



# The platform advantage in electronics

*How “asset-light” organizations can thrive in the new data economy*

IBM Institute for Business Value

## Executive Report

Automotive



## *In this report*

*The advantage of “asset-light companies*

*How to engage in the data economy*

*The three key attributes of platforms*

## How IBM Electronics can help

IBM partners with electronics companies to create secure, connected and data- rich user experiences that continuously deliver insight and advantage. We help build enterprises and devices that can understand, reason and learn, bringing expertise in strategy, platforms, the Internet of Things (IoT), AI, blockchain, security and enterprise resource planning (ERP). We define and design next-generation approaches and unique market plays across integrated and vertical high-performing platforms and ecosystems. We turn solutions, software and data into fluid and forward-focused innovation engines for improved growth. For more information, visit [ibm.com/electronics](https://ibm.com/electronics).

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## Engaging in the data economy

*Platforms present a new path to growth for electronics companies. By harnessing the value of data, platforms enable the creation of new revenue streams, services and customer interactions. “Digital giants,” such as Facebook, eBay and Alibaba, have driven consumer platform market growth. But these digital matchmakers often lack the specific, insight-rich domain knowledge that can benefit electronics customers. As a result, electronics industry players are well positioned to create or participate in platforms – or technology frameworks – to capture value and engage in the emerging data economy.*

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## The rise of the data economy

The past decade has seen a meteoric rise in market value of “asset-light” companies that do more with less. They stand in sharp contrast to the “asset-intensive” electronics business model, which spans fabrication, factories, warehouses and more, with associated supply chains and inventories. While the original asset-light business models focused on outsourcing as a path to increased value, a new group has proven the attractiveness and sustainability of another model – platform-based businesses. These new asset-light organizations grew up digital, where they use the cloud, the internet and mobile technologies across ecosystems to create interactions and services that can be easily personalized and scaled, while remaining highly efficient.

The IBM Institute for Business Value examined the responses of 527 electronics executive responses from across the globe in the IBM 2017 C-Suite study, “Incumbents Strike Back,” to understand the impact of data and platforms on the industry’s future.<sup>1</sup> We’ve combined this with new interviews, as well as current economic and stock market performance data, to create this research insight report.

Our analysis revealed an emerging desire among electronics companies to consider asset-light models, which rely significantly on combining data, services and commerce to create engaging customer experiences. Other industries have paved the way by connecting people to the things they want, such as an internet search (Google), a song (Apple Music), their friends (Facebook), even a TV (eBay, Amazon, Alibaba). These cloud-based platforms harness the power of the internet to differentiate the ways they work and demonstrate their worth to consumers. They allow nearly anyone to participate. In just a decade, some of these organizations have become “digital giants,” not only reshaping the



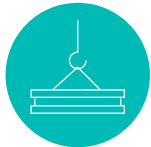
## 41%

of electronics executives report that digital giants, such as Google, Apple, and Tencent, are leading disruption in the industry



## While

market value for electronics companies averages 3x revenue, market value for platform-oriented digital giants averages 7x revenue



## 40%

of electronics executives report their companies are actively building or considering a platform-based business model

concept of an asset-light business, but also transforming the marketplace as a whole. As such, it's not surprising that over 40 percent of electronics industry executives note that these digital giants are leading industry disruption. Their efficient cost structures put pressure on asset-intensive business models, such as those common in traditional electronics organizations.<sup>2</sup>

Nowhere is the contrast clearer between these approaches than in market capitalization. In the second quarter of 2018, only one device-oriented company, Apple, made the list of the world's ten most valuable companies by market capitalization.<sup>3</sup> Five are digital giants. These platform experts experience a valuation multiple of seven, while hardware companies have multiples hovering above 3, seemingly have to work twice as hard for their money.

It's also worth noting that Apple is unique among electronics companies in the amount of services it delivers, enabling a predictable alternative revenue stream, reducing some of the market's dependence upon hardware.

Platforms represent a data-driven economy, rather than a device-driven one. They enable a data economy that pivots an enterprise's efforts to digitally delivered insight and services, enriched by artificial intelligence, and sent to interfaces that both the company itself and its customers can use.

