



Bright sparks: sensors in furnaces that track and maintain temperature levels while super-heating molten steel dramatically improve quality and yield

How to use the white heat of technology to forge greater success

Competitive strategy in today's world relies on data revenues, not products.

Mohan Subramaniam offers three ways to think like a tech giant and boost the bottom line

For decades firms have framed their competitive strategy around three important anchors: products, value chains, and industry structures. Products drive revenues, value chains position products to compete in the marketplace, and industry structures amplify the value of products. For example, products generate more value in industry structures with fewer competitors and stronger entry barriers. Rooted on these anchors, competitive

strategy is about making key choices: such as what products to offer, how to organize value chains to position products profitably, and how to influence industry structure (for example, by making investments that raise barriers to entry). Firms making and executing the right choices forge a competitive advantage. Over the years, this thinking has served a vast number of legacy firms well. Some of them, such as Boeing, Exxon Mobil, and General Motors, became the most valuable companies in the

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world. Today, however, digital titans such as Facebook, Google, and Amazon, have forced these legacy firms from that coveted perch. And they have done so without relying on the traditional anchors of competitive strategy. Data drives their revenues, not products. Digital platforms characterize how they are organized, not value chains. And digital ecosystems amplify the value of their data, not industry structures.

The explosive rise of these digital titans brings to light a new and powerful role that *data and digital ecosystems* play in the modern economy. All legacy firms cannot expect to operate as a Facebook or a Google. Yet they too can harness the newfound power of data and digital ecosystems through technologies such as sensors, Internet of things (IoT) and artificial intelligence (AI). To do so however, longstanding anchors of competitive strategy built for an industrial world must be revamped for a digital one. Business models anchored on products, value chains, and industry structures must be elevated to those founded on data and digital ecosystems. Three key inputs drive this change: first, comprehending how digital technologies have transformed the power of data; second, understanding how to construct digital ecosystems that are tailored to the needs of legacy businesses; and third, rethinking strategy as one that creates a data-driven advantage when competing in digital ecosystems.

INPUT 1: COMPREHENDING THE NEW POWER OF DATA

Data *per se* is not new. Legacy firms have long used data for insights and decision making. Sales data, for instance, identifies popular products and profitable geographies. Marketing and operations data similarly helps product development, capacity planning, advertising, and also assists in coordinating complex business models.

Modern digital technologies however allow for data to be used in far more expansive ways. A key reason for this is a shift from *episodic* to *interactive* data. Episodic data is generated by discrete events, such as the shipment of a component from a supplier, or the sale of a product. Interactive data, on the other hand, is streamed continuously through user interactions, such as posting likes on Facebook or conducting searches on Google. Digital platforms routinely use interactive data from their users to power their business models. In fact, Google, Facebook, and Amazon together control over 60% of the \$200 billion-plus digital advertising market through this kind of data. Today, legacy firms too can use interactive data to track both their assets and product-user exchanges through sensors and IoT.

Interactive data from assets and their operational parameters can boost productivity. Sensors in furnaces that track and maintain temperature levels in the right range while super-heating molten steel for example, dramatically improve quality and yield. Interactive data from products and customers in addition can drive revolutionary user experiences. Babolat offers sensors in their tennis rackets that track a player's skills and recommend ways to improve. Sleep Number, a mattress company, deploys sensors to improve sleep quality. With web-based sensors, the Washington Post recommends articles that may particularly interest their readers. Allstate Insurance's app-based sensors help users adopt safer driving habits. Interactive data differs from episodic data in two

important ways. Firstly, it generates a new class of insights. Insights from episodic data mostly come from aggregating and analyzing it after-the-fact. Interactive data additionally gives real-time insights. Mattresses can know a user's quality of sleep in real-time by tracking heart rates and breathing patterns. The information is used to dynamically adjust the mattress contours and improve restfulness. In addition, interactive data can be streamed from pin-pointed sources to develop powerful asset or user profiles that become richer over time. Steel plants can know the properties of every single component in their furnaces and use them to improve productivity. Mattress companies can track sleep patterns of every individual user. Indeed, Sleep Number uses these profiles to predict health risks for individual users, such as sleep apnea or restless leg syndrome. Partnering with the Mayo Clinic, it is expanding its business scope from selling mattresses to becoming a wellness company.

