IBM and SAP in the High-Tech Industry
Harnessing the Power of Digital Reinvention and Cognitive Computing
## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Reinvention Is Disrupting Industries</td>
<td>5</td>
</tr>
<tr>
<td>Reimagining the Industry</td>
<td>9</td>
</tr>
<tr>
<td>Connected Products</td>
<td>15</td>
</tr>
<tr>
<td>Leveraging the Ecosystem</td>
<td>19</td>
</tr>
<tr>
<td>Reinventing the Core</td>
<td>23</td>
</tr>
<tr>
<td>Harnessing the Power of Cognitive Computing</td>
<td>27</td>
</tr>
<tr>
<td>Use Cases and Solutions</td>
<td>31</td>
</tr>
<tr>
<td>Starting Your Journey</td>
<td>33</td>
</tr>
<tr>
<td>Contact Us</td>
<td>35</td>
</tr>
</tbody>
</table>
Digital Reinvention Is Disrupting Industries
Technology changes everything

To say we live in a world powered by a digital economy is an understatement. Digital reinvention has not just revolutionized how we communicate. It is also creating exciting new opportunities and enabling organizations to harness the massive amounts of data that are now available to them.

High-tech companies are in the thick of it. They are not just consuming and embracing advances in mobility, cloud computing, analytics, machine learning, augmented reality, cognitive computing, and the Internet of Things (IoT). They are also driving the development of the devices and data on which digital interactions take place.

But that doesn’t mean high-tech companies are immune to the changes that are occurring. Boundaries between industries continue to blur. Software companies are getting into hardware, OEMs are developing semiconductor technologies, and semiconductor companies are enhancing their products with more software. Leaders are emerging quickly and often from unexpected sources. New business models are being born out of innovatively applying digital technology.

In this situation, where the opportunity is huge but new market entrants are threatening, it is essential to focus digital reinvention on the right strategic priorities.
In our work with leading companies across the globe, we see four strategic priorities:

- **Subscribing to outcomes** – shifting from selling products and services to selling measurable results that are relevant to customers

- **Realizing a digital supply chain** – developing a data-driven, collaborative supply chain that accommodates volatile customer demand and heightened expectations of responsiveness

- **Delivering intelligent products** – building intelligence into products that allows differentiation through new, data-driven services and context-driven offers

- **Achieving customer intimacy** – putting the experience of the end customer at the center of every decision. Addressing what the customer really wants to do, not just the features and functions that can be built and the services that are offered

In this e-book, IBM and SAP set out a joint vision on the art of the possible and how it can help high-tech companies power new solutions by driving new business value across the entire value chain and ecosystem.

### An Industry in Transformation

Key trends that are reshaping the high-tech industry:

- Industry convergence as software and sensors make everything “technically enabled”
- Disruptive technologies and the increasing interconnectivity of “things”
- Emerging markets, such as India and Africa, that are digital first
- New revenue models as companies shift from products to capabilities
- New insights from the ability to collect and analyze massive amounts of data
- Instant availability of products and services that become more personal and intelligent with use

#### 72%

Of electronics CxOs are looking at developing new revenue models as opposed to 57% of CxOs in other industries

**Source:** “Redefining Boundaries - Insights for the Global C-Suite Study: Electronics Industry,” IBM Institute for Business Value, 2016.

#### 70%

Of all high-tech revenue will be directly related to other industries adopting the digital economy by 2020

**Source:** IDC Directions Conference Presentation, March 2015.
High tech is not only an industry in its own right; it is also at the heart of every other industry. However, with product lifecycles and the window to recapture investment shrinking, companies must consider how to stay at the top of their game and continue to provide the offerings that power the world. The answer is by reimagining themselves in two key areas: business models and business processes.

