2017
PLATFORM STRATEGY SUMMIT

MIT INITIATIVE ON THE DIGITAL ECONOMY

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M DIGITAL

The MIT Platform Summit was launched in 2013 by Geoffrey Parker and Marshall Van Alstyne to explore the phenomenon of platforms in public and private organizations, and to better understand how to manage, govern, and regulate platforms. The Summit brings together thought leaders from industry and academia to share their experiences, engage in robust discussion, and to help chart a path forward for private and public-sector leaders who seek better understanding and more efficient regulation.

PLATFORM STRATEGY SUMMIT 2017

On July 14, 2017, a global community of 300 visionaries—including business and IT executives, public-sector leaders, and academics—convened at MIT in Cambridge, MA, for the 2017 Platform Strategy Summit. Hosted by the MIT Initiative on the Digital Economy (IDE) the conference featured keynote speakers and discussion focused on the implications of platform-centered economics and management. The Summit was sponsored by KPMG, Global Payments, BearingPoint, and Tencent Holdings.

THE PLATFORM REVOLUTION

The "age of platforms" is firmly established. As outlined in the 2016 book, **Platform Revolution** (www.platformrevolution.com), platforms are no longer restricted to retail or high-tech, but are visible across multiple industries. As 2017 progresses, the trend is accelerating rapidly.

The business impact of platform markets is far-reaching—and there's data to prove it. Research from Boston University's Marshall Van Alstyne and MIT IDE postdoctoral associate Seth Benzell, along with Guillermo Lagarda, shows that on average, companies that open their application program interface (API) experience a 4% rise in market capitalization. Likewise, companies that open their developer portals tend to see lower research and development costs along with increased sales.

The shift taking place in the global market is jolting: the top 50 platform companies now have a combined market capitalization of nearly $5 trillion. Just consider that in 2001, 2006, and 2011, the top publicly traded companies by market capitalization were in finance, energy, and industrials. In 2016, these traditional industries were displaced by companies that manage digital platforms.

THE PLATFORM YEAR IN REVIEW

GEOFFREY PARKER Professor, Dartmouth, and MIT IDE Fellow
MARSHALL VAN ALSTYNE Professor, Boston University
PETER C. EVANS Principal, KPMG

From left, 2017 Platform Strategy Summit co-chairs, Van Alstyne, Evans, and Parker.

At this year's event, Summit leaders presented diverse viewpoints on key trends as well as contextual frameworks for their thinking.

Most notably, the co-chairs set the stage by emphasizing the strong focus on globalization, platform consolidation, and the rise of the industrial Internet. They also noted that competition for talent is heating up, and platforms are becoming key drivers of internal business innovation and external collaboration. Monetization strategies are beginning to gel and software developers have clout.

When you examine the largest global platforms, you discover several "super-major platforms"—such as Apple, Google, Microsoft, and Facebook—leading the way with a combined market capitalization of $3.5 trillion. China is advancing its efforts with platforms such as Alibaba, and Tencent is also taking hold. Beijing has become an epicenter for platform innovation and startups and has a tremendous user base.

PLATFORMS MEET POLITICS

The rising influence of platforms is attracting attention—and in some cases, opposition—from all corners of the globe.

In Barcelona, for example, the city council has cracked down on unlicensed apartments with Airbnb. In Germany, courts have ordered Facebook to stop collecting fine-grained data.

South Korea has blocked Google Maps and Turkey has banned access to Wikipedia. And while Uber has been barred in Italy, India is just getting around to approving ride-sharing apps.

In the EU, Google was recently fined $2.7 billion for antitrust violations, and the clock is ticking on the General Data Protection Regulation (GDPR), which goes into effect in May of 2018. Cumulatively, this represents the interplay of platforms with political systems.

There is also a noticeable rise in mergers and acquisitions in many parts of the world—totaling about $36 billion so far this year. Amazon's successful bid for Whole Foods is perhaps the most watched merger. Observers are still analyzing how this will disrupt the once-quiet, $600 billion U.S. grocery industry.

As platforms grow in size and scale, they are also contributing in significant ways to national systems of innovation and sparking meaningful growth in patents and investment in technologies, such as artificial intelligence. At the same time, regulatory scrutiny of platforms is growing, with uncertain outcomes.

The platform landscape is far from evenly distributed. There are great geographic differences and new questions about old models in play. And while businesses are becoming very aware of the issues, no one has cracked the code of how to balance data rights and unfettered digital marketplace growth.

SIX EMERGING THEMES

1
PLATFORM GLOBALIZATION

2
PLATFORM CONSOLIDATION

3
INCREASED REGULATION

4
PLATFORMS GO INDUSTRIAL

5
COMPETITION FOR DEVELOPER TALENT

6
DRIVERS OF INNOVATION

Platforms have progressed from being a novel and interesting business model to a disruptive force in every industry sector.

The Platform Strategy Summit addressed some of the most pressing challenges concerning the adoption, development, and investment in platform markets. Here are just some of the topics covered at the Summit:

- **Building and running digital platforms**
- **The evolution of the developer ecosystem in the Age of Platforms**
- **The connection between AI and machine learning and platforms**
- **How VCs view the platform market**
- **The future of payments in a platform economy**
- **What digital industrial platforms need to know about integrating edge, clouds, and apps**
- **Smart connected devices and the Internet of Things**
- **Redefining the Internet of Things with platform innovation**

US vs EUROPE: HOW PLATFORMS STACK UP

75%

At least 75% of major platforms are located in the United States.

3%
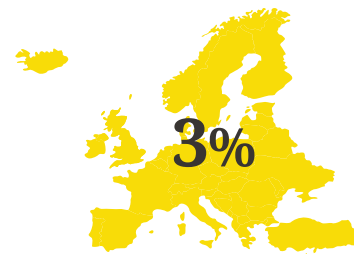
Across Europe, platform technologies are lagging and regulatory issues are heating up.

Of the world's top 50 public platforms, seven companies — or supermajors — hold a combined $3.5 trillion of market cap. The other 43 companies make up $1.4 trillion of market cap.

CASE STUDY

BUILDING AND RUNNING DIGITAL PLATFORMS

JAN GILG Head of Enterprise Architecture & IT Strategy, SAP

SAP is continuously evolving toward digital platforms, Jan Gilg told attendees.

SAP is a long-established German software company with more than 350,000 customers in over 180 countries around the world.

When Jan Gilg joined SAP in the early 2000s, the world was emerging from the Internet bubble and there was a realization that the standard SAP platform was not robust enough for our enterprise customers. The idea of connecting one of SAP's Enterprise Resource Planning (ERP) systems to the Internet was a foreign concept. The following summary of Jan's presentation shows that times have surely changed.

