

The Internet of Things, Part II: Benefits, Drivers, and Impediments

by [Curt Hall](#), Senior Consultant, Cutter Consortium

In June through October of 2015, Cutter Consortium conducted a survey asking organizations worldwide about their thoughts and plans for the Internet of Things (IoT). In [Part I](#) of this *Executive Update* series, we covered survey findings pertaining to how organizations view the IoT in terms of importance, the possibility that the IoT will live up to all its hype as an industry disruptor, and the current and future status of corporate IoT budgets.¹

This *Update* examines survey findings pertaining to the following:

- Benefits and trends driving organizations to develop IoT-connected products, applications, and services
- How organizations use or plan to use IoT applications, devices, and data
- Primary issues viewed as impeding corporate IoT initiatives

Key Drivers Behind IoT Development

The two main drivers leading organizations to develop IoT-connected products and applications are enhanced customer service and opening up new business opportunities (see Figure 1). These are followed by several more distant reasons; however, in reality, these objectives are all somewhat interrelated.

¹ For information about survey methods used and demographics of survey respondents, refer to [Part I](#).

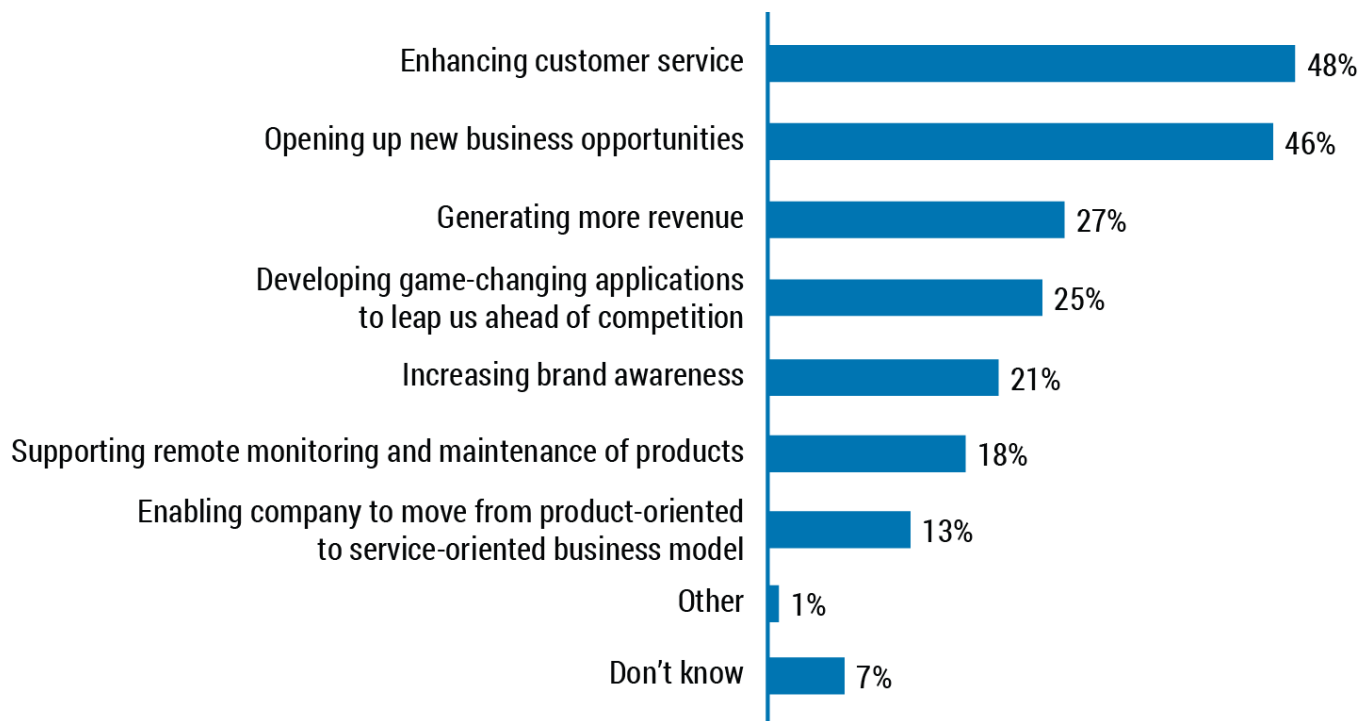


Figure 1 – What are the main reasons or goals influencing your organization’s decision to develop IoT applications and services?