Platforms engineer and orchestrate processes via apps, solving problems, enabling strategic business decisions, increasing operational efficiencies and driving new revenue growth. They facilitate innovative business models. Consider how unique the eBay marketplace was in connecting buyers and sellers when it was launched in the 1990s.

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Think about how the original growth of Netflix was based on DVD players, but how the company really took off a decade ago by transitioning to online streaming. By disintermediating the device, the service experienced exponential growth. At one point, it might have been easy to dismiss platforms as “one-off” successes. However, this is clearly no longer the case.

The asset-light model drives agility in the digital giants. They can iterate rapidly to speed time-to-market. Instead of designing hardware, they focus on intangibles: services, algorithms and streamlined processes. This allows them to show a better return on assets (ROA), along with higher revenue and profit per employee (see a sample of revenue and market valuation for selected representative tech industry participants in Figure 1). In today’s cloud era, business models are more than technology platforms. Owning the customer relationship creates a durable business since end-user relationships can’t be commoditized. Facilitating the relationship between user and buyer allows platform owners to show their value.

Many electronics companies have the ability to bring services, data and insight into a platform approach in meaningful ways. They have vast amounts of Internet of Things (IoT) and activity data, and they understand how hardware and software drive differentiation.

So, why haven’t they cracked the code? One reason is that many industry leaders have been slow to reinvent themselves digitally, especially around creating new and deep data-driven capabilities. While the industry is rapidly adopting IoT, much of the power of the data they collected has remained untapped, aside from traditional uses in post-sales service or presence-sensing.

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*Focusing on the economic value of the data and services represents an inversion of current electronics industry strategies.*

### Common cloud platform services

- Create standard easily consumed APIs
- Use standard APIs for simple integration
- Share data across many uses
- Require low end-user investment
- Incrementally renovate processes
- Low complexity enables self-service consumption

Resulting in:

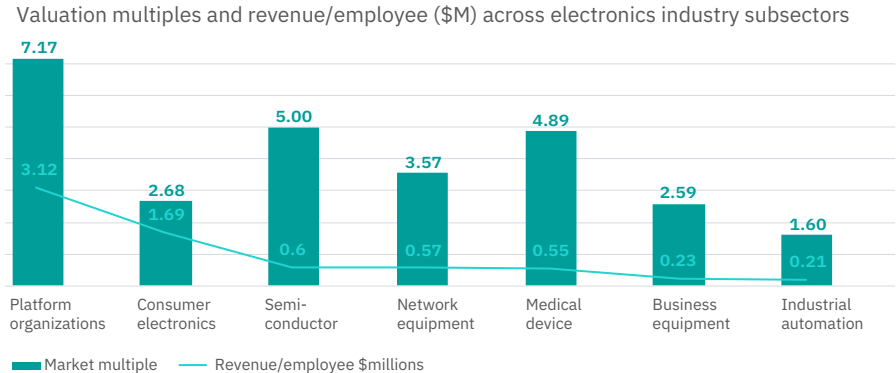
- High volume, fast-growing services
- High reuse, driving growth and value
- Deliver business value day one
- Support new businesses through accrued data and user relationships

For industry leaders seeking to make headway toward improved market valuations, deeper services businesses and new business models, three areas should be examined:

- A platform strategy focused on differentiation
- The role of machine learning and AI for scale and speed
- How to rebalance organizational investments.

**Figure 1**

*Illustrative electronics and platform companies, revenue versus market valuation*



*Note: Customized research from IBM Research and the IBM Institute for Business Value based on economic data drawn from CIS Markets.<sup>4</sup>*

A central tenet to the platform business is not to focus on optimizing individual enterprises, but, instead, transforming industries. In electronics, the primary path to scaling a business is by employing more resources (see sidebar, “Common cloud platform services”). Yet, cloud platform services scale with little direct client engagement. They can create revenue streams from data insights delivered as services or from models encapsulating industry expertise. Most of the skills in the enterprise are employed for high-margin investments in a common platform where self-service drives rapid business growth.