By 2010, SAP articulated a new strategy to become the most innovative cloud company—which required significantly different ways of building, marketing, and selling software. During the past decade, we've transformed from being a single product ERP vendor for large enterprises, to becoming a cloud company with a huge portfolio and a growing platform business.

Today, SAP not only connects systems to the cloud. We're building systems in the cloud.

Disruptive technologies have put our customers in the driver's seat and increased expectations for the products and services they desire. Our business partners—as well as our own lines of business—began asking, "What business models and platforms can we create?"

With the disruptions, there's also been a shift in mindset to think far beyond cloud offerings. With openSAP, we moved away from proprietary technology and established quite a significant ecosystem. We promote our own platform, the SAP Community Network (SCN), where we invite developers from our customer community, which totals more than one million members. Our new SAP Cloud Platform is based on open standards and open technologies, as well.

It's not necessarily the biggest companies that win market share. It's the most agile ones.

When we combined our platform with new technologies such as artificial intelligence and IoT, we also built those services into our SAP Cloud Platform. We believe this is an integral part of the future for SAP.

NEW COMPETITORS, NEW STRATEGIES

Uber, Airbnb, and Facebook share a common quality: they're all platform companies. Together, just these three companies are valued at 60% of the total market cap of the DAX, or German Stock Index. The companies represent a prime example of supply economy of scale versus demand economy of scale.

The German Stock Index is still primarily comprised of the traditional industrial heavyweights, such as BMW and Siemens—even though Siemens is a platform company now, as well. But the valuation for companies that are rigorously pursuing platform business models are much, much higher, explaining somewhat why it's possible that those newcomer companies already make up two-thirds of the DAX.

In order to react quickly, SAP acquired a handful of successful B2B cloud companies, and suddenly the cost of deals and margins became extremely important.

The challenge is how to become a cloud/platform company and stay profitable. You also have to reduce overhead if you sell a piece of software for a $50 subscription, or it's not profitable anymore.

The goal is to minimize the number of touchpoints in the sales cycle and become an ecosystem based on self-services. For SAP, that means allowing customers to test software before they buy it through an online platform.

Monetization is difficult. You can monetize the platform, as Microsoft does with Azure. But for SAP, what's more interesting is taking revenue shares from the applications that are being built by partners, or even monetizing the usage by APIs instead of offering whole pieces of software end-to-end.

The challenge is how to become a cloud/platform company and stay profitable. You also have to reduce overhead if you sell a piece of software for a $50 subscription, or it's not profitable anymore.

We have an API marketplace where we publish standard APIs for our products, and we use those same APIs to implement SAP software. It's a profitable way to leverage the APIs we build within IT for the marketplace and for partners, and helps us to build out an ecosystem of developers. We are still experimenting with these monetization models, trying to balance that with the equally important goals of building platforms, creating mindshare, and encouraging communities.

Platform development is helping us forge better connections with customers and suppliers, and new opportunities to collaborate within our own workforce. The end goal is to make our platform a competitive differentiator in the market and to offer ease and services for our customers. And we're still building toward that goal.

THE DIGITAL ECONOMY IS THE NEW REALITY

88%
FORTUNE 500 COMPANIES DISAPPEARED, MERGED, OR CONTRACTED

70%
NUMBER OF NEW COMPANIES IN TOP 10 LIST OF LARGEST GLOBAL FIRMS

66
NEW VENTURE-BACKED STARTUPS WITH $1B VALUATIONS, UP FROM 11 IN 2012

DEVELOPER ECOSYSTEMS IN THE AGE OF PLATFORMS

SAM RAMJI VP Product Management, Google

Sam Ramji, VP Product Management at Google, told the audience that "this is the best time in history" for developers.

One of Sam Ramji's favorite expressions is, "Don't ask a fish about the ocean." That is to say, it's often difficult to grasp the larger picture around us. We say that developers are developers, and that's why you need them. But, he told Summit attendees, we need to understand this more. The following are highlights of his presentation.

In some platforms, one essential side of your multi-sided market is developers. And in that case, you have very different network effects, and you have to manage that differently.
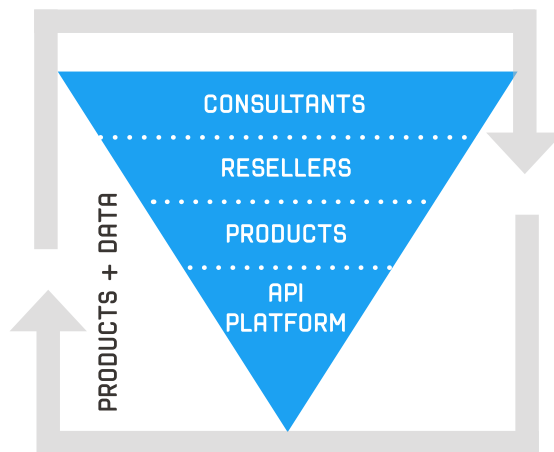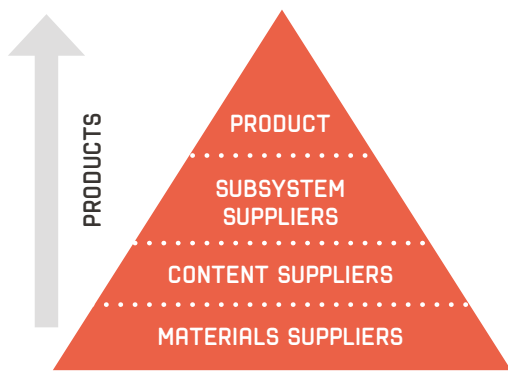
Google aims to build great developer tools because we are a company of platform businesses. Think about search and ads. Think about YouTube. Think about Android and Play. When the platform's content is built by developers, we have to win those developers and enable them to build high-quality content.

We're at a moment now where we can see developer ecosystems taking root and having an impact. From a developer standpoint, this is certainly the best time in history. We're in an era of rising demand.

Software developers are the new pharmaceutical inventors, because AI is creating new drugs through simulation and molecular analysis. So the field of software development is expanding dramatically. But, in fact, software developers aren't magical. They're people who use code to produce meaningful outcomes and they find joy in the process.

THE EXPANDING, CONNECTED UNIVERSE

What's invisible is the shift of the cost of sharing networks and data. Google has about 37 million websites and apps that connect to our infrastructure to process geo-data. You don't have to be a digital native, though, to achieve great digital breakthroughs. Phillips is adding programmability to light. So light hasn't just gotten cheaper, it's gotten programmable. Nike is creating wearables, and so on.