Developing connected products and services offers several possible benefits. In large part, these are driven by the always-on connected nature of IoT applications, and by the fact that sensor-generated data, when analyzed, can be quite revealing in terms of the device itself, the way in which it is being used, and the person and/or organization using it.

Enhanced Customer Service

Companies can use information derived from monitoring and analyzing data from sensor-enabled connected products to provide their customers with enhanced services. Such services will allow customers to achieve greater efficiency with their investments. For example, connected products can automatically inform the customer and the manufacturer’s support center before they break down. This contributes to greater customer satisfaction because it results in less unforeseen downtime. It also enables the customer service department to transition from a reactive to a more predictive servicing model.

New Business Opportunities

Data generated by connected products, when combined with other data (e.g., customer profiles, mobile usage, and surveys), facilitates rich analyses that can offer insights for R&D and other initiatives. Companies can also use it to support new lines of revenue or entirely new business models.

For example, indications of high product usage by a customer can trigger an alert to the sales team, thus leading to up-sell/cross-sell opportunities (e.g., usage-based pricing or new SLAs). In particular, the use of location and frequency-of-use information generated by connected solutions will enable many companies to open up new partnerships with companies that they may not typically have considered as business partners in the past (e.g., airline, rental car, hotel, and other travel agencies).

More Direct Revenue Generation

Connected products can dramatically change a company's relationship with its customers. One of the most important ways it does so is by enabling the company to shift from a product-oriented to a service-oriented business model. For example, instead of merely selling static pieces of product to a customer on an as-needed basis, products equipped with GPS, Bluetooth, or cellular data allow a company to establish a continuous or near-continuous link with customers in the form of a (dynamic) subscription-based service. Such services help smooth out the revenue acquisition process via scheduled payments. Location-based services also generate rich customer data that companies can use for other purposes, including up-/cross-selling and for establishing additional revenue-generating partnerships with other businesses (as mentioned above).

Game-Changing Applications

Many companies will initially consider how connecting existing products could lead to enhanced relationships with their customers (i.e., turning one-off sale products into services); however, companies should also investigate how the development of new connected offerings could lead to game-changing applications that have the possibility of giving them a leg up on their competitors.

Increased Brand Awareness

Connected products offer several possibilities for increasing brand awareness. In particular, the direct, always-on link between the provider and the customer can serve to open up dynamic marketing opportunities, which can be based on different variables ranging from location to usage rates.

Remote Monitoring and Maintenance of Products

As alluded to above, sensor monitoring combined with user-defined rules makes it possible to define scenarios in which actions are automatically triggered based on the operating status of a product as well as end-user needs. Such two-way communication with products enables companies to initiate actions on remote devices, appliances, and machinery from enterprise applications (e.g., via the Salesforce Service Cloud), thereby helping to avoid unplanned, costly field-service visits.

As an example, sensor data analysis combined with condition-based management might reveal that a customer's device or machine is starting to experience difficulties (e.g., battery is discharging, fluids are being used at a faster rate). Through predictive maintenance a company could determine that, by reducing

the load levels processed by the machine by a certain rate, it could delay a failure by several days. This would enable the machine to maintain operation — albeit at a reduced rate — until the necessary repair parts arrive.

Use of IoT Applications, Devices, and Data

Much of the hype surrounding the IoT has focused on possible benefits offered to organizations from developing connected devices, products, and services targeted at customers. However, our findings indicate that the majority of organizations plan to use IoT technologies and practices for both customer-facing scenarios and internal business process optimization (see Figure 2).

Companies should look beyond customer-facing applications and investigate how IoT solutions could help optimize internal operations. One example would be considering how connected machines and mobile and wearable devices (e.g., smartglasses) on the factory floor could help reduce production line downtime and speed time to market for products or customer orders. Another example would be to determine how the analysis of data from such activities could assist with tactical and strategic planning, R&D efforts, and so on.