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## Defining a platform strategy focused on differentiation

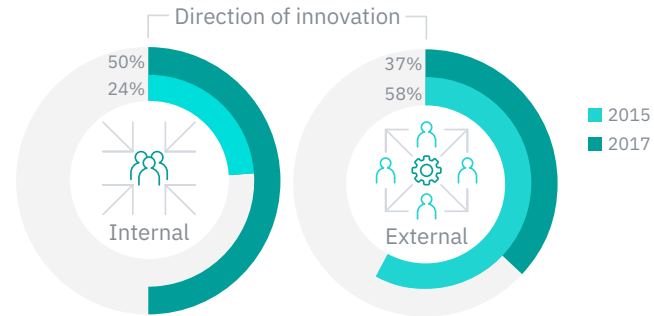
### **Platform attributes**

Platforms are a means to deliver value by providing digital access to participants in a network, who can then interact or transact with other members. They may provide information, sell products or services, provide insight or recommend actions, enable collaboration or connect users to other users.<sup>5</sup>

They are comprised of three key attributes. The first is “onboarding,” where users joining the platform find it rapid and intuitive, requiring little expense. It is easily scalable as more users join. The platform makes it easy to create interactions among participants. It connects developers and contributors to the ecosystems at large.

The second is “reciprocity,” where the platform participants derive value from each other. More platform participants result in higher value to multiple users and the platform itself. In building a network for the platform, a company doesn’t need to provide all the content, tools or data. They need to develop a network that provides value to both the users and the providers. Having partners with valuable content is as good – and sometimes better – than the platform owner developing these alone. It can lead to faster delivery of new functionality, data, offerings or user interfaces.

Reciprocity might seem like a natural concept, but it runs contrary to how electronics executives responded when asked about internal versus external innovation in the IBM Global 2017 C-suite study. In 2015, 58 percent of responding executives pointed toward external innovation. In 2017, 50 percent of the respondents noted they would pursue more internal innovation (see Figure 2).<sup>6</sup> Defining a winning strategy of what to own internally and what to source among ecosystem partners means letting go of areas that can be more effectively provided by others.

**Figure 2***Direction of business landscape change from 2015 to 2017*

The third attribute is “co-creation,” which enables participants of all types to develop new content specific to their needs. Data and tools are central to this attribute. The platform must enable views, services and tools that allow users to easily customize to their needs. Doing so requires a feedback loop and increased focus on agile development. However, it must incrementally offer the ability to work with others easily and provide increased potential for joint innovation across the ecosystem.

#### **Data attributes**

These platform attributes are not unique to electronics companies seeking to develop platforms. What is often unique in electronics is the sizable stores of IoT and device data. The insights this data can create offer a valuable proposition for electronics companies, not only in attracting users to a platform, but also in delivering continuous value to those users. It becomes even more valuable when considered alongside other data that can be brought to the platform with relative ease, including:



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- *People data* – organized by defined roles or personas: user, owner, patient, machine operator, tenant, employee, lifestyle, experience level, interactions
  - *Asset data* – organized by asset and aggregates: user journey, device history, diagnostics, usage context, location, origin, usage patterns, orientation, longevity, costs
  - *External data* – map or location events and context (buildings, routes, accessibility), macro event analysis (crime, accidents, sports, social), motion analysis (flow, transportation, traffic, satellite, hazards/accidents), financial data, regulatory data, lifestyle and trend data, health and wellness, retail or shopping data, weather, linguistics and language, media and “app data.”

It is worth noting that external data is often the last considered as a company doesn't create or own it. However, it can transform what an electronics company knows into context-rich user experiences. It opens the aperture on the types of problems the platform can answer for its participants.

Since some of this data is likely external to the organization, it is part of the reciprocity attribute – where its owner can contribute it to the platform in exchange for an economic or other benefit. As an example, a platform partner may provide information on equipment repairs it completes that leads to a revision in a predictive maintenance algorithm, enabling improved uptime. Or, aggregated anonymous medical condition data may be contributed by a health organization to allow application and device developers to deliver new solutions that support well-being. An organization that develops digital twins – living digital simulations of physical assets that update and change as their physical counterparts change – can deliver data that drives new product designs, enabling co-creation.

