



# Navigating the cloud continuum

*Electronics companies implement hybrid to deliver innovation*

## Executive Report

Electronics

### How IBM can help

The electronics market is undergoing profound change. Armed with data collected from their ecosystems and customers, new competitors are manufacturing products and services with enhanced capabilities. What makes this possible? Hybrid cloud solutions can collect and integrate data from internal and external sources and can improve insight into operations to help achieve distinct advantage. IBM delivers cloud-driven and data-based solutions that can dramatically reshape industries into fluid and forward-focused innovation engines. For more information, visit [ibm.com/electronics](https://ibm.com/electronics) and [ibm.com/cloud-computing](https://ibm.com/cloud-computing).

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## *Positioning your organization for success with cloud computing*

*With the rise in cloud adoption, electronics companies are broadening from an operational mindset to an innovation orientation. Hybrid cloud is the driving force behind this transition, providing new use cases that empower business reinvention. As electronics CIOs and business executives negotiate their company's unique position in the cloud continuum, they are using key criteria to identify compelling use cases for hybrid cloud adoption that can generate business innovation and value.*

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## The span of the cloud continuum

Interest in cloud computing has skyrocketed across the electronics industry. In a recent IBM Institute for Business Value (IBV) report, 89 percent of electronics firms surveyed say they have implemented or are piloting cloud implementations.<sup>1</sup> In another IBV study, 71 percent of the most digitally advanced electronics companies plan continued cloud investment.<sup>2</sup>

In the electronics industry, cloud adoption initially occurred at opposite ends of the cloud continuum (see Figure 1).

- On one end, *private clouds* focused on mission-critical and intellectual property areas “behind the firewall,” including traditional IT applications, and manufacturing and design. Within a private cloud, data could be used quickly and conveniently and was perceived to be more secure.
- At the other end, *public cloud* adoption – driven by the Internet of Things (IoT) and customer demand – facilitated connected ecosystems. Public clouds enabled the integration of supplier, distributor and sensor data into more connected products and services.
- Across the center of the spectrum is a full range of *hybrid cloud* solutions that allow organizations to combine the benefits of public and private clouds in ways that are suitable for each particular enterprise.



**89 percent of electronics firms** surveyed say they have implemented or are piloting cloud implementations<sup>3</sup>



**44 percent of electronics executives** surveyed cite alignment with strategic business goals as a top criterion in deciding which workloads to move to the cloud<sup>4</sup>

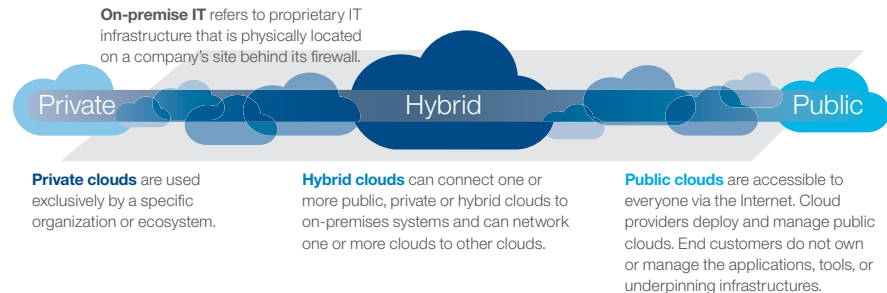


**54 percent of senior electronics executives** surveyed report they expect hybrid cloud to “facilitate innovation” in their organizations<sup>5</sup>

Early successes with public and private clouds led electronics executives to seek more fluid, productive and insight-rich ways to work across the continuum of both cloud approaches. As a result, emerging hybrid cloud adoption is business-focused, offering new use cases that reach across the ecosystem to achieve business transformation. Organizations are examining use cases for improvements across the portfolio, from developing new operating models, to driving new efficiencies and reducing operating risk. These use cases are helping to create new revenue streams and transform customer relationships.

To help electronics executives navigate their place in the cloud continuum and lead the charge to innovation, this report reveals the attributes that identify compelling use cases for hybrid cloud adoption, pinpoints eight specific areas where these solutions are particularly impactful and offers specific recommendations for getting started.

**Figure 1**  
*The cloud continuum*



Source: IBM Institute for Business Value.

