Using data by design

Digital Reinvention in electronics

IBM Institute for Business Value

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Powering next-gen electronics companies

The global electronics industry is the cornerstone of the digital economy and the Internet of Things (IoT). Electronic devices act as conduits for users' digital experiences, which are now seamlessly enabled and updated in the cloud. The industry's digital device success has also introduced its latest challenge: going beyond the device. Leveraging data to drive insights is key to delivering greater value. Doing so requires electronics firms to flawlessly integrate hardware, software, services and data while learning from and adapting to users. Through Digital Reinvention™, they can combine digital approaches and data by design to drive new capabilities, changing business from the ground up.

The dialogue of digital data

It's well known that electronics have transformed the way humans interact, make and buy things, deliver medical care, bank and entertain themselves. A vast majority of today's communications and interactions leverage electronics. Increasingly, most of these interactions are digital, enabling virtually every industry to create new, engaging approaches to customer and user experience.

Miniaturization and mobility dramatically changed the world's perception of what a single-handheld device could do. Then, hardware devices became software centric, allowing more capabilities to be digitally accessible. Finally, software-as-a-service brought even greater potential, delivered at the touch of a button and rapidly executed in the cloud. Across industries, companies big and small had the potential for interactions that were at once digital, data rich and dialogue driven (see Figure 1).

While electronics manufacturers pursue relentless reinvention for the marketplace, they must do the same for their organizations or risk the same marginalization as cameras and desktop computers: The digital camera market fell from 148 million units sold in 2011 to 49 million units in 2016.[1] In 2017, PC sales fell below 63 million for the first time in a decade.[2]

A pervasive and exponential growth in network and computing power has contributed to a dramatic decrease in the cost of storing data. And today cloud computing delivers increased processing speed and functionality. These technology forces enable next-generation approaches such as IoT and artificial intelligence (AI) to put powerful insights in consumers' hands, on countertops and in plant machinery. Intelligent machines – small and large – are reshaping the world and its capabilities.

Electronics executives say

that dramatic external forces will impact their business in the next two to three years: 76% cite market factors while 73% cite technology

72% of electronics companies

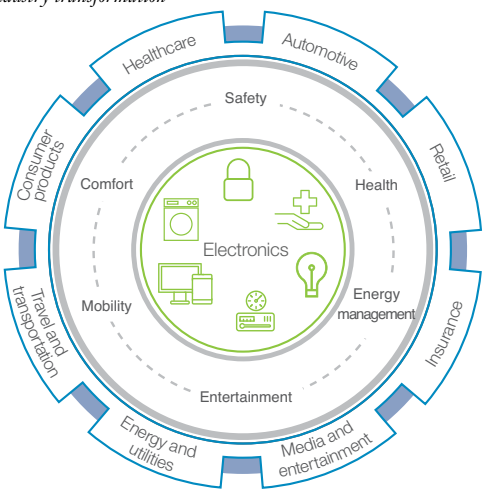
tell us the boundaries between industries are blurring

41% of electronics companies

are launching or modifying new business models in the next two to three years to respond, compared to 17% that did so in the past two to three years[4]

Figure 1

Electronics are central to industry transformation



Source: IBM Institute for Business Value analysis.

However, the sheer volume of data has made it hard to separate signal from noise, hindering the discovery of insights and innovation. Complicating matters, extracting the optimum value from data needs to occur in "real time" as data is increasingly perishable. Indeed, some data has a freshness date: Knowing customers' purchase intent while they're shopping or detecting a faulty part before something goes wrong enables timely decisions and action.

So, technology provides the opportunity for organizations to derive more value from data, but electronics executives report that their ability to capitalize on it remains elusive.[3] It's time for electronics firms to go beyond devices, software or technology and reinvent themselves.