**Bringing it all together**

The platform enables frictionless interactions across large amounts of data by reducing it to valuable insight and services that can be exchanged far more easily. The platform owner is responsible for collecting and allocating revenue across the participants. They're also often responsible for sales activities and adjudicating disputes.

Building a platform might not be the right answer for every electronics manufacturer, however. Data, insights and data sciences expertise can be contributed by both platform owners and participants. Providing data aggregation or transformations, creating semantic models or analytical insights, developing user interfaces, expanding service offerings, or enabling blockchain utilities might be better options for companies that determine they don't have the resources or customer bases to be successful on their own (see sidebar, "Participants, roles and tasks that drive the data economy").

Three key principles drive platform success across the data economy: establish the audience and need and determine the right problems to solve for the right audiences, leveraging people, asset and external data in solutions; encourage ecosystem reciprocity in which members work together to deliver assets and capabilities, collaborating to develop win-win propositions; cultivate data curiosity – getting the data is a small part of the challenge, but finding personnel who can interrogate it, explore client challenges and build new use cases requires a transformational shift in the organization.

Finally, organizations must be ready to commit to this new form of innovation. This may be the most difficult as it requires reallocating capital and resources toward the platform business model, as well as new competencies less focused on traditional electronics.

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## Artificial intelligence unlocks value

Artificial intelligence (AI) represents a mission-critical capability to transform data into customer-rich insight at scale for platform success. It's not just about collecting the data, but also connecting it in meaningful ways. Previously, most electronics companies have emphasized IoT over AI, which may have limited their potential. While only 31 percent of electronics executives surveyed in the IBM 2017 Global C-suite study report they are using a mix of structured, unstructured, behavioral and visual data today, 56 percent say they plan to move this way in the next two-to-three years.<sup>7</sup> Only 23 percent indicated they understand how to use AI to improve business outcomes.<sup>8</sup>

Understanding how IoT data can be leveraged is difficult. It's also indicative of why 32 percent of electronics executives said they experience a challenge scaling their IoT platforms.<sup>9</sup> Yet, IoT plus AI isn't additive; it's exponential in the amount and quality of insight it can generate (see sidebar, "Why AI").

But there is a recognition of AI's promise. In the next two-to-three years, 40 percent of executives noted that AI will impact their products and services delivery models, and 52 percent expect an impact on research and development.<sup>10</sup> Another 37 percent stated that AI plus IoT would allow the full potential of IoT to be realized, and 38 percent indicated that applying AI/cognitive to vast amounts of data from IoT will enable the discovery of new patterns.<sup>11</sup>

Mature platforms that leverage AI can deliver the "secret sauce" in demand generation for electronics executives. Using AI as a means to customize for each customer, platforms can deliver insight and revamped experiences at the individual or company level.

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### Participants, roles and tasks that drive the data economy

#### **Data presenters**

Provide a user interface for data investigation, discovery and user engagement.

#### **Insight providers**

Derive valuable new insights from statistical methods, algorithms, machine learning, semantic models and analytics libraries.

#### **Platform owners**

Create technical foundations for development, hosting apps, device discovery and APIs for connectivity.

#### **Data aggregators/data custodians**

Collect data from disparate devices, including the cloud and IoT, and normalize it.

#### **Data producers**

Access, control and/or collect data. They are IoT and big data focused.

## Why AI?

### Understand

Reduce noise, increase signal; define relationships, annotate data and create insight.

### Reason

Disambiguate and resolve conflicts; prioritize and align insight across domains.

### Learn

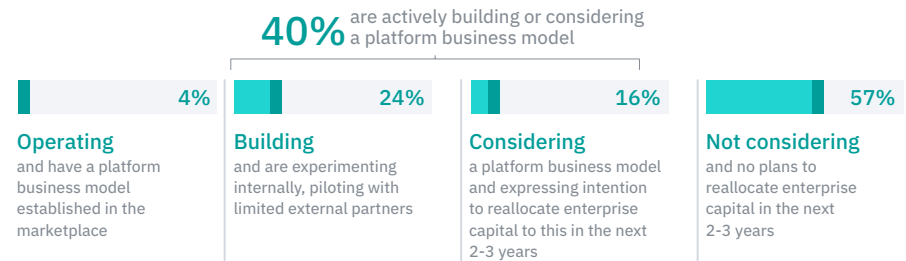
Continuously update and relate findings across functional areas and user interactions.