THE PRODUCT PYRAMID, INVERTED

PRODUCTS (left triangle, top to bottom):
PRODUCT
SUBSYSTEM SUPPLIERS
CONTENT SUPPLIERS
MATERIALS SUPPLIERS

PRODUCTS + DATA (right inverted triangle, top to bottom):
CONSULTANTS
RESELLERS
PRODUCTS
API PLATFORM

For all of us born and raised in the 20th Century, the classic product pyramid is how companies were built. Ideally, that was the place of most power; most intimacy with customers; pricing control. But in 2007, my colleagues and I designed a diagram [above] which has been very durable. Literally, it's firm-inversion; good platform companies are inverted pyramids.

From a 20th Century mindset, this inversion seems insane. Why would you want to give up all that customer intimacy? But here's the secret: In the first packaged software era of platforms, you didn't have APIs. The magic came when platforms started to have APIs, and now every time a customer uses something built by a third-party developer, the data comes back to you, and the revenue can sometimes come back to you as well.

THE POWER OF DEVELOPER NETWORKS

Through this looping cycle, there's an almost magical effect; when digital platforms have developers on one side, you see breakaway outcomes and the power law shifts.

More developers yield more meaningful outcomes; more data goes into the platform that can then route back to the platform.

There's another part to it as well. Developers, as people, have a network effect with code. We're in an open-source era. So the more developers that join the platform, the more they will generally share code with each other and create open-source frameworks. This diminishes the future costs of new developers coming in, and it makes the developers on your platform better because that shared code is a cognitive asset.

We're entering an era where empathy is a competitive advantage. Developers have agency, they have choice, interest and values. Empathize with their outcomes.

I offer this challenge: Community management is product management for an ecosystem. When this concept is well understood, these will be your most valuable and highly leveraged employees. Companies and academia need to shine a light so we are not a fish asking about the ocean, but we actually have a map of where to go.

EMERGING COMPONENTS OF PLATFORM DEVELOPMENT

1 OPEN SOURCE

The modern developer's basic expectation. This is how we license source code. The more that we enable open source in our platforms, the more developers can benefit.

2 OPEN DEVELOPMENT

Open development improves efficiency and mandates a certain set of outcomes. It is fueled by an explosion of third party, open-sourced, source-code controlled systems.

3 FOCUS ON COMMUNITY

Lao Tzu said, "All streams flow to the sea because it is lower than they are. Humility gives it its power. If you want to govern the people, you must place yourself below them."

THE SEARCH FOR THE VALUE GENOME

BARRY LIBERT CEO and Founder, OpenMatters

Barry Libert, CEO and Founder of OpenMatters, describes his value genome theory.

If you want to be part of the platform economy, you have to pre-allocate capital and measure what matters.

BARRY LIBERT

In 2001, Craig Venter discovered the human genome based on four billion single letter combinations of AATG, AACT, ACTG. In short, all of us are made up of just four letters of code. In his presentation, Barry Libert speaks to how he applied this concept to the economy.

For a deeper understanding of what's happening in economics today, I created The Genome Code of platforms and networks. If we can define what's happening in the world as an economic genome, we can map and understand the underpinnings of what people are talking about today.

For instance, using a machine learning algorithm that looks at each and every one of your organizations, I can design, develop, and decipher the corporate genome of your organization based on that algorithm.

In 1975, 83% of all assets were made up of tangible things. Over the next four decades, the allocation of capital dramatically shifted. In fact, by 2013, only 15% of the world's economy was now in tangible items
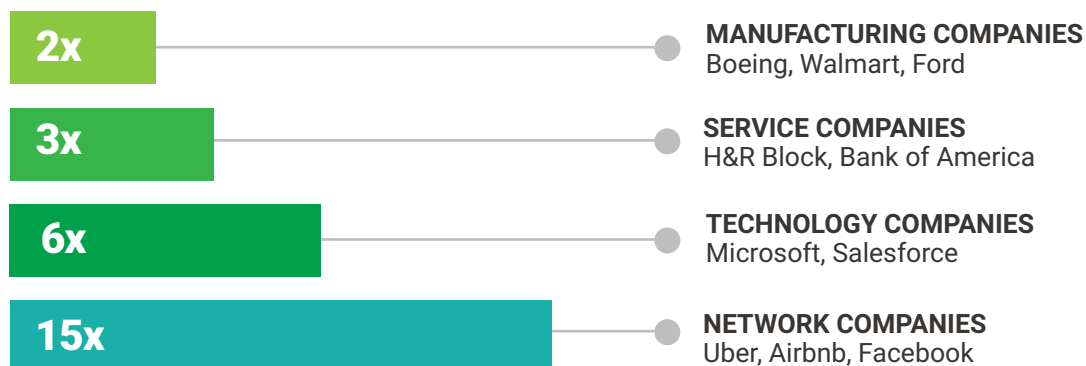
The first innovation we developed was called Feature Selection. We started with assets, also known as things and money, then searched for features, such as human capital and intellectual capital. We also examined relationships, such as the ones between customers and employees.

By 1999, we filed patents for Feature Selection for the Global Economic Genome. We examined 11,000 companies and ended up with four classifications of companies from the underlying features set.

As a result, we can map the genome of every company and every country, once you get the feature selection right and if all the data sets are available.

▼ THE ROI OF THE VALUE GENOME

Network companies trade at eight to 15 times revenue because the economic value of the genome of the organization dictates the outcome of its economics.

2x — **MANUFACTURING COMPANIES**
Boeing, Walmart, Ford

3x — **SERVICE COMPANIES**
H&R Block, Bank of America

6x — **TECHNOLOGY COMPANIES**
Microsoft, Salesforce

15x — **NETWORK COMPANIES**
Uber, Airbnb, Facebook

AI, MACHINE LEARNING, AND PLATFORMS

MARSHALL VAN ALSTYNE Professor, Boston University
WALID ALI Senior Director, AI & Cloud Solutions, Intel Corporation
STEVE HILL Global Head of Innovation & Investments, KPMG
RUCHIR PURI Chief Architect, IBM Watson
XIANGYU WANG VP, Tencent / Enterprise Product

Our first panel of industry leaders discussed how the concentration of "information wealth" is increasingly driven by artificial intelligence (AI) and machine learning. Panelists made the case for the growing interconnectedness of platforms and AI. Read on for excerpts from the panel.

> The opportunity to train a machine how to interact with humans is among the best applications of AI.
>
> **XIANGYU WANG**

Marshall Van Alstyne, (far right), leads panelists (from left) Xiangyu Wang, Ruchir Puri, Steve Hill, and Walid Ali.