Secondly, real-time interactive data can be shared widely, even with external entities. In fact, sharing it widely amplifies its value. Mattresses improve quality of sleep when its real-time data is shared with other assets in a room to switch off televisions, music systems, or lights just when a user falls asleep. Excavators in construction sites reduce project costs by signaling to concrete pourers and other fabricators just as they finish their job in excavating.

Episodic data, on the other hand, is closely guarded and shared selectively even within organizations. As its primary value stems from aggregated after-the-fact insights (such as product margins or market-share performance), this kind of data is kept confidential for competitive reasons. Notably, even aggregated after-the-fact interactive data and its unique user profile insights are rarely shared with external entities. It's only real-time interactive data that's amenable to sharing. Real-time data is intrinsically transient. Its value in sharing is realized only in real time – such as at the moment a mattress user falls asleep, or just as an excavator completes its job. Because the value of real-time data disappears after the fact, firms need not worry about giving away confidential information when sharing it. This facet of interactive data provides new value to legacy firms. However, to fully unleash its power, this data must be harnessed within digital ecosystems.

INPUT 2: CONSTRUCTING DIGITAL ECOSYSTEMS TAILORED TO THE NEEDS OF LEGACY FIRMS

Digital ecosystems are networks of data generators and recipients. They are commonly seen in digital platforms such as Uber or Airbnb – as networks of drivers and riders, or homeowners and renters. The unprecedented value generated by their digital ecosystems is well recognized. Legacy firms, however, are not digital platforms. They do not operate like Uber and Airbnb. Yet they too can develop data-sharing networks that are tailored to their business needs. Their digital ecosystems are a combination of production and consumption ecosystems.

Production ecosystems are data-generating sharing networks within a firm's value chain or its produce-and-sell activities. These ecosystems initially emerged with advances in information technology (IT) that generated and shared data within value chains mostly to automate »

manual work processes. IT systems were clunky when they began. Different systems acted in silos, restricting network growth. Today, IT systems are more sophisticated. Enterprise Resource Planning (ERP) and cloud-based services, for example, digitally connect and streamline a myriad of value-chain activities to improve operational efficiencies.

Typo?

1. In addition, digital technologies such as sensors, IoT and AI, further enrich and expand the scope of modern production ecosystems. We see “lights out factories”, where machines interact with one another enabling plants to run for weeks with little human intervention. Such applications substantially improve operational efficiencies and save firms millions of dollars. But beyond operational efficiencies, modern production ecosystems also unlock the value of data by turning them into new streams of revenue.

Caterpillar’s production ecosystems track data on the wear and tear of their equipment, predict likely component failures, and offer predictive maintenance services for new revenue streams. GE’s production ecosystems in aircraft engines guide pilots to fly in ways that optimize fuel consumption. GE then shares the proceeds (of cost savings) with airline companies and generates new revenue streams beyond engine sales. R&D, product development, marketing, sales, and after-sales service units – when digitally connected to receive, analyze, generate, share, and react to sensor and IoT data – can deliver such value. The more widespread and intricate a firm’s sensor/IoT network across such units, the larger and richer its production ecosystems.

Unlike production ecosystems that are internal, networks within a firm’s value chain, consumption ecosystems are external networks associated with entities that complement the consumption of products. Most products have complements that enhance their demand. Cars, for instance, need roads, gas stations, and independent service providers that can conveniently fix a flat tire or adjust brakes. Light bulbs need sockets, wiring and electricity. In the traditional industrial world, these complements were rarely part of a legacy firm’s business model. But with sensors and IoT generating interactive data, that world has changed. Cars connect drivers with road conditions, locations of gas stations, and independent service providers in real-time, depending on specific needs. Light bulbs sensing motion can connect homeowners to security systems when detecting motion during times that the home is expected to be unoccupied. These are ecosystems that did not exist in the industrial world. They stem from a network of external entities that complement a product’s sensor data and enhance consumption experiences of a user. And as sensors and IoT proliferate across billions of assets, consumption ecosystems are getting progressively richer, opening ever more value-creating opportunities from data.