## Realigning capital allocations to fund platform development

Innovative companies are venturing onto platforms and, as they do, they're pulling their ecosystems in the same direction. While only 4 percent of electronics executives have an established platform business model, 40 percent are considering or building a platform (see Figure 3).<sup>12</sup> Based on IBM Institute for Business Value (IBV) research data, it's estimated that, in electronics, USD 92 billion has been invested in building or extending platforms in the last few years, most notably by a market valuation leader Apple.<sup>13</sup> Yet, other electronics executives are examining the valuation-increasing "asset light" data and services approach as a priority. For those organizations, IBV research estimates an additional USD 89 billion across the industry might be invested in the next two-to-three years.<sup>14</sup>

**Figure 3**

*Stages of adoption of a platform business model*



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However, moving to a data economy and the platforms that underpin it means going well beyond devices. Data is more than “digital exhaust,” or what’s left over at the end of a hardware interaction. It’s no longer viable to leave valuable business information, services and transactions behind – these are the newest forms of competitive benefit. Consider a few examples:

- IoT data, combined with location and housing data, may allow first responders to reach people in need more quickly and can be delivered to communities via rugged devices
- Wearable technology with embedded blockchain technology might enable new digital payment authentication for real-world purchases
- Enabling an aging individual to interact with a digital “friend,” who may be virtual or robotic, may provide services and care delivery to those who have little human contact.

While products are traditionally designed for mass production, platforms offer the ability to create distinct, intelligent, responsive systems for smaller audiences. Yet, they need assets that span products, ecosystems, data sets and clients. With repeated interactions, each of these examples provides an opportunity for the platforms and services to gather data that allows understanding, reasoning and learning based on their users’ needs.

*A delicate balance exists in finding a sufficiently valuable revenue stream matched to an organization's ability to change.*

While platforms may be asset light, hardware revenue is still the likely funding model that will allow them to coalesce in the short term. For instance, if a manufacturer of robotic arms wanted to switch to selling them “as a service,” a focused transition must be deployed to address both cash flow and revenue concerns. That is why platform onboarding is such an important first step for platform creators and owners.

When searching for funding, it can come from multiple places. An organization can consider diverting a share of revenue or profit from each product sale. It might be funded from productivity or reallocation within. It's also worthwhile to consider limiting the funding of lower-margin or lower-volume businesses, potentially divesting them entirely. Another approach is to layer high-value paid services atop products at an extremely attractive price to build a services base. Financial amortization of contracts can lead to cash influx that can grow the platform business. Consider collaborative approaches that bring multiple ecosystem partners together to contribute, especially within a vertically integrated product area. Finally, there's raising capital externally, through joint ventures, equity or issuing stocks or bonds. The goal is to act quickly enough to deter competition, even if that means looking at potential competitors as partners.

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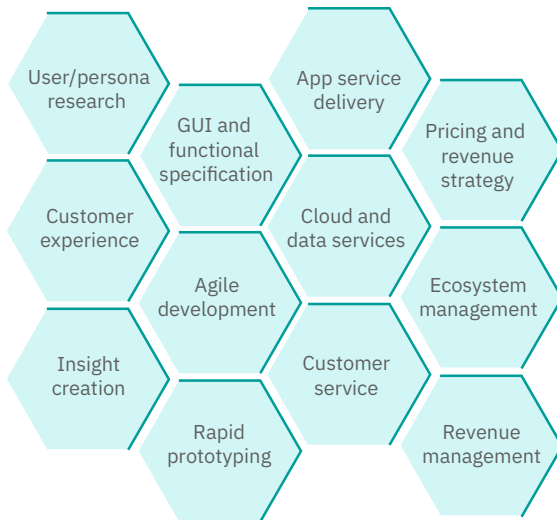
Ecosystem strength is also critical. Those without strong partnerships across the industry and into others – retail, healthcare, construction, media – might find it difficult to create sufficient reciprocity. For some companies, contributing data to an ecosystem member’s platform may be more palatable and less disruptive to their current businesses. Not every organization needs to create a platform; for many, participating in and creating supplemental services or data-driven revenue streams will help diversify and differentiate their businesses.