Xiangyu Wang: The growth of WeChat and QQ Instant Messenger platforms in China demonstrate the rapid growth of AI capabilities, especially in social media. Tencent is among those enabling these systems. As a technology-driven social enterprise, we understand the value of science and technology is to help people make things happen.

Moreover, applying AI to the enterprise service field not only helps large enterprises reduce cost and enhance revenue, but helps middle and small businesses to run efficiently and grow rapidly.

On WeChat, most people speak, rather than type, their messages. The Chinese also like to take and upload pictures into their QQ system; Tencent has the largest picture database in China, and maybe globally.

Additionally, the company is working on machine learning image recognition that can be used by police to locate missing persons. It's called the Chinese Amber Alert, or QQ Alert. Recently, a family was reunited after 30 years.

The opportunity to train a machine how to interact with humans is among the best applications of AI.

Steve Hill: AI, cloud, and data will be the three legs of the stool that will bring change to all industries. AI partnerships are about relevance. Our industry will be irrelevant unless we adapt these types of technologies and take the robotic tasks away from people. These rote tasks account for about 30% of the industry today, and can easily be digitized. As platforms converge with AI they will uncover new business opportunities.

Walid Ali: There is a massive need for innovation that has to be driven by the ecosystem. As much as we love to empower our partners, we are actually benefiting a lot from this partnership.

Ruchir Puri: We are seeing opportunities in unlocking insights that we are not even exploring today.

Wang: In China, we are using AI to augment humans and dramatically condense the sales cycle. It usually takes four days to pass information about a car purchase through the call center, to the dealer, and then to the local site via the dealer platform. Now, it only takes 15 minutes using Tencent's AI technology. The software understands the client's requirements and priorities, and what after-sales opportunities may exist, as well.

The technology can save 45% of a salesperson's working hours, but interestingly, the carmaker isn't laying off 45% of their employees. Instead, the system replaces some of the rote activity, so humans can spend time better supporting and empathizing with clients.

Hill: It's important to understand the notion of job augmentation versus replacement, especially with so much AI hype in the marketplace today. Just as medical devices in the general practitioner's office created more specialists, we're going to see lots of professionals with cognitive abilities become more needed as machines do more data collection. Machines will identify problems; humans will be the problem solvers.

Marshall Van Alstyne: If you think of network effects as a system, it becomes more valuable through use. AI systems do that, too. If you get the data tables, and others can then process the data, the system becomes more valuable and creates additional data. These network effects are fundamental to the growth of ecosystems.

I'd also argue that governance is one of the most important platform questions of all. It involves not just companies, but the citizens and the environments in which they reside. That's a huge issue.

Puri: AI has probably pushed open innovation more than any other technology in terms of involving the research and academic communities. It has accelerated innovation more than anything else I can think of.

80% of data is dark data

"This data is actually locked within enterprises, which means that it is not going to be shared over a public network," says Ruchir Puri, chief architect at IBM Watson.

Platforms leverage three layers of knowledge: public, industry, and enterprise. Weaving these three together to deliver insights, with AI techniques, will deliver solutions and insights to enterprises.

FROM SERVICES TO PLATFORMS: DEUTSCHE BANK

MARKUS PERTLWIESER CDO, Deutsche Bank

Markus Pertlwieser is responsible for the digitalization of private and commercial banking at Deutsche Bank.

Deutsche Bank started their digital journey roughly three years ago and plans to invest about $1 billion in digital. Markus Pertlwieser explains the bank's challenge to hone their digital capabilities, encourage adoption, and attract outstanding talent. A summary of his presentation follows.

There is no silver bullet that transforms a traditional bank to digital. You have to digitalize your entire value chain starting with the customer experience. Cultivating client relationships is one of the most important tenets of Deutsche Bank. For us, that also means staying relevant and remaining a trusted partner for customers.

As we continue our platform journey, we'll go channel-by-channel. In Europe, there will be new services like account information service providers and payment initiation service providers. There will be a totally new kind of competition. What we focus on are big players in the financial service industries, such as insurance companies. And some competitors—such as asset managers—may also be partners as regulation changes and technology platforms emerge.

Deutsche Bank is one of the top five investment banks in the world.

We don't think that there will be a winner-takes-all in the short-term, but we truly believe that there will be significant market consolidation, and therefore it's extremely important to have many digital capabilities within the bank.

Digitalization is a strategy (r)evolution, not an IT upgrade.

There are many challenges when you are a traditional company in a traditional industry. We have many classically siloed IT teams, and when we open up our platforms to third-party products, we need to orchestrate partners. This is more of a B2B business than a B2C business, and therefore, it requires totally different kinds of capabilities.

Digitalization is not an upgrade of IT; it is a revolution of the strategy. We also believe that the banking industry will become a platform industry in the near future, and we have to open up our product shelf. That's why we launched a retail deposit marketplace, so when our customers come to us, there are also retail deposit products that are not only from Deutsche Bank.

There will also be many APIs so that third-party developers can use the data to come up with a kind of net store for our customers, say, for contract management or tax advisory, because we believe there could be real value for our customers.

The key question in a platform economy will be about the role of the digital identity. We need to build up our digital identity capabilities to a point where customers can store their identities, which can be transferred for the services they want as an end customer.

One single company will be not big enough to build up a platform like that. That's why we joined with Allianz, Daimler, and Axel Springer to bring together all these different kinds of use cases. And we gave the data back to the customer so the customer can decide on his or her own which services to use and which personal data can be used.

We believe the banking industry will become a platform industry in the near future.