**Reimagining business models**
The digital economy offers significant opportunities for high-tech companies to adopt new business models. These include:
- Creating relationships with individual users
- Building learning devices and experiences that are powered by cognitive computing
- Monetizing the data and insights generated by the Internet of Things
- Selling specific business outcomes instead of products
- Developing ecosystems and partners that extend reach, brand presence, and customer understanding

In order for these business models to be successful, companies will need to reinvent their entire value chain. This includes how and what they sell, how their supply chain works, and how they manufacture, service, and report on the assets and insights they develop, share with, and manage for clients.

**High-tech value chain**
![High-tech value chain diagram]

In addition, these business models will call for the development of a dynamic ecosystem of interconnected suppliers, value-added resellers, and trading partners. Key to the success of this will be the ability to deliver rich data, insights, contributions, and interactions that benefit the customer.

**Reimagining business processes**
High-tech companies can use digital reinvention to reimagine processes in three key areas – product development, operations (supply chain and manufacturing), and customer interaction (marketing and sales).
Digital reinvention can be used to change fundamentally the way new products are developed and launched. In the digital world, new ideas, product use information, and new requirements from customers can be continuously captured and fed back to research and development (R&D). Digital tools can be used to design and prototype test iterations rapidly to foster a “fail fast and fail cheap” approach. Companies can move toward delivering a “lot size of one.”

To respond rapidly to global demand changes while balancing service and delivery costs requires existing supply chains to be transformed into demand-driven networks with demand-driven business planning. Key to this will be the ability to provide vital business information across the network, make use of real-time data analysis, and improve collaboration among all participants.

Of outperforming supply chain executives surveyed said cognitive computing will transform their demand planning and forecasting capabilities


Learn more

Discover the cognitive supply chain, where digital operations are reimagined.

Download the report

Explore how cognitive manufacturing is activating the next generation of production.

Read the research

Find out how to build stronger relationships with customers by engaging them at every touch point on their journey.

Visit the Web site
Connected devices, connected manufacturing equipment, and cognitive computing offer the opportunity to rethink the manufacturing process to make it seamless and bring to it unprecedented intelligence. The process must connect the lab to the shop floor, and the shop floor to the customer.

A cognitive application for visual inspection identifies problems by matching patterns to images of defects that have been previously analyzed, which can boost productivity significantly. So, too, can cognitive maintenance, which analyzes data from connected equipment in conjunction with existing service knowledge to improve equipment reliability.

57% Of electronics companies have either adopted or are piloting artificial intelligence or cognitive computing


However, increased productivity is only part of the story. Integrated and connected manufacturing provides the alerts and feedback loops that turn insights into action across the organization. With a seamless flow of data all the way from product development to postsales service and back to research and development, cognitive capabilities help companies optimize manufacturing. They can accelerate the supply chain, streamline distribution, and enhance next-generation products and experiences.

In addition, the move to digital services will generate new revenue models, such as usage-based pricing and entitlement models and subscriptions. As a result, processes for configuring, pricing, quoting, and billing will need to be adapted to ensure it is easy for customers to use and consume the services.

For example, imagine a medical equipment manufacturer who wants to move from selling products to selling imaging services. In the new business model, the organization would need new processes for managing the availability, functionality, and performance of its equipment, as well as interaction with customers – for managing service tickets, for example. In addition, the payment model would be very different, perhaps based on a combination of a fixed monthly fee, the number of images produced, and the quantities of consumables used.
Connected Products
Driving new value-generating opportunities

Connected products enable high-tech companies to get closer to their customers. Engineering and marketing functions can gain firsthand knowledge about exactly how products are being used, which functions are being over utilized or underutilized, and whether the customer experience is agreeable or not. They can also be informed when products are broken.

This knowledge can then be used to determine which products, product features, and services are developed and adopted, allowing companies to achieve rapid time to market with intuitive, relevant, tailor-made offerings.

Combined with social networking, open-source hardware and software, 3D printing, and crowd-sourced development funding, connected products are digitally reorienting organizations towards collaborative, global, and transparent development processes.