A key decision point is around AI capabilities. Platform success is increasingly underpinned by enriching data, generating insights and providing services that improve customer interactions. Those without a strong analytics competency will find success elusive. AI often enables some of the attractive features that drive early onboarding, such as voice interaction or great recommendations.

When making a role decision, it’s important to honestly assess how much change and complexity an organization is willing to take on. For many electronics companies, the right place to start will be participation in an ecosystem instead of ownership. Participation allows companies that may have a limited amount of data and AI/analytics competencies to create an add-on revenue stream with a small upfront investment leveraging current resources. Attention must be paid to specific skills including:

- Data acquisition and management
- Data freshness and retention
- Security and privacy
- As a service (aaS) offerings
- Services and insight development.

**Figure 4**  
*Required competencies for creating a platform-based business*



For those looking to create a high-impact, high-revenue opportunity platform, the complexity goes up accordingly. Platforms will require increasing amounts of analytical and AI skills to generate services and insights worthy of users' attention and payment. In addition to the skills previously outlined, key core competencies must be considered (see Figure 4).

Finally, the investment threshold for platform development can range from an initial investment of USD 500,000 to 1,000,000 for an initial minimum viable product (MVP), based on development of a relatively low-complexity app and an ecosystem with three-to-four services and application programming interfaces (APIs) and integrations.<sup>15</sup> Any investment should be gated – enabling functionality to be added iteratively and easily. The MVP must consider specification, development, build, and onboarding – including marketing, engagement, retention and service.

What is most important is that the platform finds shared roots among owners, developers, contributors and customers. These roots can prevent disintermediation and drive the platform's long-term sustainability.

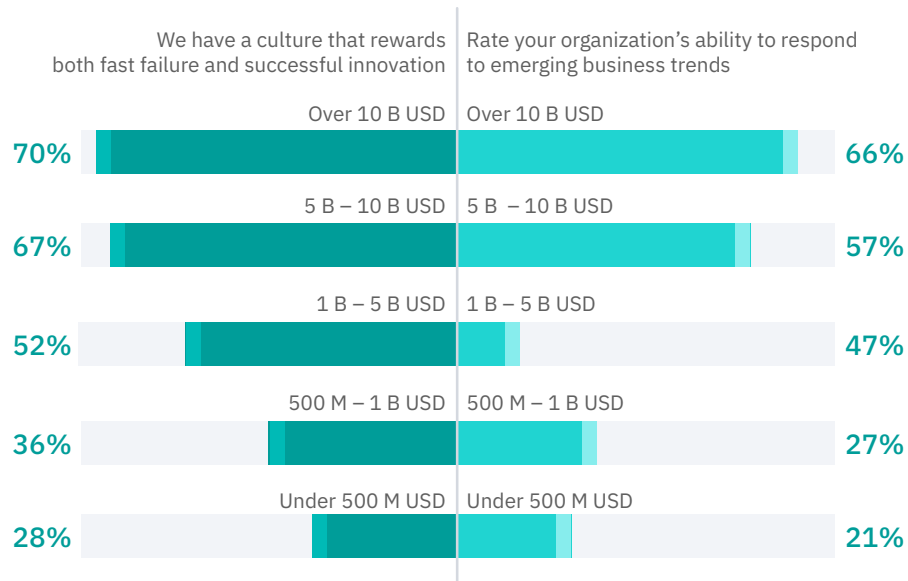
Significant talent implications exist in delivering core competencies. It's possible for some of these to be co-created or cultivated across the ecosystem. However, it's also likely that early platform players will be larger organizations with greater bench strength in data management, security and privacy, and revenue management. Contrary to traditional wisdom on the nimbleness of start-ups, IBV research indicates that larger



organizations are developing the advantages needed in moving to platforms (see Figure 5). They have not only the resources, but also have been developing a culture attuned to failing fast toward successful innovation and their ability to respond to emerging business trends.<sup>16</sup>