In some Ford models a driver can order Starbucks coffee through Alexa. Through real-time location, weather and traffic data, the car predicts the precise time that Starbucks should expect the driver, ensuring prompt availability for a drink pick-up (without waiting in line). In the meantime, Ford’s MyPass app automatically completes the purchase through a connected bank. Retailers like Starbucks, Alexa, and banks, complement

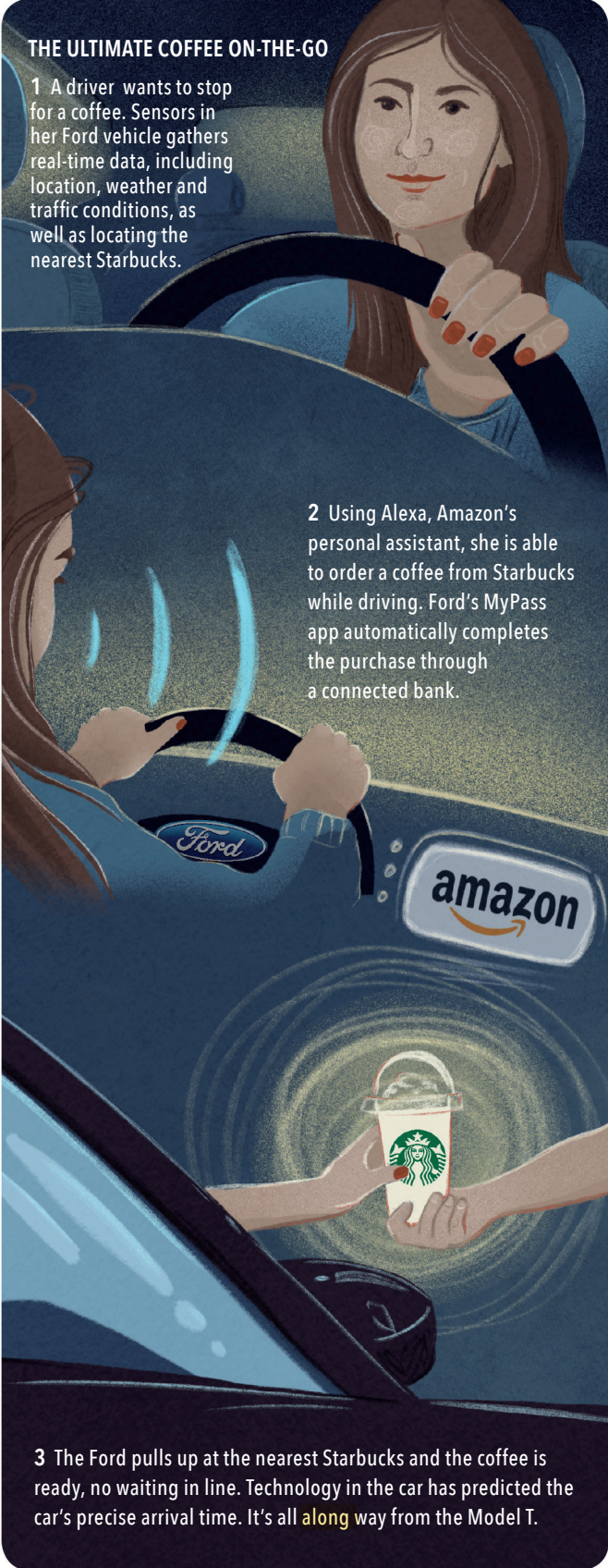


Illustration: Theresa Schwietzer

a long way

the interactive data generated by sensors in the cars (such as real-time location), and form Ford’s consumption ecosystem. This ecosystem expands further when more retailers (in addition to Starbucks) or more assets (such as parking lots) become available to digitally complement its sensor data.