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## Incoming clouds

In the early days of cloud computing, most conversations started with an IT benefits approach, such as increasing systems productivity and uptime. Resulting private cloud solutions typically addressed infrastructure, data and applications management, IT help desk and application development/DevOps, while maintaining strict control over security and compliance. This IT-centric focus significantly reduced the cost of infrastructure and appealed “to enterprises looking to extend their legacy infrastructure and applications to the cloud while helping to optimize past investments.”<sup>6</sup>

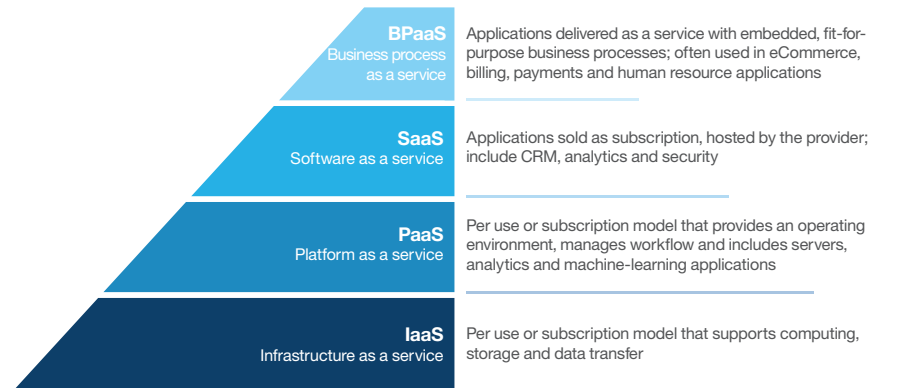
These private cloud implementations soon proved necessary, but not sufficient to meet the needs of the business. Enter public cloud services (see Figure 2). Public cloud adoption accelerated after initial concerns about security and privacy seemed to be overstated. By 2016, over half of electronics executives did not include security requirements in their top five challenges to their organizations’ cloud adoption.<sup>7</sup>

As a result, private cloud implementations were increasingly complemented by public cloud services that could enhance customer service, communicate more efficiently with distributors or improve access to external sources of business intelligence. Other business workloads are also migrating to the public cloud. In early 2017, public cloud human resources adoption was forecast to reach 33 percent and CRM adoption to reach 47 percent by the first half of 2018.<sup>8</sup>

But this “blocking and tackling” – that is, focusing on the basic requirements – approach to cloud management ignored the potential of hybrid cloud to transform businesses. Electronics cloud leaders began combining private and public clouds to move beyond technological agility to drive business innovation. Their success proliferated the idea of employing hybrid clouds for enterprise transformation.

**Figure 2**

*The public cloud computing stack*



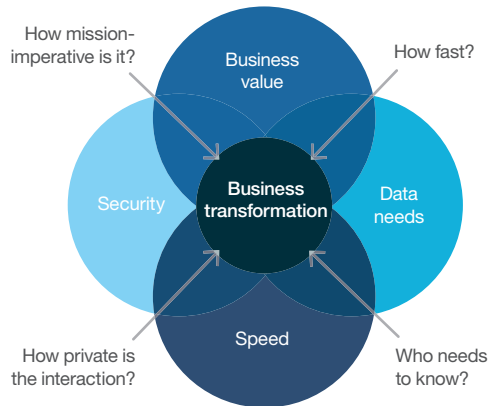
*Source: IBM Institute for Business Value.*

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Electronics enterprises are adopting hybrid cloud to extend customer value propositions and innovate company and industry ecosystems. In 2016, 20 percent of electronics executives reported they expected hybrid cloud adoption to grow their organizations by reaching new customers, 22 percent anticipated accelerating creation of new business models and 40 percent expected to enter new markets.<sup>9</sup> Over half of all surveyed electronics executives expected hybrid cloud to “facilitate innovation” in their organizations.<sup>10</sup>

In the future, electronics companies can use hybrid cloud to spark new business innovation by incorporating emerging technologies, such as artificial intelligence (AI) and the IoT. According to Gartner, “endpoints of the IoT will grow at a 33% CAGR from 2015 through 2020, reaching an installed base of 20.4 billion units, with almost two-thirds of them consumer applications.”<sup>11</sup> Using hybrid cloud as a technology convergence platform that combines IoT data and cognitive computing is necessary to generate deep insights quickly enough to boost competitive position. This is the future for electronics companies – applying hybrid cloud to new use cases that can deliver enhanced business value.