It shouldn’t be forgotten that the data and insights gained from smart, connected products can fundamentally change relationships with customers and give rise to new business processes and models. The data and insights gained can be used to:

• Educate users – track the production process with a real-time manufacturing dashboard, for example
• Delight users – ship needed parts and proactively schedule service to prevent unnecessary downtime on a manufacturing line
• Improve experiences – enable a phone to act as a building entry badge that can call a lift on demand, for example

Cybersecurity
As products become more software driven, they are more open to cyberattacks. And, as the Internet of Things grows, there are more opportunities for attackers to exploit any weak points in the network.

Two recent studies on data and security give the high-tech industry reason to consider IoT security and the potential for data breaches more seriously. Both studies point to a high likelihood of material data breaches, where nearly half of the breaches are of malicious intent. The studies also show that organizations have not yet figured out who owns IoT testing or its execution. That often leads to a lack of adequate accountability, which most executives would consider a risk too large to take.

Questions organizations need to ask today include:

• Who owns the responsibility for IoT device security?
• Are all of an organization’s apps and device interactions tested appropriately?
• What is the testing process and how good is it at preventing data leakage?
• How can security be balanced with end-use convenience to provide protection and ease?
Driving New Value

Intelligent connected products offer new opportunities for companies to:

- Understand and respond to customers seamlessly
- Develop more relevant offerings
- Accelerate time to market
- Deliver better user experiences

Learn more

Discover the SAP® Leonardo system, which has all the latest technologies and services in one intelligent system.

Visit the Web site

Take a look at the trends driving the industry in this IBM point of view.

Read this SAP Security Point of View document.

Find out how electronics companies are using new technology to reinvent warranty management.

Read the report

Check out “2017 Study on Mobile and IoT Application Security,” a report from Ponemon Institute LLC.

View it now

Understand more about how to prevent security risks.

Visit the IBM Web page

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Leveraging the Ecosystem
Delivering end-to-end value creation

High-tech companies do not exist in isolation. They belong to an ecosystem that includes suppliers, value-adding resellers, and trading partners. This is not new. What is new is the opportunity to collaborate and share data like never before, driven by digital reinvention.

For example, take a device manufacturer’s ecosystem. It involves a globally sourced, diverse range of component and raw materials suppliers, manufacturers, assemblers, wholesalers, retailers, and consumable suppliers. The final product – and ultimately the sense of ownership – depends on all partners working to their optimum capability.

Clearly a problem that is caused in any one area can materially impact the owner’s experience. Creating a platform that connects a traceable supply chain, production assets, finished products, and Big Data analytics would enable fast feedback loops to be developed that provide information rapidly to all partners and improve the product experience.

For example, parametric data could be collected, fed back through the ecosystem, and used to adjust the manufacturing process to compensate for deviations, which would improve the quality and yield of the end product. This is just one way an ecosystem can add more value for customers.

Companies that successfully take advantage of their ecosystems:
- **Change their organizational mindset** by identifying and exploiting pockets of potential value creation while leveraging capabilities and synergies across the ecosystem. Leading organizations stay ahead by continuously testing the possibilities of value creation in entirely different ways.
- **Build the right connections** by understanding their capabilities and how to realize synergies with ecosystem partners. Effective partnering improves the ability to share and transact across platforms. It allows partners to attract, develop, and scale. And it fosters the flow of value-making connections across producers, contributors, and consumers.
• Make their organization more agile by evolving with their ecosystems and changing their roles as circumstances dictate. This requires new technology that acts as a platform and has the scale and flexibility to empower dynamic new business models and consumer interactions across participants.

• Build a more open culture that allows companies to share information more freely and, as a result, derive greater value from the ecosystem.

69%

Of global CEOs rate ecosystems as the most impactful business trend


Learn more

Discover how a digital supply chain can meet rising customer expectations with faster-than-fast responsiveness.

Ecosystems exist because participants can deliver more value acting together than acting alone.
Reinventing the Core
 Adopting a digital business framework

To transform their businesses successfully, high-tech companies need an IT architecture that provides both stability and long-term reliability for the core enterprise processes. At the same time, the architecture must provide the flexibility to change and include new functionality as the business environment evolves.