The impact of convergence: Fuzzy boundaries

Innovative products that enable new experiences provide opportunities for new business models. With some electronics firms realizing massive growth over the past 40 years, the innovators have successfully entered multiple adjacent or even distant industries, building new relationships and ecosystems. For example, many semiconductor and microprocessor companies have venture capital arms watching the market and assisting fledgling entrants. Qualcomm Ventures has investments in more than 120 portfolio companies along the electronics continuum, with particularly strong focus in virtual reality, IoT, drones, automotive, cloud and mobile health.[5] And with Samsung Bioepis, Samsung has entered pharmaceuticals, advancing an extensive pipeline of biosimilar candidates through process innovation.[6]

Simultaneously, the last two decades have seen extraordinary growth of media industry super-platform providers with data-rich beachheads in advertising or commerce. During this decade, they began providing new services and offerings. By providing consumers free content-rich connected platforms, these providers can amass more customer data in days than some electronics firms could collect in a year. They also put it to novel uses, answering questions and solving problems across their companies. Then, they decided to go further.

Multiple digital platform and software players have become electronics manufacturers and content providers. Amazon, Google, Facebook and Microsoft have all joined Apple in producing devices and offering content.[7] What's more, they're continuing to push the boundaries of interactions, with voice and gesture recognition, and augmented reality/virtual reality features. These companies are extending their brand ethos, with electronics powering their interactions. They have never taken their eyes off the data and business models that drive their knowledge and fund their operations. In fact, they've continuously pushed forward in designing superlative experiences.

Building a partner ecosystem with industry leaders

Samsung Mobile worked with partners to expand and optimize the B2B experience for the Galaxy Tab Active2, including integration of asset management and work management capabilities. These new capabilities allow users untethered integrated views of their industrial environments. With built-in durability and industrial applications including AI-enabled equipment inspection and maintenance, the Galaxy Tab Active2 offers an easier and more efficient experience for field workers, while delivering next-gen mobility.

The executive vice president of Samsung Electronics' Global Mobile B2B Team explains, "We strategically worked to build a wider partner ecosystem for extended functionality through collaborations with leading industry players, such as IBM, ecom Instruments, Gamber-Johnson, RAM Mounts, iKey, OtterBox and KOAMTAC."[9]

Electronics industry executives are acutely aware of these changes. We recently surveyed more than 400 global electronics executives about changing economic conditions and found that approximately three-quarters of them believe external market factors as well as technology will dramatically influence their businesses in the next 24 to 36 months. Additionally, 72 percent told us that the boundaries between electronics and other industries are blurring. Similarly, 73 percent believe that the industry is experiencing the impact of incumbents delivering new forms of innovation. So, it's not a surprise that 41 percent are innovating or launching new business models to respond – up from just 17 percent in the prior two to three years.[8]

While threats and new entrants are reshaping existing markets, new services and business models offer opportunities for expansion. Digital innovators are identifying these opportunities in traditional and emerging electronics markets, where they successfully blend equipment, software, services and content into powerful packages (see sidebar: *Building a partner ecosystem with industry leaders*).

In addition, some industry executives are embracing new categories and routes to market. For example, Panasonic spent the last decade moving away from consumer electronics and closer to B2B and B2B2C markets, becoming the exclusive battery cell supplier for Tesla's Model 3 and reinventing itself as a provider of advanced auto parts.[10] The company is also creating next-generation LCD displays – not for use in television sets but for medical and business display applications.[11] Without the pressure on lower-margin consumer products, the company can pursue longer-term goals around its autonomous driving system launch in 2022.[12] The Panasonic story is indicative of a new operating environment that is becoming essential to electronics leaders' long-term success.

Forging a new paradigm

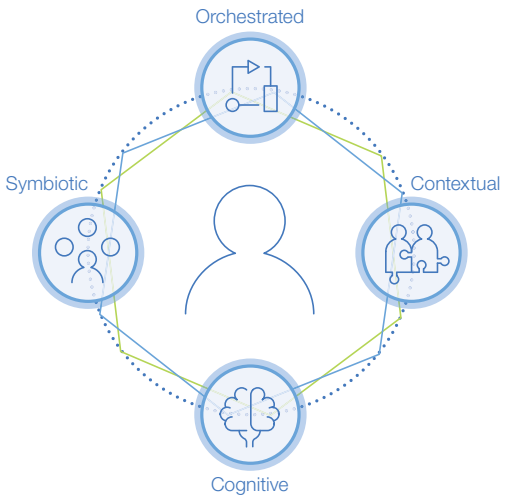
If electronics provided a gateway to the digital economy, IoT sensors have made everything a data point. IoT capabilities enable tracking and traceability, support remote decisions and enable better services management. Cognitive electronics lead the way with sensors to – in essence – hear, see, taste, smell, touch and intuit. Devices indeed have become agents among cross-industry use cases.