‘All legacy firms cannot expect to operate as a Facebook or a Google. Yet they too can harness the newfound power of data and digital ecosystems through technologies such as sensors, Internet of things and artificial intelligence’

Unlike the entities in its value chain, a firm does not directly control this network. Also, to participate in these consumption ecosystems, legacy firms must extend their value chains into digital platforms that facilitate exchanges among different connected external entities. Ford’s auto, for example, acts as a platform facilitating exchanges between Alexa, Starbucks, banks, and the driver to deliver new value. For many legacy firms, these are new and unfamiliar ecosystems. Their business models are not designed to track the networks in which their products are consumed, nor are they used to running digital platforms. Yet, they cannot be overlooked, as they offer exciting avenues to generate new value and expand consumer experiences.

INPUT 3: RE-THINKING COMPETITIVE STRATEGY IN A WORLD OF DATA AND DIGITAL ECOSYSTEMS

Harnessing new value-creating opportunities generated by data and digital ecosystems is the new goal of a modern competitive strategy. Crafting such a strategy needs a revamp of old premises and assumptions. This does not mean that a legacy firm’s traditional strengths in products, value chains and industry structures are no longer relevant. Far from it. What a re-think of competitive strategy entails is to find the most effective ways of using traditional strengths as foundations to build new digital strengths. The following five initiatives can shape such a transition. While this article provides a quick overview of these initiatives, more details can be found in my book, The Future of Competitive Strategy: Unleashing the Power of Data and Digital Ecosystems (MIT Press).

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- 1. Use data to expand revenue generation:** In the traditional world, data supports products, helping them maximize revenues and profits. In the new world, this role is reversed. Products support data by becoming conduits to generate new user-interaction data. And this data can drive additional revenue streams beyond those generated by products. Adopting sensor-equipped products and establishing fresh revenue streams from interactive data is an important new thrust for competitive strategy.
- 2. Use digital ecosystems to expand business scope:** Legacy firms have always used value chains to shape their value propositions. How

they source, manage operations, conduct R&D, or market their products, determine their business scope. Modern competitive strategy requires using the traditional strengths of their value chains, yet transforming them into rich production ecosystems to generate fresh data-driven services. Wherever appropriate, value chains must also extend into digital platforms to harness new value from emerging consumption ecosystems. These strategic initiatives will expand a legacy firm’s business scope beyond what their traditional value chains offered.

3. Use customers as sources of interactive data: Customers do not merely buy products. They can also provide interactive data. Such customers are digital customers. Converting regular customers to digital customers is an important strategic task that legacy firms must undertake. It entails convincing regular customers of the value of new sensor-equipped products and the fresh customer experiences their interactive data can provide. These are new marketing priorities for the digital world.

4. Recognize new digital competitors: Most legacy firms consider their competitors to be those who offer similar products. In the digital world, competitors are also those who possess similar data. These are digital competitors. If a light bulb company, say, enters the security systems business using sensor-based motion data, it must reckon that there are several other contenders that have access to the same kind of data – such as cameras, furniture, or even Google Home and Alexa. Competing in this world requires changing old conceptions of competitors and learning new ways to compete.

5. Build barriers to competition through network effects: Legacy firms have long relied on scale economies to build barriers to entry. Toyota, Boeing and Exxon-Mobile for example, derive formidable strengths from scale economies. The explosive power of data, however, comes from network effects. Facebook, Spotify or TikTok derive their power from network effects, where the value for any one user increases when there are other users. As legacy firms enter the world of data and digital ecosystems, they must learn how to harness the power of network effects from their sensor-equipped products and their data-driven services.

None of these initiatives is easy. But to thrive in the new digital world, legacy firms must adopt these new principles. This is the future of competitive strategy. And it has already arrived. ■

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