This concept, often referred to as “bimodal IT,” is brought to life through the SAP Digital Transformation Framework methodology. It helps customers create an end-to-end digital enterprise architecture that:

- Allows core transactions and analytics to run consistently and uninterrupted
- Connects seamlessly with solutions that support workforce engagement, supplier collaboration, the customer experience, and assets within the company and supply chain

The framework allows companies to work smarter, faster, and simpler by connecting transactions with powerful cognitive analytics. Advanced in-memory computing technology allows companies to run the business live, in real time. As a result, total cost of ownership is reduced significantly, which frees up funds for additional infrastructure investments.

SAP Digital Transformation Framework helps companies eliminate poorly integrated value chain systems operating on disparate data sets. High-tech companies can run more simply by leveraging one version of the truth across the entire company.

Accessing solutions to run core business processes has to be simple. With SAP solutions, high-tech companies can choose to deploy on premise, in the cloud, or a hybrid of the two. At the same time, the satisfying user experience the solutions deliver is key to gaining acceptance for digital change, as it helps drive user adoption, engagement, and productivity.
SAP Cloud Platform
At the heart of SAP solutions is SAP Cloud Platform, which enables companies to accelerate digital transformation across the business—all without the requirement of maintaining or investing in on-premise infrastructure.

By covering all high-tech processes, the platform allows companies to:
• Extend existing cloud and on-premise applications and maximize their value by quickly adding new functionality
• Integrate cloud and on-premise applications to eliminate data silos and make digital access simple, secure, and scalable
• Build and run brand-new cloud applications rapidly to solve new problems, engage new customers, and drive new revenue

Learn more
Find out how three discrete manufacturers are using SAP S/4HANA® to sharpen their competitive edge.

Watch the video

Discover the value a digital core can bring to your business.

Read the overview
Harnessing the Power of Cognitive Computing
Systems that understand, reason, and learn

As the Internet of Things expands, it is generating massive amounts of data. The problem is that the sheer volume of information generated is so vast that we no longer have the ability to use it productively.

Cognitive systems change this dynamic. They extend the base levels of artificial intelligence and machine learning. They incorporate better signal and sensory (speech, auditory, vision) processing with deep learning, reasoning, and natural language processing. They change human-computer interaction and provide dialog and narrative generation. They present humans with the ability to extend their expertise by gleaning knowledge from the vast amount of information available to us.

The high-tech industry has been using algorithms and artificial intelligence to its advantage for decades. Cognitive systems represent the next evolution in harnessing data and technology to make better decisions and take informed action. Cognitive systems go beyond the chatbot and voice command, enabling us to understand deeply complex problems in areas like regulatory compliance, critical-parts management, and equipment repair diagnosis.

These systems help forge a new relationship between man and machine. And they have three capabilities that differentiate them from traditionally programmed computing systems.

Understanding
Cognitive systems have the ability to navigate the complexities of human speech by understanding idiosyncrasies and colloquialisms and knowing the ways we express ourselves to one another. They can also put the content they receive into context.

Reasoning
There are very few times when we, as humans, are presented with useful information without having to infer from the data what we need to meet our objectives. In doing so, we are reasoning with a purpose – often generating a hypothesis and then proving the theory. This is something cognitive systems can also do.
Learning

Cognitive systems are fundamentally different from traditional computational computers, which are hard coded with rules and logic that follows a decision-tree format. Cognitive systems get progressively smarter with each outcome, action, iteration, and new piece of information. Together, these three capabilities enable cognitive systems to understand massive amounts of data – structured and unstructured, text-based, and sensory – from inside and outside the organization, in context and meaning, at astonishing speeds. Cognitive systems enable us to view the world differently. We can answer new questions because we can now find the answers, with both the systems and the humans who interact with them continuously learning.