Mobility solutions, edge computing and IoT provide the basis for real-time engagement and responsiveness. Drones provide affordable, scalable ways to monitor, analyze, track, deliver and retrieve in ways that were unimaginable only a few years ago. And robotics – whether in process automation or physical presence – promise to fundamentally change the way all types of business and economic activities occur.

All of these electronics enable and support what we refer to as the everyone-to-everyone (E2E) economy. The E2E economy has four distinct elements: It is orchestrated, based on business ecosystems that are both collaborative and seamless. It is contextual, in that customer and partner experiences are calibrated and relevant to their specific actions and needs. It is symbiotic, in that everyone and everything, including customers and businesses, are mutually dependent. And it is cognitive, characterized by AI-enabled self-supported learning and predictive capabilities (see Figure 2).

Figure 2

Elements of the E2E economy



Source: IBM Institute for Business Value analysis.

Defining Digital Reinvention

Digital transformation involves integrating digitized data across the enterprise and combining externally available data in the cloud. Some early examples of transformed digital functions include customer relationship management (CRM) and human resources solutions in the cloud. At the same time, omni-channel experiences across devices and integrated into retail or media also took hold. Now, the E2E economy is addressing supply chains, procurement

and enterprise resource planning (ERP), providing a single view of customers, breaking down product and departmental silos, and delivering cross-channel consistency with digital transformation.

Digital Reinvention goes further. It involves a reimagining of how business is done. By design, it centers on outcomes rather than inputs and starts with the future rather than the present or past. It helps electronics businesses reconceive how and with whom they operate and how they engage with their environment. And it helps them better understand the imperatives of their consumers, customers and business partners – which helps them anticipate rather than respond to needs. Shifting away from a product-centered focus to an experience-centered one is key (see Figure 3).

Figure 3

From digitization to digital transformation to Digital Reinvention

Source: IBM Institute for Business Value analysis.

In electronics, the seeds for Digital Reinvention were sown in the transition from hardware to software supported by apps and cloud services. Expanding functionality without needing to change out hardware made it much easier to incorporate improved feature sets. It also allowed much better data collection, with each click, button push or interaction. Interactive software experiences yield tons of data about the experience, the interaction path and its success, the user and the location – all telling a story. IoT extended this further, allowing sensors to provide more in-the-moment data.

The digital advantage

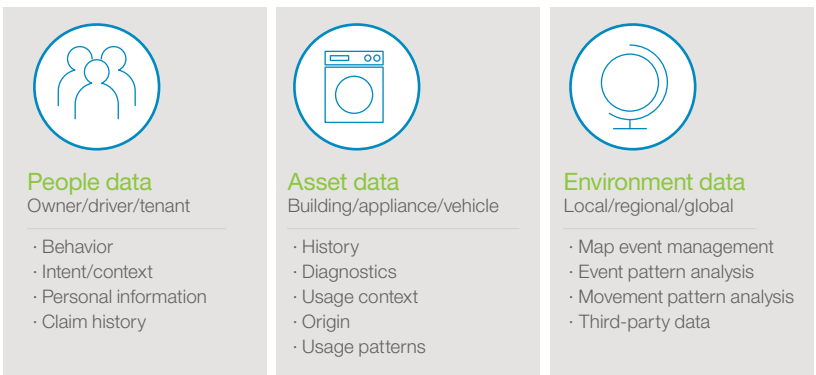
Digitally reinvented electronics organizations pursue new approaches to products, processes and ecosystem participation. They design products with attention toward the types of information they need to collect to design the right customer experiences.

This includes many different types of data from multiple sources inside and outside the company (see Figure 4). Digitally reinvented companies harness insights from their own user, transaction and behavior data. They also leverage data that exists in the market at large, like news, weather, events, maps or even recipes. They focus on increasingly important IoT and sensory data, along with content including video and images. And they look to a significantly broader array of ecosystem partners for data sharing and insight development.

For instance, if a manufacturer's engineers wanted to understand the impact of heat or friction in a production line, the company could add sensors to measure those areas. If a company wanted to understand how various electronic billboards performed and the size of the audiences they might reach, satellite imagery could assist. Engineers could use that data to determine how bright bulbs should be, address text or image readability, or match messaging to nearby public transportation.