MARKUS PERTLWIESER

Infrastructural shifts are becoming more common in banking and fin-tech, with many companies investing in Ethereum and other open-source, blockchain-based technologies.
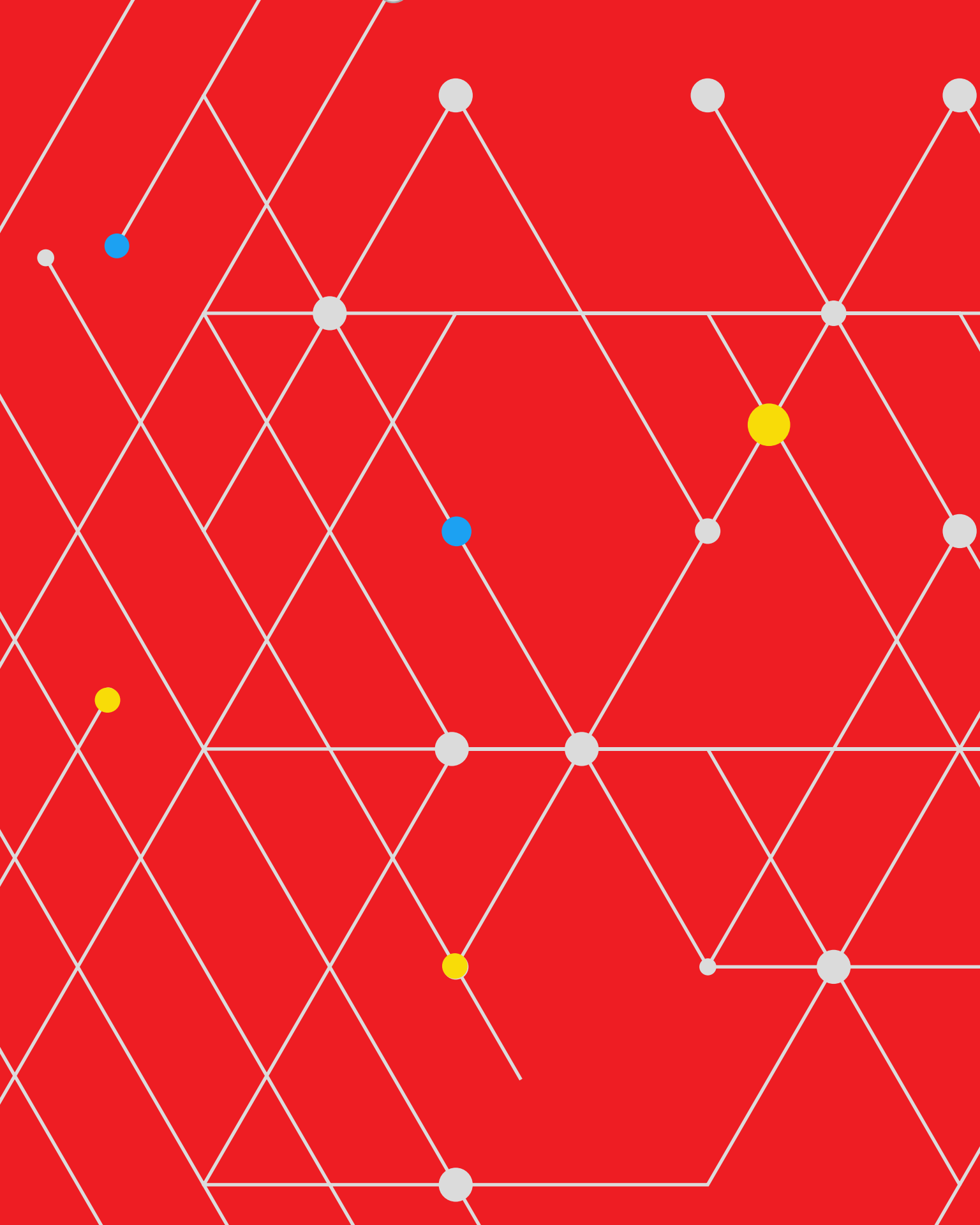
Help us drive the conversation.

The MIT Initiative on the Digital Economy explores how
people and businesses will work, interact, and prosper
in an era of profound digital transformation.

We invite you to connect, engage, and share ideas
with other visionaries who are shaping the
conversation about the future of the digital economy.

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THE VC VIEW OF THE PLATFORM MARKET

ANDREI HAGIU Visiting Associate Professor, MIT
SIMON ROTHMAN Partner, Greylock Partners

Simon Rothman (left) and Andrei Hagiu at the 2017 Platform Strategy Summit.

As recently as 2011, the top publicly traded companies by market capitalization were in finance, energy, and industrials. In 2016, however, these traditional industries were displaced by much faster-growing companies that manage digital platforms—such as Apple, Google, Microsoft, and Facebook.

To discuss these fast-moving trends, the Summit hosted a conversation between Andrei Hagiu, Visiting Associate Professor, MIT, and Simon Rothman, Partner, Greylock Partners venture capital firm. What follows are some key excerpts.

Simon Rothman: Marketplaces, networks, or more broadly two-sided platforms—where you don't own the assets or the people—are probably the best business models ever created. I'll put that out there.

I'm very biased, but here are my reasons. One is they're very, very durable. Typically, as businesses get bigger, they tend to get weak, as illustrated by the lack of original S&P 500 companies that are still on the list. The only one left may be GE. In contrast, network businesses get stronger over time.

Secondly, they tend to be very high growth business models. When they work, they compound. If you look at Facebook, Airbnb or Uber, as they work faster, they actually have exponential growth until they plateau. Craigslist today is so anachronistic; it looks as if it were built 20 years ago, which it was, and it hasn't evolved. At the same time, Craigslist is a testament to the durability of marketplaces and platforms.

Lastly, platforms tend to have really high margins since they don't own the people or assets. Airbnb doesn't own the hotel or the rooms. Uber doesn't own the vehicles.

eBay doesn't own the products. Traditional economic dynamics are inverted. There is high, compounding, exponential growth and high margins because there is no ownership. And that defies normal business gravity.

The biggest downside is the fact that they're almost impossible to build; but that also means they're equally hard to kill.

> Platforms tend to have high margins since they don't own the people or assets.

The early generation of marketplaces, like eBay and Craigslist, were very open platforms and laissez-faire, where people did the listing. The platform created the metadata, the images, and the writing. They did the sales. They created the terms, the pricing—everything.

That model worked well when the Internet was young, consumers were new, and having broad selection was acceptable. If you wanted collectibles, going where there were a million of them was a lot better than trying to go to a million swap meets. The platform was "good enough." Now, marketplaces tend to be intermediated, and platform companies are in a middle zone. They're no longer completely hands-off, nor do they own everything.

Uber tries to look as if it controls customer service, but it doesn't control anything. The vehicles aren't theirs, the drivers aren't theirs, but they do a lot of matching. Airbnb is in the middle, as well, but slightly closer to eBay's model.

ESTABLISHING RESPONSIBILITY

The challenge is this: if you're a customer at an Airbnb and you have a bad experience, whose fault is it? There are legal faults and there are practical faults, but for most legal purposes, it's not Airbnb's fault. However, when something happens, Airbnb gets blamed.

While it seems like Airbnb actually brokers rooms, Uber brokers rides, and eBay brokers used goods, they each really broker trust. The currency is not cash or products, it's trust. When you violate that, you bear the weight of that consequence regardless of the legal issues. That's the challenge: Customers have all the expectations of control, and you live in the tension between.

Andrei Hagiu: These two points are worth emphasizing: The first is that one reason we like marketplaces is that they are very low touch. If they work, they work beautifully in the sense that the platform is orchestrating buyers and sellers to come together without actually having to do much, except governance. In practice, it's not that simple. In a lot of cases, the users, or the buyers and sellers or other constituents, may actually hold you responsible for much more than you control.