Cognitive Procurement

Operating as part of a global strategic alliance, SAP and IBM are working on cognitive procurement solutions that will redefine the source-to-settle process. The two companies will use the SAP® Leonardo system, IBM Watson, and SAP Ariba® solutions to bring intelligence to procurement data. The solutions will deliver predictive insights from unstructured data that will improve decision making across supplier management, contracts, and sourcing activities.

Watch the joint presentation by IBM and SAP at the SAPPHIRE NOW® conference.

Learn More

Discover how cognitive procurement can help companies make better decisions in this thought-provoking Ardent Partners report.

Find out how cognitive computing and connected manufacturing can help companies on their transformation journey.
Use Cases and Solutions
Digital reinvention and cognitive computing for the high-tech industry

The combination of IBM cognitive computing and SAP technology provides high-tech companies with a huge opportunity to reimagine how their business operates and develop an agile organization and IT environment that can adapt to changing business conditions. Here are just some of the applications that are available.

**Visual Inspection for SAP Software**
Harness cognitive capabilities to identify defects in parts, components, and products by matching patterns to images of defects that were previously analyzed and classified. The solution interfaces with back-end SAP software to handle the quality issues and initiate maintenance work orders.

*Learn more*

**Distributed Manufacturing**
Capitalize on direct manufacturing to meet changing customer demands, streamline supply chains, and speed time to market. The SAP Distributed Manufacturing application helps you achieve these goals by connecting supply chain solutions from SAP with the 3D printing capabilities of a global manufacturing and logistics partner network.

*Learn more*

**Cognitive Maintenance Management**
Access data from connected equipment and products and analyze it in conjunction with existing service knowledge and other sources of relevant external data. Tap the data to understand how to improve equipment quality, uptime, service time, and the overall service experience.

*Learn more*

**IoT for Uptime**
Analyze sensor data throughout a plant and use trade-off analytics to determine the best course of action.

*Learn more*

**Smart Materials Planning**
Leverage machine learning algorithms to correct errors in master data before they have an impact on the bottom line.

*Learn more*
How can your business begin its digital and cognitive journey? Here are seven steps you can take to unleash the power of SAP solutions and IBM’s cognitive technologies.

**Use design thinking with the user experience in mind**
Strategies and designs must be structured around the user experience, not the technology or the software’s capabilities. Design thinking focuses on building experiences that customers embrace.

**Develop a digital approach that leads to cognitive strategy**
Look at your products, services, processes, and operations, and determine which should be digital. Create assets across your organization that let you build information you can easily share digitally and use for future learning.

**Define your data strategy**
Determine which data you need for your operations, where to get it, and the data you need to own and protect as you protect your intellectual property today. Data is the lifeblood of digital systems. Capturing it today allows you to learn from it tomorrow.

**Extend analytics with cognitive computing**
Understand how an analytics competency can be upgraded to cognitive capabilities. Start by defining use cases where cognitive systems can dramatically enhance the baseline of the analytics and machine learning approaches already in place.

**Move to a cognitive cloud**
Make sure your business can get everything possible out of your cloud services, your data, and your cognitive applications.

**Build a cognitive infrastructure**
Your cognitive-enabled business requires an IT infrastructure designed for cognitive workloads. Your infrastructure must be able to handle the data and analytics required by cognitive solutions.

**Adopt security for a cognitive business**
When everything is connected, everything is vulnerable. Make sure everything you do, every bit of data, and every transaction is secure.
Learn More

View IBM’s leading security immune system, which uses leading solutions that work together across your ecosystem. Watch the video

Find out more about the alliance between IBM and SAP. Visit the Web site

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SAP Consulting Services from IBM
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Authors and Contributors

IBM
Matthieu A. van Bilsen: bilsen@nl.ibm.com
Rami Ahola: rami.ahola@fi.ibm.com
Cristene Gonzalez-Wertz: cristeneg@us.ibm.com

SAP
Jeff Howell: jeff.howell@sap.com
Thomas Pohl: th.pohl@sap.com
Joerg Kaufmann: joerg.kaufmann@sap.com
Ulf Petzel: ulf.petzel@sap.com

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