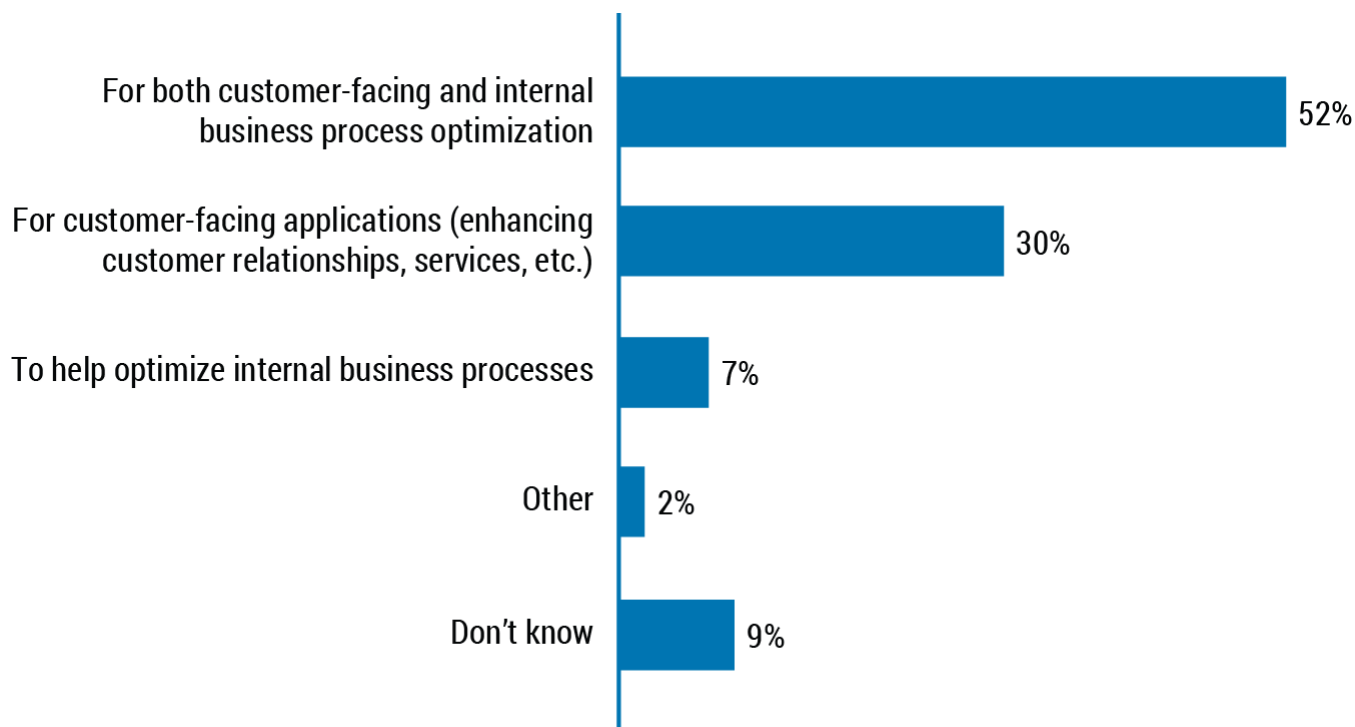


Figure 2 – How does your organization use or plan to use connected IoT applications, devices, and data?

Main Issues Impeding IoT Initiatives

Figure 3 shows the most significant issues organizations view as standing in the way of implementing their IoT plans and initiatives.

