimated. Digital platforms and ecosystems rely on a range of non-financial measures of success.

7. **Recognize that the scalability of the technology is key.** As customer needs become greater, the platform and ecosystem will likely become more complex. Customers will demand a personalized experience that will require firms to adapt the technology and scale it globally.

8. **Collaborate to increase the gravity of the platform.** The rate of change is rapid, making it important to continually seek input from outside as well as new ideas from inside the company. Be aware of the teething problems in advancing an idea. Know that most of the challenges faced are similar, so working collectively and not competing helps to create game-changing solutions. Be ready to invite others to build complements on top of the platform to elevate its gravity. This means exposing to others what one does best, which is somewhat counterintuitive.

Source: Deloitte analysis

Acknowledgements

The World Economic Forum would like to acknowledge a broad community of cross-industry contributors for their support in developing this briefing paper.

Academia

Special thanks to academia for their deep insights and tireless collaboration in co-authoring this briefing paper.

Michael G. Jacobides, Sir Donald Gordon Chair of Entrepreneurship and Innovation, London Business School, United Kingdom

Arun Sundararajan, Robert and Dale Atkins Rosen Professor of Business, Stern School of Business, New York University, USA

Marshall Van Alstyne, Questrom Professor of Management, Chair of Information Systems, Boston University, USA

Executive Steering Group

Thank you to the leaders in our Digital Platforms and Ecosystems Executive Steering Group for their advice and leadership on this initiative.

Hanzade Dogan Boyner, Chairwoman, Hepsiburada, Turkey

Rahmyn Kress, Chief Digital Officer, Henkel, Germany

Christof Mascher, Chief Operating Officer, Allianz, Germany

Markus Pertlwieser, Chief Digital Officer, Deutsche Bank, Germany

Rob Ransom, Vice-President, Strategy and Corporate Development, Booking.com, Netherlands

Gisbert Rühl, Chief Executive Officer, Klöckner, Germany

Paul Scanlan, Chief Technology Officer, Huawei Technologies, People's Republic of China

Karthik Suri, Senior Vice-President and Chief Operations Officer, GE Digital, USA

World Economic Forum

Cristian Citu, Digital Transformation Lead

Derek O'Halloran, Head, Future of Digital Economy and Society, Member of the Executive Committee

Deloitte

Sincere gratitude to the Deloitte team for helping to orchestrate and bring together the diverse perspectives.

Andrew Blau, Managing Director, Signature Issues Leader. Deloitte Consulting LLP (Deloitte United States)

Mimi Lee, Managing Director, Global Industrial Products and Construction, Deloitte

Case studies

Finally, thank you to the senior executives who shared stories about the evolution of their digital platform and ecosystems.

Hamid Akbari, Chief Executive Officer, Blanc Labs, and Chairman, Velocia, Canada

Terry von Bibra, General Manager, Europe, Alibaba Group, Germany

Andrew Byrne, Head, Public Policy, Uber Technologies, United Kingdom

Nilesh Jain, Director and Co-Founder, CliniVantage Healthcare Technologies, India

Tom Kirschbaum, Co-Chief Executive Officer and Founder, Door2Door, Germany

Carsten Linz, Business Development Officer and Global Head, Center for Digital Leadership, SAP SE, Germany

Peter Lochbihler, Director, Global Public Affairs, Booking.com, Netherlands

Frédéric Mazzella, Chief Executive Officer, BlaBlaCar, France

Emmett O'Keefe, Head, Public Affairs, North America, Booking.com, USA

Markus Pertlwieser, Chief Digital Officer, Deutsche Bank, Germany

Rob Ransom, Vice-President, Strategy and Corporate Development, Booking.com, Netherlands

Gisbert Rühl, Chief Executive Officer, Klöckner, Germany

Paul Scanlan, Chief Technology Officer, Huawei Technologies, People's Republic of China

Martin Scheepbouwer, Chief Executive Officer, OLX Group, Netherlands

Henning Schult, Senior Manager, Strategy and Regulatory Affairs, Allianz, Germany

Darren Smith, Founder and Chief Executive Officer, Traipse, USA

Karthik Suri, Senior Vice-President and Chief Operations Officer, GE Digital, USA

Marius Swart, Lead, Digital Acceleration, Operations and Strategy, Henkel, Germany