Rothman: Once you breach the trust, the marketplace unwinds. This is especially difficult to understand for companies that are not born as marketplaces or platforms, but are trying to transform their business into a platform. If you start as a pure marketplace, you're at least aware of these issues and set the rules and educate users from the get-go.

PLATFORM STARTUP 101

If you have an established, traditional product or service business, and decide to build a marketplace offshoot, your customers will still view you as the main provider. You will be perceived as more responsible than a company that launches a marketplace from scratch.

So, whether it's in banking or the hotel industry, the challenge is not what you offer, but how you offer a consistent experience without owning anything or employing anyone—and do it at scale, in thousands of places. That's the magic.

THE FUTURE OF PAYMENTS IN THE PLATFORM ECONOMY

PETER EVANS Principal, KPMG
JEREMY NEREN Founder and CEO, GrocerKey
DREW WEINSTEIN Co-Founder and President, Velo Payments
FRANK YOUNG SVP Global Product and Innovation, Global Payments

Every business is ready to dive in and multiply their transactions with network effects. What's not often discussed are the nitty-gritty, behind-the-scenes issues that can make or break a platform and its participants.

One of these critical issues is how people pay and get paid. How do platform systems work with existing payment systems, and how do backend payments work, or not work, in facilitating the exchange?

Platforms usually want to monetize. They may have a free component, but to be sustainable, they've got to get the money flowing somehow. Yet, the payment process is much more complicated than most imagine.

Co-chair, Peter Evans (far right), leads panelists (from left) Drew Weinstein, Jeremy Neren, and Frank Young.

A distinguished panel of experts gathered to explore the basic, yet complex topics concerning payments in the platform economy. Here are some key takeaway learnings:

Frank Young: I left Google two years ago after leading their payment partnership efforts—specifically with consumer-facing apps like Google Wallet and Android Pay. It was obvious that if you wanted to make some impact in digital commerce, you needed to get as close as possible to the point of interaction between the consumer and the merchant. It's using technology to simplify the complexity of those merchant interactions that matters. Platforms amplify that complexity tenfold.

Drew Weinstein: In January, Velo Payments started to address a very specific question: How to use payment technology from the 1960s in the digital age? No one anticipated that a digital company would be paying everyone—from app developers to sellers on Amazon—millions of payments a day, across the world, using dozens of banks that all have different formats.

The data problem is profound, and the error rate is offensive, but you can't just throw all the old pipes out. Velo is trying to change the data sets to improve error rates and to have better visibility into digital funds flow.

For 60 years, payment meant you took a card out of your wallet and you swiped it. In a platform economy, we're living in exponential times, and yet the infrastructure really isn't keeping pace. In essence, we've paved the cow path as it relates to payments.

Payments also represent unique challenges for the platform economy around data quality, process automation, straight through processing, data normalization across the different industries, and the data structure that follows.

In a platform, you've got to abstract beyond any one bank, because corporations are going beyond one service provider. Wires are really slow and expensive. The amount of data you need in order to take a transaction from the consumer all the way to the sub-merchant—from a risk and compliance standpoint—is substantial.

Jeremy Neren: Projections indicate we could see up to $150 billion in e-grocery sales in the U.S. alone by 2025, from the current $25 to $30 billion. Ensuring that consumers are charged the right amount and grocers are getting paid is complex. Were there incremental purchases made after authorizing the transaction? Does the consumer have the available funds? Those are just some industry-specific issues.

For their part, the engineers who are tasked with rewiring online shopping experiences, are no longer satisfied paving the cow path; they're trying to create entirely new experiences.

Internal operation processes are complicated, too, even in a technology-driven organization. There are stakeholders in product groups, payment operations, reconciliation, and customer success. And finance is definitely involved because this is about money movement. Interestingly, in some platform companies you now can find a head of payments, which is great because one person should have this mandate.

Peter Evans: Certainly, platforms are aware of the issue. That's why Amazon created Amazon Payments, and eBay purchased PayPal. Fast forward to Alibaba's Alipay. Ten years from now, it is going to have every financial institution shaking in its boots because it's trying to deliver an experience at a scale and pace that the existing infrastructure cannot support. Starbucks Mobile has $12 billion on its stored value account. That would make it a top 20 financial institution in the United States.

Basically, we're asking how to marry the public Internet to this very trusted infrastructure that we're all kind of dependent on—the banks.

No one anticipated that a digital company would be paying everyone millions of payments a day, across the world, using dozens of banks that all have different formats.

A PLATFORM FOR DIGITAL EDUCATION

ANANT AGARWAL CEO, edX

Anant Agarwal describes the edX platform.

In addition to asking if platforms will eliminate jobs, we should ask what we're doing in job retraining. Anant Agarwal, CEO of edX, offered his thoughts on the topic.

Agarwal has used edX, the global online educational system offered through MIT and Harvard, to teach students all over the world. In fact, attendance in his classes exceeds more than 300,000 learners.

A summary of his presentation follows.

Through unbundling, platforms enable new models.

An estimated 50% of today's jobs will be gone by 2030. That means that in 13 years, one in every two people is likely to be out of a job.

No doubt, the world is completely changing around us, as is the very nature of work. Entire industries have been transformed, and Uberization has become a word that will get into the Oxford dictionary in a few years.

Today's millennials work and study in new ways as well. They'd rather not sit at desks and work. Even in the corporate world, people want to learn, study, and work on the go, via mobile and in small groups and teams. But, despite these preferences and new kinds of jobs, education hasn't changed in a long time. We're still educating people in the same old manner.

We have to move to a completely new model of education; a continuous learning model. Systems that keep youths in schools from the age of 18 for four years are over; finished.

EdX is a nonprofit platform company that wants to revolutionize education and reimagine what it could look like in the future. You can go to edX.org, download the mobile app, pick up any course and learn for free. We have a freemium model where you learn for free, but if you want a certificate showing that you've passed the course, you pay $150. We have to keep the lights on at edX, and our university partners also need a revenue share.

Today, we have about 130 partners—including MIT, Harvard, Berkeley, Oxford, Imperial College, and most of the Ivy League schools. Also,

corporations like Microsoft, Linux Foundation, the World Bank, and others supply great content on edX.

We've grown in five years to 12 million students from every country in the world, taking 1,500 courses. Unlike Uber, Google, and Amazon, we give our platform away free. If you go to GitHub you can download our software and launch your own platform at Open edX, where there's another 12 million additional learners on 800 Open edX sites around the world.