**Figure 3**  
Deciding cloudability



Source: IBM Institute for Business Value.

## “Cloudable” criteria

To gain competitive advantage from a unique blend of public and private cloud solutions, executives first need to determine which business processes are cloudable – that is, which functions can and should move to the cloud to achieve business transformation. But which attributes should be used to identify and prioritize workloads?

For electronics firms, four key criteria can help executives define cloudable use cases that culminate in business transformation: business value, data needs, speed and security (see Figure 3).

*Business value* addresses the use case’s ability to support specific business objectives and strategies. Forty-four percent of electronics executives cite alignment with strategic business goals as a top-five criterion in deciding which workloads to move to the cloud.<sup>12</sup> For example, hybrid cloud use cases can enhance operational efficiency, expand collaboration with customers and business partners, and expedite new products and services. Business value drives rapid response to evolving customer demands, while simultaneously cutting development time and safeguarding the company’s intellectual property.

*Data needs* center on the type, frequency, quality and accessibility of information. Each cloudable use case evaluates its dependency on data to facilitate business transformation. Hybrid cloud use cases can combine public and private data in novel ways. Consider the ability to redirect parts or finished goods based on weather patterns or customer demand. Combining publicly available weather information with supply chain data can substantially improve customer satisfaction while reducing the extent of lost and damaged merchandise. CIOs and business executives must work together to carefully define the right data sets that can achieve enterprise transformation.



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*Speed* is mission-critical to electronics organizations, whether they are responding to a customer inquiry or addressing a problem on a manufacturing line. Forty-two percent of electronics executives identified timing/speed to market as one of their top five criteria in deciding which workloads should be moved to the cloud.<sup>13</sup> Each use case must be evaluated to determine whether a hybrid cloud implementation can deliver new operational services and customer experiences fast enough to meet market demand.

Consider a faulty compressor in a refrigerator. With IoT data and predictive analytics, it is possible to detect that the compressor is failing. It's also possible to see if a technician is nearby to provide service that avoids a breakdown. While the timeliness in responding to failing parts is clearly important in enhancing customer satisfaction, preventing defective items from leaving their manufacturing lines could avoid costly customer service calls altogether. By using sensors that complete quality inspections during manufacturing processes, faulty components may not be installed in customers' homes in the first place. Incorporating edge computing (see sidebar, "What is edge computing?") into hybrid cloud implementations that can act quickly on perishable data sets can confer competitive advantage to their adopters.

### **What is edge computing?**

Edge computing processes data at the network's edge, near the data's source to increase its actionability. It can decrease latency and bandwidth demands between IoT sensors and clouds by performing analytics and sharing priority information (when warranted). Doing so can avoid unwanted outcomes, such as catastrophic failures in parts, plant machinery and mobile applications.

### The CIO's changing role

With a heightened business focus on cloud-enabled use cases, CIOs find their roles are expanding. These days, the term “CIO” has two meanings: Chief Information Officer and Chief Innovation Officer. In fact, CIOs have a greater sense of urgency than other C-suite executives to transform their roles.<sup>16</sup> It is no longer enough to discuss the needs of the business with internal executives. Today's CIOs must also be responsive to the needs of ecosystem partners – including suppliers, distributors and manufacturing partners – as well as customers. By 2020, 69 percent of electronics CIOs expect “becoming a digital platform for the enterprise ecosystem” to be one of their core responsibilities.<sup>17</sup> By helping to determine a company's place in the cloud continuum, the CIO can provide a platform essential to business transformation.

In another break from tradition, CIOs are looking more often to partner externally for business innovation. This strategy can speed the incorporation of emerging technologies into new cloudable use cases, energizing organizations to leap ahead of the competition.<sup>18</sup>

*Security* is essential in the public and private cloud continuum. Ninety-six percent of electronics executives state that sufficient security is at least moderately required for their organizations to successfully deliver value from cloud adoption.<sup>14</sup> As billions of IoT devices become accessible to hybrid clouds, electronics organizations must determine a fundamental balance between data access and privacy. Use cases must thoughtfully weigh business objectives with customer permissions to achieve innovation in ways acceptable to both.

These four criteria, in turn, lead to questions that each business use case must address:

- How fast does the answer need to be determined or action need to be taken?
- Which constituencies are impacted by implementation of this use case? Are they inside the enterprise or part of an established, trusted network?
- What types of information transfer are needed? How private do data interactions need to be?
- How mission-imperative is the use case? Is the use case of enough importance to mobilize the organization to change?