Endnotes

1. "Platform Ecosystems: How Developers Invert the Firm" (2017) by Geoffrey Parker, Marshall Van Alstyne and Xiaoyue Jiang won both *MIS Quarterly's* paper-of-the year award and the Association for Information Systems' publication-of-the-year award in 2018. The executive article, "Pipelines, Platforms, and the New Rules of Strategy" (2016) by Marshall Van Alstyne, Geoffrey Parker and Sangeet Paul Choudary was a "must read" for *Harvard Business Review*.
2. Parker, Geoffrey, Marshall Van Alstyne and Sangeet Paul Choudary, *Platform Revolution: How Networked Markets Are Transforming the Economy – and How to Make Them Work for You*, W. W. Norton & Company, 2016.
3. Hagiu, Andrei, "Strategic Decisions for Multisided Platforms", *MIT Sloan Management Review*, Research Feature, Winter 2014.
4. "How Lyft Learned to Stop Worrying and Embrace the Pivot", *Inc.com*, 12 August 2017.
5. Zeng, Ming, "Three paradoxes of Building Platforms", *Communications of the ACM*, vol. 58, no. 2, 2015, p. 29.
6. World Economic Forum and Deloitte, Interview with Marius Swart, Lead, Digital Acceleration, Operations and Strategy, Henkel, Germany, on 12 November 2018.
7. Van Alstyne, Marshall, Geoffrey Parker and Sangeet Paul Choudary, "Pipelines, Platforms, and the New Rules of Strategy", *Harvard Business Review*, vol. 94, no. 4, 2016, pp. 54-62.
8. Parker, Van Alstyne and Choudary, *Platform Revolution*, op. cit.
9. Jacobides, Michael, Carmelo Cennamo and Annabelle Gawer, "Towards a Theory of Ecosystems", *Strategic Management Journal*, vol. 39, no. 8, 2018, pp. 2255-2276.
10. Eisenmann, Thomas, Geoffrey Parker and Marshall Van Alstyne, "Strategies for Two-Sided Markets", *Harvard Business Review*, vol. 84, no. 10, 2006, p. 92.
11. See Jacobides, Cennamo and Gawer, "Towards a Theory of Ecosystems", op. cit.
12. The idea is developed in Jacobides, Michael, Thorbjørn Knudsen and Mie Augier, "Benefiting from Innovation: Value Creation, Value Appropriation and the Role of Industry Architectures", *Research Policy*, vol. 35, no. 8, 2006, pp. 1200-1221, and the competitive implications drawn from Jacobides, Michael and John Paul MacDuffie, "How to Drive Value Your Way", *Harvard Business Review*, vol. 91, no. 7, 2013, pp. 92-100.
13. *The Guardian*, "Nokia's chief executive to staff: 'we are standing on a burning platform'", 9 February 2011. Available at https://www.theguardian.com/technology/blog/2011/feb/09/nokia-burning-platform-memo-elop (accessed 12 February 2019).
14. See, for example, Fuller, Jack, Michael G. Jacobides and Martin Reeves, "Myths and reality of business ecosystems", 2019, *Sloan Management Review*, forthcoming.
15. For a more detailed framework on how to navigate the world of ecosystems, see Jacobides, Michael, "What's Your Ecosystem Strategy?", 2019, *Harvard Business Review*, forthcoming.
16. Jeff Bezos, in a 2018 note communicated in a 10K report, asked Amazon employees to refrain from using PowerPoint and to focus instead on "storylines", brief narratives that give a sense of the shifting plot that the firm must follow. For an early discussion of playscripts, see Jacobides, Michael, "Strategy Tools for a Shifting Landscape", *Harvard Business Review*, vol. 88, no. 1, 2010, pp. 76-85.
17. Khan, Lina, "The Ideological Roots of America's Market Power Problem", *Yale Law Journal*, vol. 127, 2018.
18. For the potential downsides of industry transformation, see research drawn from another World Economic Forum project on the financial services sector and the global financial crisis: Jacobides, Michael, Michael Drexler and Jason Rico, "Rethinking the Future of Financial Services: A Structural and Evolutionary Perspective on Regulation", *Journal of Financial Perspectives*, vol. 2, no. 1, 2014, pp. 47-72.
19. See, for example, Iansiti, Marco and Karim Lakhani, "Managing Our Hub Economy", *Harvard Business Review*, September-October 2017, pp. 84-92.
20. Sundararajan, Arun, *The Sharing Economy: The End of Employment and the Rise of Crowd-Based Capitalism*, MIT Press, 2016.
21. For thousands of years, an individual's network of commercial trust was limited to close circles of family and friends, and reputation in a community, typically a village. The emergence of government standards stimulated the initial big step towards expanding trade outside one's community network. As the scope and structure of government expanded, various economic institutions, often government-backed – property rights, contracts, courts of law to enforce these contracts – created the third phase of commercial trust. Over the last century, as the managerial revolution has spawned the large corporation, some of these private institutions use their brands to convey values, qualitative attributes and the promise of quality and reliability in exchange for one's future business. See Sundararajan (2016, op. cit.), Chapter 2, or Botsman, Rachel, *Who Can You Trust? How Technology Brought Us Together and Why It Might Drive Us Apart*, PublicAffairs, Hachette Book Group, 2017, for a more detailed discussion.
22. A sociological term of art, "social capital" refers to "social connections and the attendant norms and trust". See Putnam, Robert D., "Tuning In, Tuning Out: The Strange Disappearance of Social Capital in America", *PS: Political Science and Politics*, vol. 28, no. 4, 1995, pp. 664-683.
23. For additional details on the DREAMS framework, see Mazzella, Frédéric, Arun Sundararajan, Verena Butt d'Espous and Mareike Möhlmann, "How Digital Trust Powers the Sharing Economy: The Digitization of Trust", *IESE Insight*, no. 30, 2016, pp. 24-31.