Figure 4

Data for Digital Reinvention comes from virtually everywhere



Source: IBM Institute for Business Value analysis.

Finally, digitally reinvented electronics firms use platforms and tools for AI to mine data at scale, bringing new data combinations for insights to unlock value. Using novel data integrations and analytics can shine a bright light on traditional electronics process disciplines. Even manufacturing execution systems, ERP, and supervisory control and data acquisition systems are increasingly more digital, automated and intelligent. And new technologies like robotic process automation (RPA) allow fluid changes organized around transactional learning to increase smarter decision making within organizations and across partners (see page 9 sidebar: *Employing RPA to reinvent business processes*).

As business ecosystems continue to evolve, they will yield substantially more fuzzy boundaries and greater sharing among providers, vendors and ecosystems. Digitization will help make data more consumable for systems and organizations to leverage for smarter decision making. Data can help organizations:

- Achieve personalization based on deep insights about users and environments
- Proactively anticipate needs and act on them
- Provide a consistent user experience across various form factors.

Digital data capture, usage and interactions enable the potential for significantly improved efficiency, capability, interoperability and growth. As testament to every piece of data contributing value, consider the simple chatbot. Chatbots are digital agents that harness the value of data captured and use it to improve interactions rapidly. They can help improve customer service, act as a direct-to-customer channel and improve IoT-driven service.

A digitally reinvented future

Continued innovation will further expand the use of connected devices across industries. Advanced analytics will continue to yield new insights that shape new strategies, while AI technologies will underpin and overlay electronics products and the overall industry. Product development will also become much more highly engineered around the desired data to collect for each individual user. New digital business models and services capabilities will emerge and expand, transitioning from capital expenditure to operating expenditure models, with data-driven insight at their core. This is likely to extend electronics into new territory, continuing disruptions and disintermediating even current devices and machinery.

Employing RPA to reinvent business processes

Automation Anywhere's robotic process automation (RPA) platform automates repetitive tasks, helping knowledge workers decrease time spent copying and entering data across disjointed systems, filling out forms and re-entering content that could easily be passed system to system. By collaborating with an ecosystem partner, Automation Anywhere extended its bot framework across a wide assortment of business and operational processes and reduced the level of investment needed to automate a process while maintaining total visibility of the process. This means customers can introduce software bots into critical business processes, regardless of any new or heritage systems. By working with ecosystem partners, Automation Anywhere helps clients integrate multiple elements – including people, systems and bots – into seamless processes in the cloud or on-premises systems.[13]

Sensors track medication use

Proteus Digital Health has developed an FDA-approved drug sensor system for monitoring medication adherence. Using tiny ingestible sensors inside drug tablets and a sensor patch worn on the body, the system sends information to a mobile app when a pill is swallowed.[15] If the system is a success, Proteus could significantly benefit from a medical sensor market predicted to grow 8.5 percent a year and reach USD 15 billion by 2022.[16]

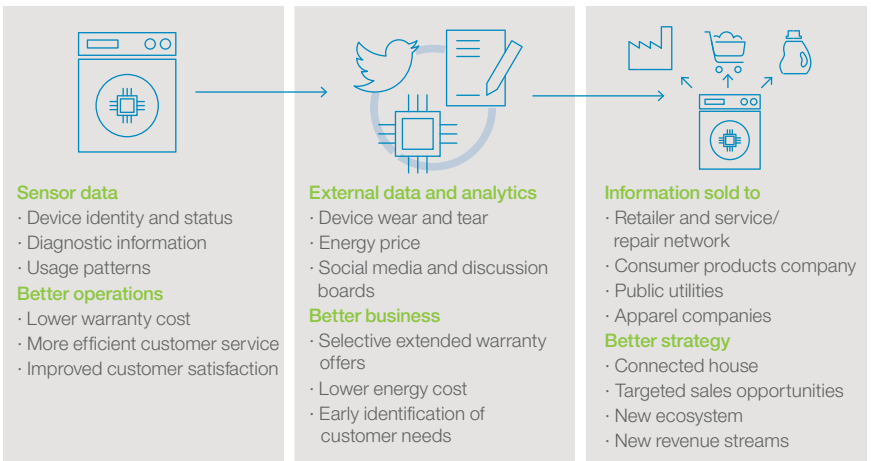
Because electronics firms are at the core of many industries and developing ecosystems, Digital Reinvention could drive additional disruption across industries. For instance, digital technologies are already revolutionizing healthcare – impacting medical devices, health records and even medications (see sidebar: *Sensors track medication use*). Similarly, connected aircraft, electronic boarding passes, smart phones and watches, and biometric travel tokens are redefining the travel sector.[14]