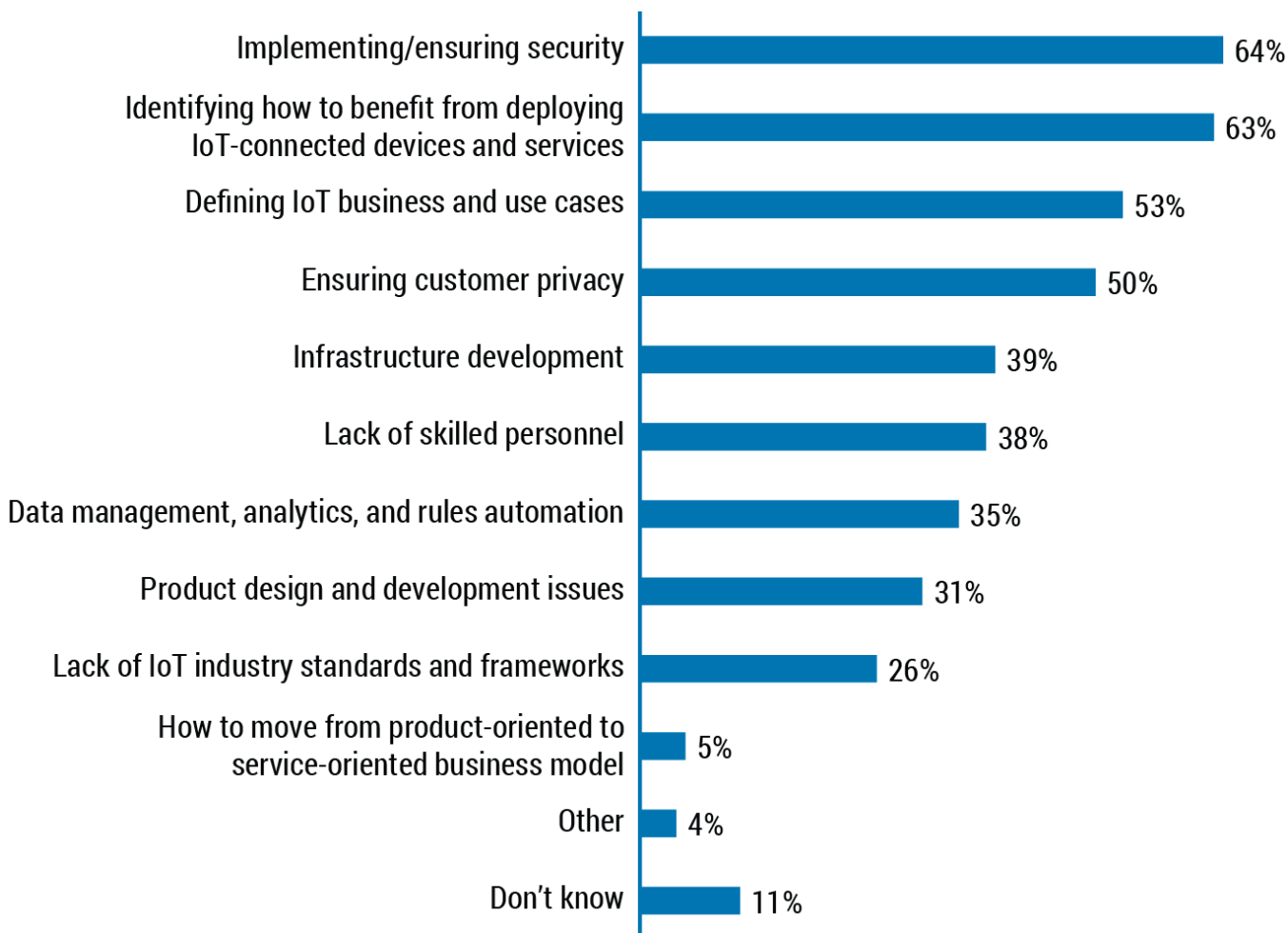


Figure 3 – What are the biggest issues you see concerning getting started with connected IoT applications and services?

Security

Security is paramount when it comes to IoT initiatives; the more objects a company connects, the more it opens itself up to possible attack. Frequent reports of attacks on a range of businesses and industrial facilities by security agencies like the NSA, and Chinese, Russian, and criminal hackers — with the intention of conducting commercial and industrial espionage — are forcing many organizations to think long and hard about the possibility of actually ensuring the security of IoT offerings and applications. This is evident in the answers to a follow-on question we asked organizations regarding whether or not they thought that

today's security technologies and practices could be successfully adapted to support IoT-connected solutions. As shown in Figure 4, the majority of those surveyed believe that the IoT requires some new form of security model and practices if it is to achieve widespread adoption by mainstream organizations.

These findings strongly suggest that vendors offering IoT-connected products and solutions — as well as those implementing them within their respective organizations — are going to have to get far more serious about security once they start marketing/deploying connected solutions. Security providers are also going to have to come up with new technologies and practices. This includes implementing better threat detection and prevention technologies and practices within the devices themselves and within the networks and platforms for managing them. Let's hope the new security offerings coming onto the market that are designed to apply machine learning (ML) and other big data analysis techniques to threat detection and prevention will help.