UNBUNDLING SERVICES

Instead of stovepiping, platforms unbundle services—some of those are performed by platform suppliers, and some by the platform itself. We are unbundling education.

On edX, we've gotten rid of admissions. Anybody can come and learn. We don't have campus capacities; it's all online. There are no queues, no application forms. The courses and content are supplied by the university; the platform is from edX. Our credentialing comes from edX.

We've launched a new credential called the MicroMasters because we believe the one- and two-year master's degree is a thing of the past. Who wants to do a program for $150,000, or an MBA for two years where you have to give up your job and leave your home?

It's crazy. People are going to get MicroMasters and module credentials online for about $1,000.

Some platforms unbundle services, and then, as Amazon is doing now, they rebundle them in different

ways. Rebundling might enable an Omnichannel approach to education, much like Amazon will rebundle as it incorporates Whole Foods Market.

Universities customarily don't allow more than a small percentage of students to attend. The more you turn away, the more prestigious and famous you are! It's backwards.

> That's the beauty of platforms: they're a democratizer.

MicroMasters is open admissions. When you apply technology to a platform, you don't have physical constraints. A big theater might turn you away if there's no seating, but Netflix never turns you away. That's the beauty of platforms: they're a democratizer. Everybody's welcome. By applying technology and scaling, you can really drive down the cost.

Today's platform technologies are absolutely just scratching the surface. Once the true network effects take place, Uber begins to talk to Netflix, and Microsoft to Google. We're doing that now in education.

As a result, we believe that traditional universities will change. Those that are innovative will exploit this unbundling and re-bundling. They will be transformed in the future—so will corporate learning and retraining. The new models are unfolding before us.

DIGITAL INDUSTRIAL PLATFORMS: INTEGRATING EDGE, CLOUDS, AND APPS

DANIELLE MERFELD VP, GE Global Research

Danielle Merfeld explained how platforms will allow us to apply digital technologies to the physical world, especially the industrial world, and extract value — whether it's cost, productivity, or other ways to look at value or performance. A summary of her presentation follows.

Danielle Merfeld, VP, GE Global Research, describes the complexities of opening up APIs in an industrial Internet.

If you take a look at diversified industrial companies like GE, you'll see them very rapidly merging both the physical and the digital, with very interesting implications. You'll see that across healthcare, transportation, power generation, jet aircraft, and more, GE's mission is to transform industries by connecting the physical and digital.

Hundred-year-old heavy industries, like railroads, are not sexy. But developing applications, deploying them to all the locomotives, and keeping up with all the software updates, is going to be much easier as our platform emerges. These industries don't really like to invest a lot of capital, certainly not a lot of high-tech computing power, but that's changing.

Platforms will allow us to apply digital technologies to the physical world, especially the industrial world, and extract value—whether it's cost, productivity, or other ways to look at value or performance. It's not a top-down, centrally focused, cloud-centric view. Much more of the value that we're going to create is from the edge of the industrial Internet: at or near the asset.

CONNECTIVITY AT THE EDGE

The edge is the connection point of the digital and the physical worlds. An edge device feeds into the cloud and can access and see all the information technology like big data, visualization, and analytics.

But you can also reach the physical assets and access operational technology—like closed-loop controls, real-time security, and machine connectivity—at the edge. In the last five years we have 100 times more computing power at the edge—which means actually doing analytics and solving problems right where the data's being generated. This was not what we envisioned when we started this process, but it's the reality of our business.

Physical limits kept us from operating in ways that are standard in the consumer industrial world where everything can be located in the cloud. So we are adopting systems that are more suitable to our requirements.

Until last year, our Predix platform was very cloud-centric, then we added our Edge OS, the missing link.

We found that it's not just the plant manager that we're going to talk to at a customer site, it's the energy trader of that utility. So, we have a completely different relationship now, and we have customers buying full digital solutions.

Our API is already open, but is it just for our customers and engineers?

In terms of the bigger ecosystem, we already have an app development environment, but we still have a lot of decisions to make as we fully develop and exploit this platform. Many questions arise as we go along. One is how open or closed will this platform be? We're developing primarily with the GE industries in mind, but we understand that it's going to be more valuable when it's adopted more broadly.

Our API is already open, but is it just for our customers and engineers? Can we bring in third parties? Are we going to train people? How are we getting more people on our application development platform?

Some issues are unique to GE, some are common across many industries, but we will keep exploring ways to improve and exploit digital platforms in our settings.

Much more of the value we will create will come from the edge of the industrial Internet—at or near the asset.

DANIELLE MERFELD

SMART CONNECTED DEVICES AND THE INTERNET OF THINGS

GEOFFREY PARKER Professor, Dartmouth and Fellow, MIT IDE
CARSTEN BECKER Head of Corporate Center Innovation, TÜV NORD Industry Services
LILIAN CORAL Chief Data Officer, City of Los Angeles
CHETAN DESAI Global Industrial Internet Manager, Schlumberger
SUSANNE SEITINGER Global Segment Lead for Smart Cities, Philips Lighting
GEOFF SNELSON Director of Strategy and Futures, Milton Keynes Council

Above, Lilian Coral (left), explains how data sets are handled by the city of Los Angeles. Below, Susanne Seitinger, describes "smart lighting" at Philips.

Geoffrey Parker led this panel in exploring some of the governance issues related to smart connected devices and the Internet of Things across many sectors, including Smart Cities.

As more sensors get attached to more physical assets, the issue of who controls the data and what can be done with it becomes incredibly salient. The panelists ranged from industrial service providers to governmental representatives.

It's critical to step away from a siloed model when it comes to city data sets and bring them together into a platform that is interoperable.

This is essential in order to address big social challenges.

Susanne Seitinger: With 300 million street lights in cities, of which only about 2% are connected, lighting represents a major opportunity to create a pathway for future IoT capabilities. But how do we think about the data stream created from connected lights that are owned by the cities? Who governs the rights to use that data? And are those rights well understood?

There's a big task ahead to generate rich data sets that have reliable information. As a result, data governance is still evolving because we don't know everything that we're going to be able to do with the data we are collecting. It's no longer just the city or the organization running the platforms that are involved: It's data users. It can be entrepreneurs or platform providers who generate new services in adjacent verticals. We also engage with civic leaders who want to improve or invent new services.

So as these different kinds of actors start to become part of the mix, you need data governance structures that allow each of them to participate and access this data.

Geoff Snelson: As a strategist for a mid-sized city in the U.K., I deal with this issue as well. My city has established a data hub environment in which data can be exchanged and managed in a flexible way by multiple sources. The core principle of the data hub is that the data providers keep control of the data—they retain ownership and set the policies for the use of that data. Anyone who wishes to use the data has to subscribe to those policies.