Together, these four attributes help define the ability of hybrid cloud use cases to deliver business transformation to the enterprise.

Gone are the days when the CIO could plan on using cloud merely for achieving infrastructure efficiencies. Over half of electronics executives cite their customers as a top influence on guiding enterprise cloud initiatives.<sup>15</sup> This new focus for hybrid cloud adoption profoundly changes the CIO's purview (see sidebar, “The CIO's changing role”).

## Hybrid cloud use cases in electronics

We identified eight hybrid cloud use cases that are particularly significant in fostering innovation in electronics firms (see Figure 4). To assess the dimensions of potential impact on enterprise transformation, we evaluated each case against the four cloudable criteria.

**Figure 4**

*Evaluating hybrid cloud use cases in electronics*

	Business value	Data needs	Speed	Security
Chatbots and virtual assistants				
Technical support and service				
Cognitive procurement				
Cognitive supply chain				
Factory safety				
Electronics design cloud				
Environmental compliance				
Optimized demand forecasting				

*Source: IBM Institute for Business Value analysis.*

**Chatbots and virtual assistants** on the cloud are rapidly becoming the standard for managing customer interactions. With their ability to quickly and accurately address customer needs, automated assistants are already transforming marketing and customer service. Due to advances in AI and natural language processing, customers soon may not know or care if they are chatting with a human. The ability of chatbots to collect data efficiently and interface with internal company processes, like analytics and research, can streamline gathering insights from customers and provide input for future product development.

**Technical support and service**, when delivered via hybrid cloud, allows technicians or engineers in the field to instantly access the information they need around the clock – whether it's user guides, training videos, product schematics, performance history or other data. This access helps a remote technician efficiently troubleshoot a problem, reducing the time it takes to accurately diagnose and repair it. The benefits to the business can be far-reaching, including a boost in customer satisfaction and enhanced employee retention.

**Cognitive procurement** leverages hybrid cloud and AI to reduce the cost of procuring parts, products and services. An intelligent cloud platform collects and analyzes pricing data from structured and unstructured sources. During the negotiation process, the cloud platform provides strategic and tactical decision support using benchmarking and analysis of supplier information, industry news, internal company inventory levels and purchase history. This information can reduce costs and improve the operating efficiency of the procurement function.

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**The cognitive supply chain** employs an intelligent cloud platform to track and manage asset movements throughout an entire ecosystem. Hybrid cloud, combined with AI, IoT sensor data and predictive analytics, can enhance production planning, inbound and outbound logistics and inventory management. If things go wrong – such as a supplier bankruptcy or a storm disrupting a shipment – the cognitive supply chain can recommend workaround solutions. Business advantages can include operational agility with real-time insights and immediate response capabilities, along with a boost in operational efficiency internally, and with partners, suppliers and distributors.

**The hybrid cloud use case for factory safety** combines worker biometrics, manufacturing process data and information about ambient conditions to help workers and management make the right decisions on the production floor. Data analysis from workers' wearable devices – such as those tracking temperature, heart rate, movement and location – integrated with data on work area conditions can provide insight for optimal productivity conditions. The analysis can also offer an alert mechanism to prevent accidents or convey critical instructions, and provide root cause analysis when something goes wrong. Cloud-enabled factory safety can heighten productivity and improve workplace safety, and provide auditable compliance with regulating agencies.

**The electronics design cloud** facilitates product designers from across an ecosystem to efficiently work together to design, develop and test new products. This cloud-enabled use case can improve design and development efficiencies for faster time to market, and spark innovation as designers build on each other's efforts. Designers can also leverage the electronics design cloud to work with marketing to test various form factor options that can heighten customer demand and improve sales.

**Hybrid cloud-enabled environmental compliance** gathers regulatory and compliance data across an entire supply chain to manage compliance with environmental statutes throughout an electronics firm's design, manufacturing and logistics processes. In an industry where 40 percent of C-suite executives expect regulatory concerns to be an important force impacting the enterprise in two to three years, this use case can reduce the risk of company liability.<sup>19</sup> It can also seamlessly interface with regulatory agencies to verify compliance, reducing operational distraction from production activities.