In energy and utilities, smart metering infrastructure, connected homes and edge computing are driving new operational efficiencies and capabilities.[17] Telematics, wearables, IoT, drones and connected homes are creating new business models around user-based property and casualty insurance.[18] And drones, interactive signage, digital billboards and omni-channel contextual shopping are redefining retail.[19]

The common thread among these innovations is the electronics industry and the devices it creates. The industry must continue evolving from a traditional product-centric orientation to a more expansive, holistic and systemic business ecosystems perspective (see Figure 5). Ecosystem-expansive approaches leverage partners in simple – yet mutually beneficial – ways. The interdependent relationships should result in transparent, clear, beneficial and relevant interactions. As part of their Digital Reinvention, electronics firms can leverage analytics and AI to help create new interactions, anticipate needs and engage in customer-desired ways across the entire ecosystem.

Figure 5

Embracing expansive ecosystems



Source: IBM Institute for Business Value and Electronics Industry analysis.

Figure 6

Digital Reinvention is founded on new experiences

Source: IBM Institute for Business Value analysis.

Readying for reinvention

To enable successful Digital Reinvention both for customers and themselves, electronics businesses need to pursue a new strategic focus, build new expertise and establish new ways of working (see Figure 6). In addition, Digital Reinvention requires a self-funding approach to safeguard innovation, as well as a commitment to continually build digital proficiency.

Pursue new focus

Electronics businesses and their ecosystem partners should continue developing new compelling experiences and move toward building shared data platforms and monetizing new value opportunities. Collaborative partnerships can bring together assets that address new marketspaces or better serve customers in easy-to-purchase, easy-to-deliver ways (see page 13 sidebar: *Cisco embraces collaboration to enhance security offerings*). Initiatives might spawn new business models; offer new forms of financing; or encourage deeper, more resonant customer interactions, which can lead to improved net promoter scores.

Build new expertise

Electronics firms must continue digitizing processes, functions and activities across the enterprise. At the same time, they need to monitor and understand digitization in the industries they service. It is one thing to incrementally improve existing devices with new versions and marginally improved capabilities. It is another to conceive, design and develop fundamentally new devices, products or services. In addition, electronics companies should strive to create deep, AI-enabled contextual capabilities that allow ecosystem users greater access and more shared capabilities.

Establish new ways of working

Electronics industry leaders need to identify, assemble and retain the talent necessary to create and sustain highly digital organizations. Recognizing this, 62 percent of electronics executives cited people skills as an important external force that will impact their business in the next few years.[21] Even larger percentages cited market factors along with technology forces, which also point toward new ways of working. Digital Reinvention requires innovation across the ecosystem and within the enterprise, where an innovation-infused culture will inevitably incorporate design thinking, agile working and fearless experimentation (see page 14 sidebar: *Arrow Electronics and Indiegogo – fostering IoT innovation*).

Adopt a self-funding approach

To protect and expand innovation and new capabilities, electronics businesses need to conceive, develop and deploy new technologies quickly and in ways that are scalable and sustainable. Earnings from past successes might be identified and channeled to fund additional future investments, which in turn should drive further innovation and growth in what can become a virtuous cycle.