24. Heimans, Jeremy and Henry Timms, *New Power: How Movements Build, Businesses Thrive and Ideas Catch Fire in our Hyperconnected World*, Doubleday, 2018.

25. Quoted in 2007 EconTalk interview: https://www.econlib.org/library/Columns/y2007/Romergrowth.html (accessed 14 February 2019).

26. An analysis of these blurring lines in the context of information filtering, fake news and misinformation is provided by Michael Posner in "Harmful Content: The Role of Internet Platform Companies In Fighting Terrorist Incitement and Politically Motivated Disinformation", NYU Stern Center for Business and Human Rights, 2017. Available at https://issuu.com/nyusterncenterforbusinessandhumanri/docs/final.harmful_content._the_role_of_ (accessed 14 February 2019).

27. "Multi-homing happens when users or service providers … form ties with multiple platforms … at the same time." See Zhu, Feng and Marco Iansiti, "Why Some Platforms Thrive and Others Don't", *Harvard Business Review*, January-February 2019, pp. 118-125.

28. This governance choice has a long history. Section 512 of the Digital Millennium Copyright Act limits the liability of platforms like YouTube stemming from copyright infringement by its users and, analogously, Section 230 of the United States Communications Decency Act limits the liability of platforms from content generated by their users with similar protections offered in the European Union by Directive 2000/31/EC. These laws are central to the existence and growth of platforms ranging from eBay and Amazon to YouTube and Facebook. A 2008 court decision in the United States involving the sale of fake Tiffany items on eBay affirmed the limits on platform liability in this context.

29. See, for example, Hollyer, James R., B. Peter Rosendorff and James Raymond Vreeland, "Democracy and Transparency", *Journal of Politics*, vol. 73, no. 4, 2011, pp. 1191-1205.

30. IEEE, "Ethically Aligned Design v2: General Principles", IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems. Available at https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/ead_general_principles_v2.pdf (accessed 11 February 2019).

31. A broader perspective on embedding the right values into systems powered by algorithms is provided in Wendell Wallach and Colin Allen's 2008 book, *Moral Machines: Teaching Robots Right from Wrong*, Oxford University Press.

32. For example, Recital 71 of the GDPR includes language that requires platforms to "prevent, inter alia, discriminatory effects on natural persons on the basis of racial or ethnic origin, political opinion, religion or beliefs, trade union membership, genetic or health status or sexual orientation, or processing that results in measures having such an effect". Available at http://www.privacy-regulation.eu/en/recital-71-GDPR.htm (accessed 11 February 2019).

33. A detailed discussion of these shifting boundaries and the associated evolution of regulatory models can be found in Sundararajan, *The Sharing Economy* (op. cit.), Chapter 6, entitled "The Shifting Landscape of Regulation and Consumer Protection". See also Sundararajan, Arun, "Democratic Reform for Digital Platforms", Working Paper, New York University, 2019, and the related Ted Talk, available at https://www.youtube.com/watch?v=DhkPwlABby4 (accessed 12 February 2019).

34. Famously, the NHS failed to develop an electronic patient record, a project once described as "the biggest civilian computer project in the world", despite spending over £11 billion. Such shifts in the procurement philosophy can thus both save public funds and engage entrepreneurial action.

35. For further details about public-private partnership models for regulation, including the three mentioned, see Sundararajan, *The Sharing Economy* (op. cit.), Chapter 6.

36. For a detailed discussion of nine factors that shape whether regulatory responsibility might be delegated to a platform, see Sundararajan, Arun, *The Collaborative Economy: Socioeconomic*, Regulatory and Policy Issues, Report to the European Parliament IP/A/IMCO/2016-12, 2017. Available at http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/595360/IPOL_IDA(2017)595360_EN.pdf (accessed 11 February 2019).

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

The World Economic Forum, committed to improving the state of the world, is the International Organization for Public-Private Cooperation.

The Forum engages the foremost political, business and other leaders of society to shape global, regional and industry agendas.

World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org