**Cloudable optimized demand forecasting** blends analysis of internally generated data sets, like sales patterns and marketing offers, with externally available data sets such as industry growth, profit margins, cost of capital, economic indicators and consumer sentiment. This analysis can optimize price and promotion decisions based on company objectives, such as market share, return on sales, revenue growth and gross profit. This capability is critical in the electronics industry, where 84 percent of C-suite executives characterized the ability to derive insights from analytics to make marketing decisions as "more important in the coming two to three years."<sup>20</sup> An optimized demand forecasting solution enabled by cloud can increase customer demand, extracting more effective monetization of customer relationships.

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## Charting your course

To foster business innovation, business executives and CIOs need to work together to implement hybrid cloud solutions (see Figure 5).

### 1. Identify your most beneficial use cases (start with Figure 4)

Given your organization's strategic objectives for business innovation, determine your cloudable evaluation criteria considering business value, data needs, speed and security. Scrutinize potential hybrid cloud use cases, including the eight presented in this report, with an eye to your potential place in the cloud continuum. Which business processes should be located on a public cloud? Which should remain private? What will be the role of hybrid cloud? What performance metrics will you use to evaluate each cloudable project's success? With this foundation, develop and prioritize a list of near-term and medium-range hybrid cloud use cases that best fit with your organization's competitive and financial goals.

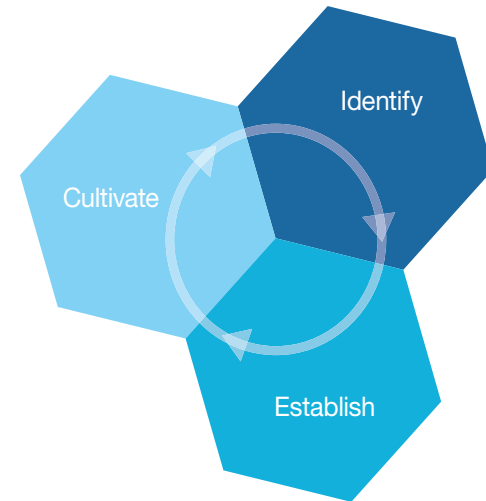
### 2. Establish cloud governance and accountability

To align your organization's adoption of hybrid cloud with your business strategy, pinpoint the key business and IT stakeholders of each cloudable use case. With these stakeholders, establish a cloud governance council that brings expert insight to the use cases you plan to implement in the near-term. As a first objective, the council can articulate your organization's holistic goals for hybrid cloud adoption based on your product, marketing and ecosystem strategies along with selected performance metrics and IT guidance that can measure progress and drive cross-enterprise success.

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**Figure 5**

*Plotting your course in the cloud continuum*



*Source: IBM Institute for Business Value.*

Then the real work begins. The council can sponsor a redesign of affected business processes to take better advantage of a more dynamic, cloud-enabled platform. Once necessary changes to business architecture are identified, the council can develop an integrated implementation plan that covers the green-lit use cases, their timelines, accountable business and IT executives and metrics that will determine each project's success. As each use case moves into the implementation phase, the council can be held accountable for progress made.

### **3. Cultivate a culture of continuous improvement through innovation**

As emerging technologies such as AI and IoT become relevant for your business, update your hybrid cloud strategy and use cases. Add skills in critical new technologies, such as analytics, blockchain, cognitive computing, virtualization and networking to bolster your company's ability to invent new cloud solutions. Update your cloud governance model, cloudable evaluation criteria and performance metrics to reflect your latest goals and hybrid cloud projects. Demonstrate the high value placed on innovation by broadcasting your cloud successes. Reach out to new ecosystem partners and include them in your hybrid cloud adoption plans to continually evolve your position in the cloud continuum.



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## Are you ready to innovate with hybrid cloud?

- Based on your overall transformation strategy, where should you position your company in the cloud continuum? What is your optimal mix of private, public and on-premise IT?
- What criteria will you choose to identify and prioritize your high-value cloudable use cases?
- How will your plans for leveraging emerging technologies, such as AI and IoT, impact your cloud adoption plans?
- What is the opportunity cost to your enterprise's competitive position if you don't adopt hybrid cloud?

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### IBM Institute for Business Value

The IBM Institute for Business Value (IBV), part of IBM Global Business Services, develops fact-based, strategic insights for senior business executives on critical public and private sector issues.

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