From a business model perspective, the data hub could ultimately allow for the purchase and pricing of data, as well. However, we are in a bind: until they deploy a technology at city-scale and can understand the economics, we won't know the value of the data that's going into the systems. But getting the investment to deploy at city-scale requires some understanding of the business value and model before committing to the investment.

Chetan Desai: Schlumberger is an old-school industrial vertical—oil and gas services—with lots of opportunities for digital disruption. The oil and gas industry spends about $800 to $900 billion dollars a year in capex. I believe about 30% of that could be disrupted digitally, and that IoT is an important enabler.

We're not close to the seventh inning of this game yet. There are many obstacles. For instance, fully 70% of Schlumberger's operational footprint cannot access any of the top three public cloud providers' computer infrastructure today. So we operate in places where Amazon, Microsoft, and Google don't give us access to their public cloud infrastructure.

Schlumberger sees tremendous value near the edge of the network, while the cloud plays an important role in terms of fleet aggregation and global insight generation.

> We don't know everything that we're going to be able to do with the data we are collecting.

Carsten Becker: I find that many people significantly underestimate the risk of data security, thinking it's only about data privacy. There are many examples where you can see how much it can harm people when somebody is doing something wrong with data. And as was said earlier about trust being the new currency, you only get a single chance. If you run a platform and you mess it up, there is no second try. The best way to avoid that is to make it secure by design.

Lilian Coral: In contrast to the industry perspective, for the city of Los Angeles, we manage open data as a public good. But at some point, in order to really manage enterprise-wide data and to leverage and extract value from it, as well as share that publicly, it has to become a line item and a full vertical within the public organization.

We avoid stating that one data set is more valuable than another because in many cases, we've seen that data that wasn't valuable last year can be of immense value today. Furthermore, it's going to be critical to step away from a siloed model when it comes to city data sets and bring them together into a platform that is interoperable. This is essential in order to address big social challenges.

In closing, Parker emphasized the challenges that shared governance present, as well as the significant opportunities that access to new data sources will create.

The oil and gas industry spends about $800 to $900 billion dollars annually in capex. Desai believes about 30% of that could be disrupted digitally, and that IoT is an important enabler.

REDEFINING THE INTERNET OF THINGS WITH PLATFORM INNOVATION

HERVÉ COUREIL EVP and Global CIO, Schneider Electric

Many attendees were from industries interested in becoming platforms or converting an existing product or service to a platform. Hervé Coureil has made the transition and offers several best practices. A summary of his presentation follows.

Hervé Coureil, EVP and Global CIO, Schneider Electric, describes his platform journey.

You may have tons of IoT devices generating zillions of signals, but you need to make use of those signals.

HERVÉ COUREIL

Schneider Electric has revenue of approximately €25 billion and 150,000 employees. We like to describe ourselves as the global specialist in energy management automation.

We see ourselves really as a technology provider. Cloud, pervasive sensing, analytics, machine learning, deep learning, artificial intelligence, and end-to-end security are all combined in our digital strategy.

The first priority is our obsession with connecting our products and making them smarter. The next step is about building services and the business model. So it is not only about enabling intelligence on top of every individual product, but creating new offerings, new business models and new ways to think about outcomes and system optimization. Additionally, we put emphasis on transforming customer engagement and bringing domain expertise to the customer that can be mission-critical to them.

Our platform, called EcoStruxure, is the unifying experience, or common thread, among our lines of business and the services of Schneider Electric. It's one technology stack, and a set of core technologies that we apply to many different segments. The platform helps us get from the lowest to the highest level of connectivity value.

Our second core belief is closing the loop. You may have tons of IoT devices generating zillions of signals, but you need to make use of those signals. You need to trigger that event and channel it to the right field service engineer; either your service engineer or a partner's engineer.

We believe that integrating the Internet of things, event management, analytics, and your back-end system is super-important. In order to trigger actions and to close the loop, you need to really think about your platform and your IoT architecture from an end-to-end perspective.

Moreover, we want to close the loop in the field. Traditionally, businesses have big control rooms with multiple screens where operations reside. We think that tomorrow, you're going to empower operators that are as close as possible to your processes.

To some extent, the IoT allows you to inject tons of physical data into the digital world. Augmented reality lets you take the data back and project it around you. We're very interested in these options moving forward.

Four areas that we are looking at right now, are: information architecture; data models; platform ecosystems (including partners, developers, app stores, marketplaces, and APIs); and empowering field operators.

▼ 5 LEARNINGS FROM OPERATING AN END-TO-END DIGITAL PLATFORM

1 Maintain balance between shared components and the agility that comes with domain-specific expertise

2 Architect at scale for data collection and aggregation

3 Build a holistic Information Architecture from design/build to operate/maintain stages

4 Design experiences that integrate both asset and customer identity

5 Think both Cloud and Edge security, end-to-end

Co-chair Marshall Van Alstyne sums up four key takeaways from the Summit.

FOUR BIG IDEAS

MARSHALL VAN ALSTYNE Professor, Boston University

Capping off the information-filled day, Marshall Van Alstyne distilled the presentations into four key takeaways to use and share with platform colleagues.

Whoever owns the data owns the opportunity

This issue came up in the IoT panel, the finance panel, and the AI panel. One of the things I want to emphasize, however, is that openness facilitates recombination spillovers. If you keep things completely closed, simply owning the opportunity doesn't mean that you will get to seize it. You might need to open your ecosystem more.

Push your digital twin to the edge

GE was quite insightful about modeling virtual objects to improve real objects. If you're going to optimize, these digital twins are exactly what you can work on at low cost, and model your ecosystem environment. Also, they have great information resources that can be recombined and opened for third parties to use. Again, focus on recombination and reward others for helping you.

Respect complementers, especially the hidden ones

Sam Ramji's wonderful talk addressed this point. Even though they're often less respected, you need troll hunters and guru makers in your communities. Your partners are one of your greatest sources of ideas, inspiration, and recombination, and you will need those for the long term.

Unbundle, and close the loop

Unbundling is germane to education platforms, reducing the friction to adoption, and the friction to re-use of ideas. But, closing the loop also really matters because that's where you're going to get the feedback that gives you ecosystem growth in the long run.

OUR THANKS

We are deeply indebted to the MIT Initiative on the Digital Economy and the sponsors that provide the resources necessary to better understand the changes being driven by increasing digitization.

We are grateful to the organizations that have also given their time to help us better understand the unique challenges faced by private and public organizations as they seek to adapt to the rapidly changing environments in which they operate.

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