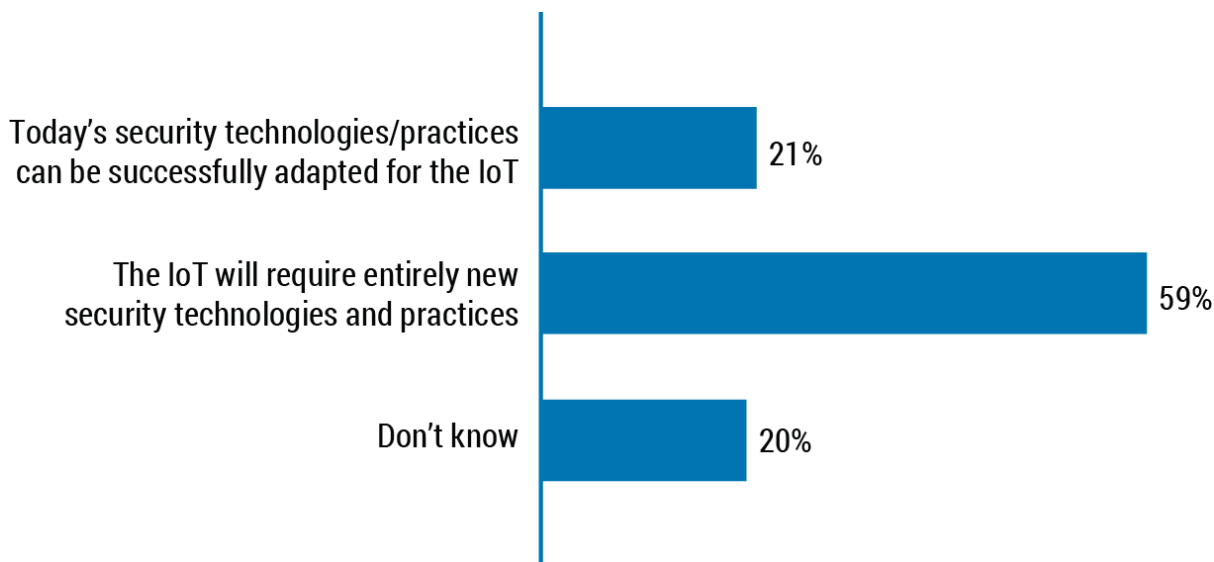


Figure 4 – Do you think that today's security technologies and practices can be successfully adapted to support the IoT, or do you think that the IoT will require entirely new security technologies and practices?

Identifying Potential Benefits

The fact that identifying potential benefits ranks so high among those issues seen as impeding organizations in their IoT efforts indicates that IoT proponents and solutions providers still have a lot of work to do when it comes to the need to educate organizations on what the IoT has to offer.

Defining IoT Business and Use Cases

Again, the fact that the issue of defining IoT business and use cases ranks so prominently among impediments to IoT efforts underscores the newness of the IoT concept. That said, things are on the

upswing, and we are now seeing standards groups like the Industrial Internet Consortium and others undertaking initiatives to define use cases and develop test beds for specific applications and industries.

Developing the business case that supports the development of the connected device can be tricky because it involves mapping out your product/service strategy and determining the specific goal(s) you hope to achieve with your connected product (e.g., directly generate more revenue, increase brand awareness, and enhance customer service/loyalty).

Ensuring Customer Privacy

Consumers and the media are increasingly raising the issue of privacy when it comes to the IoT, so it is understandable that many view privacy as a possible roadblock to IoT development. To avoid embarrassing and potentially costly surprises, organizations must carefully define their procedures for ensuring customer privacy when it comes to connected devices. This plan should include a determination of the technical capabilities required by the connected device to protect customer privacy, as well as a detailed analysis of how you plan to share customer data and insights with partners. Ideally, this should all be done at the time of the use case and business case stages. To wait is to invite trouble.

Infrastructure Development

I expected our findings to reveal greater concern among organizations when it comes to IoT infrastructure development. Perhaps this relative lack of concern is because organizations have several choices for implementing IoT infrastructure: they can build it inhouse or — even more appealing (and as is the trend) — they can use a cloud-based platform and service offered by commercial providers. (Part III will discuss survey findings pertaining to IoT infrastructure implementation trends.)

Lack of Skilled Personnel

Developing and supporting connected products typically requires companies to acquire new skills and new personnel. This includes those possessing an understanding of mobile and sensor technology development techniques as well as new skills for working with new types of data analysis (e.g., sensor data).

Data Management, Analytics, and Rules Automation

Achieving business value from all the data generated by connected solutions requires the use of big data storage and analysis technologies that can scale to meet the constantly increasing demands. Organizations will need to have experience with environments like Hadoop, NoSQL databases (DBs), streaming analytics, high-performance analytic DBs, and business rules platforms, among others.