Cisco embraces collaboration to enhance security offerings

An organization is only as safe as its weakest part. One vulnerable area is shared networks, where access can be hard to control. Recognizing that traditional approaches to curb security breaches were insufficient, Cisco joined forces with IBM to create best-of-breed security offerings. A built-in AI-driven security operations platform helps customers secure their organizations more effectively from the network to the endpoint to the cloud. Ecosystem collaboration enabled the companies to more rapidly offer solutions to address the growing threat of cybercrime.[20]

Arrow Electronics and Indiegogo – fostering IoT innovation

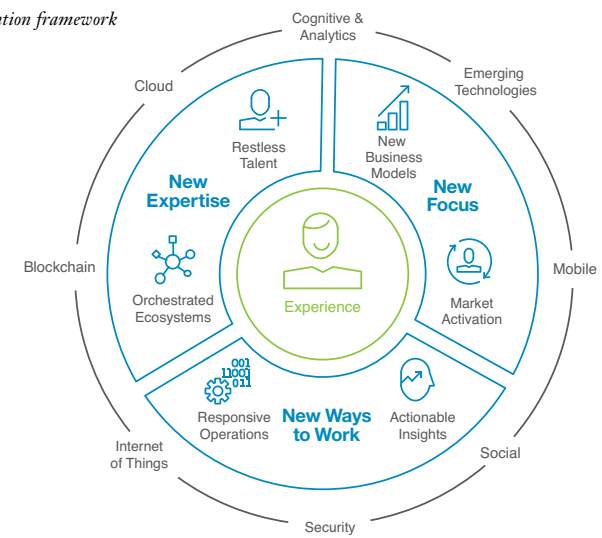
Arrow Electronics and Indiegogo are reinventing the way new IoT products and services are created. Crowdfunding platform Indiegogo has teamed up with Arrow Electronics, a global technology company, to foster innovation for technology and IoT entrepreneurs.[22] Qualified campaigns using the Indiegogo funding platform have no-charge access to IoT and design platforms for an unlimited amount of time. This includes more than 160 cloud services to incorporate ready-to-use capabilities, such as AI, blockchain, advanced data analytics and cyber security. In addition, qualified startups have access to a global network of technical and industry expertise, education, mentoring, and enterprise customers and business partners, all of which can help bring innovative IoT products to market quickly.[23]

Embrace digital drivers

To survive and thrive, electronics businesses must remain digital leaders. Platforms and ecosystems are becoming fundamental and breaking down traditional market and industry definitions. Digital Reinvention creates a pathway for an experience-first planning approach, employing the strengths of the organization, as well as its customers and ecosystem partners (see Figure 7). Detecting innovative ways to deliver value is at the heart of embracing digital drivers. Clearly, emerging technologies and evolving customer experiences point toward the prospect of digital innovation yet to be mined.

Figure 7

Digital Reinvention framework



Source: IBM Institute for Business Value analysis.

Digital deep dive

To accelerate Digital Reinvention, electronics industry leaders can take four initial steps: Envision possibilities, create pilots, deepen capabilities and orchestrate ecosystems.

Step 1: Envision possibilities
Conduct envisioning sessions for consumers, customers, partners and employees based on design thinking to produce a definitive reinvention blueprint. For example, through deep conversations and in-depth marketing analysis, develop a better understanding of needs, aspirations and desires; brainstorm new ideas to enhance engagement; and visualize unexpected customer scenarios. Incorporate external stakeholders, including customers, into these sessions to encourage thinking that goes beyond business-as-usual.

Step 2: Create pilots
Develop prototypes using agile development, test them with customers and get them to market quickly to promote feedback and iteration. Establish communities of interest to create safe environments to beta test innovations, and incorporate them as a central part of design and development processes.

For more information

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Step 3: Deepen capabilities

Augment digital capabilities with strategic initiatives, and continue to build and deploy necessary applications aligned to the target Digital Reinvention operating model, platform and ecosystem strategy. As pilots evolve, impediments around development will emerge, highlighting limitations in existing capabilities. Adopt a continuous, iterative strategy to address limitations by building new or extending existing capabilities.

Step 4: Orchestrate ecosystems

Embrace a strategy based on holistic reinvention rather than a series of point solutions, maintaining a clear focus on deep needs, aspirations and desires of customers, clients, partners and others. Focus on ecosystems to expand and align a broader set of capabilities and to help create and deliver on customer promises.

Key questions

- How can you make your digital strategy more ambitious to face market changes head on?
- How do you make your organization more agile and proactive to better address unexpected challenges and opportunities?
- How can you identify the best ecosystem partners to extend and amplify devices, software, insights and skills across the marketplace and into market adjacencies?
- How can your organization's leaders become more visionary so they can anticipate what customers want before they know it themselves?

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