**Figure 5**

*Size isn't necessarily a disadvantage—larger companies are becoming more agile*



## Recommendations

With trends, it's important to know when to jump in and when to wait. It is a "jump-in" moment when an organization can make moves that influence company valuations and provide valuable insights and services for their customers. Executives should be direct and explicit about what they need to do:

### **Get your data so you can add value**

- Move from collecting data from every interaction – human, IoT, machine, integrated – to using it to generate insight. Assess and prioritize where insights deliver the most value – and to whom.
- Transition your hardware design and development processes and teams to include a significant focus on data, insight design and interfaces, continuously providing valuable data to enhance customer offerings.
- Leverage AI to provide personalization, increase attractiveness and delivery of compelling experiences. Use it to position the organization for higher-value insight and services.

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### **Determine your platform orientation**

- Define underserved users and customer needs, assess how to meet these with data and services, not features and functions.
- Determine desired platform participation level – participant or owner – and set expectations accordingly: what assets do you have that can be delivered as-a-service?
- Determine where a data platform can play a much bigger role answering questions and sharing insights across an ecosystem and its customers. What services can support users or provide them with new opportunities or protect them from risks?

### **Get in the game**

- Assess market position and ecosystem strength.
- Create greater connectivity, allowing platform participants access across the network, increasing the value they find in your offerings.
- Whether sharing physical assets or developing new products and services, it's important to continually align on business values and practices across the ecosystem—especially security and data usage as the world evolves.

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**Related IBV publications**

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Digital Reinvention in electronics

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Intelligent Connections

Reinventing enterprises with Intelligent IoT

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Plotting the platform payoff

Chief Executive Officer

<https://www.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=63015563USEN&dd=yes>

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## Key questions

How do we create ecosystems that add value by exchanging, combining and transforming data to increase value?

What parts of your organization's data have the greatest opportunity to be transformed by platform approaches?

How do we transition to more asset-light models? Who must be involved in this strategic transition?

What capabilities are present and what is needed to capture, store, process and share data through a platform?

How do we protect data assets while also making them accessible to those willing to pay for them?

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### For more information

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**Notes and sources**

- 1 Incumbents Strike Back: Insights from the Global C-suite Study.” IBM Institute for Business Value. February 2018. <https://www.ibm.com/services/insights/c-suite-study>
- 2 2017 IBM Global C-Suite Survey Data. IBM Institute for Business Value.
- 3 “The 100 largest companies in the world by market value in 2018 (in billion U.S. dollars).” Statista. <https://www.statista.com/statistics/263264/top-companies-in-the-world-by-market-value/>
- 4 CSI Market, [https://csimarket.com/stocks/at\\_glance.php?code=ibm&image.x=0&image.y=0](https://csimarket.com/stocks/at_glance.php?code=ibm&image.x=0&image.y=0)
- 5 Libert, Barry, Megan Beck and Jerry (Yoram) Wind. “Network Revolution: Creating Value Through Platforms, People and Technology.” Knowledge@Wharton, University of Pennsylvania. August 9, 2016. <http://knowledge.wharton.upenn.edu/article/the-network-revolution-creating-value-through-platforms-people-and-digital-technology/>
- 6 2017 IBM Global C-suite Survey data. IBM Institute for Business Value.
- 7 Ibid
- 8 Ibid
- 9 Ibid

- 
- 10 Ibid
  - 11 Ibid
  - 12 Ibid
  - 13 Ibid
  - 14 Ibid
  - 15 Ibid; Eastwood, Gary. “New Report Provides Snapshot of the Global State of Enterprise Mobility.” Unified Communications Insight. March 18, 2016. <http://ucinsight.com/latestnews/new-report-provides-snapshot-of-the-global-state-of-enterprise-mobility/uch> Does it Cost to Develop and Build an App [2018 update]?” Appster. <https://www.appsterhq.com/blog/app-development-cost/>
  - 16 2017 IBM Global C-suite Survey data. IBM Institute for Business Value.

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