Product Design and Development Issues

Probably the reason that product design/development issues rank fairly low on organizations' lists of potential IoT roadblocks is that many plan to seek outside help with connected product design and development. (Part III will discuss these issues further.)

Lack of IoT Industry Standards and Frameworks

As a follow on, we asked organizations to indicate the importance they give to the development of IoT industry-standard frameworks and practices (see Figure 5). Overall, 84% attach some degree of importance to the development of industry standards and practices when it comes to the IoT achieving widespread adoption by mainstream organizations. Just 11% do not attach much importance to the need for industry standards and practices when it comes to the future success of the IoT, believing that the IoT has sufficient momentum on its own to obtain widespread adoption.

These findings indicate overwhelming support among organizations for the development of industry standards when it comes to the greater adoption of IoT technologies and practices. Indeed, over half (53%) of those surveyed believe that standard frameworks and practices are crucial to the success of the IoT.

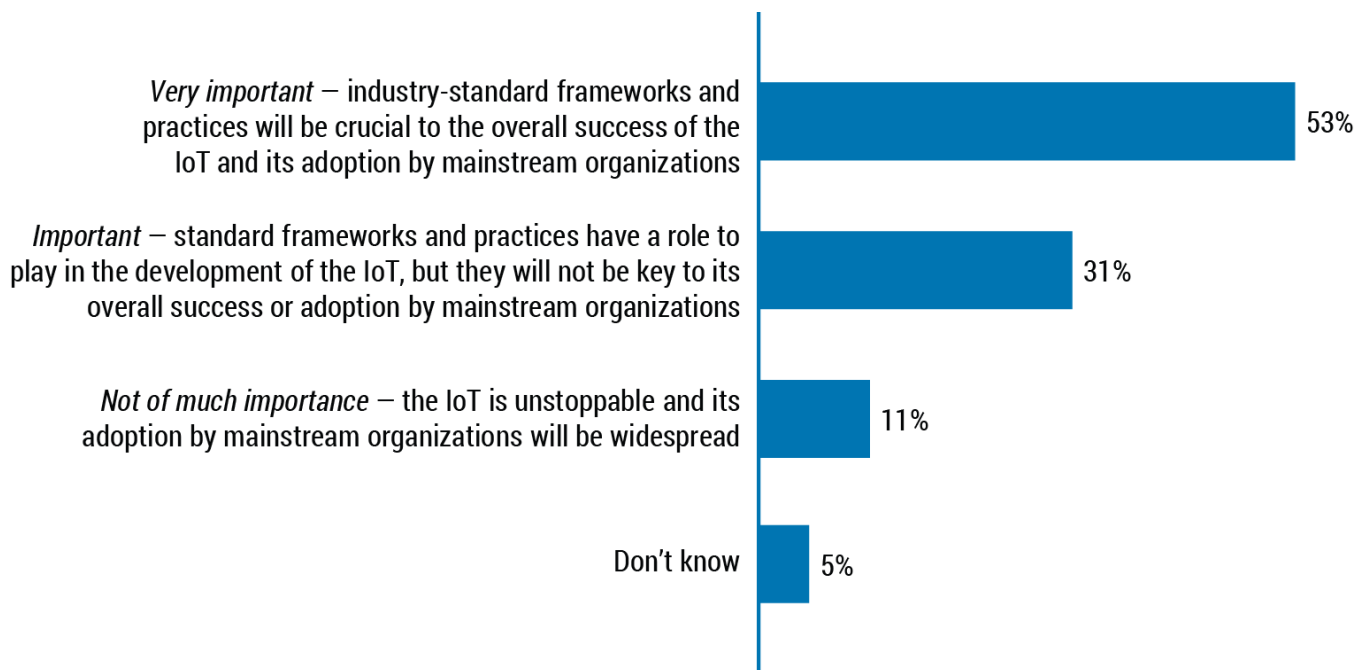


Figure 5 – What level of importance do you attach to the development of industry-standard frameworks and practices for supporting connectivity and interoperability between different vendors' IoT devices, machines, and services?

Moving from a Product-Oriented to Service-Oriented Business Model

Offering connected products can require a company to transform from a product-oriented business into a service-oriented business. It also tends to require the business to transition into a software and services provider. This is especially true should a company decide to offer mobile apps for customers to interface with their connected solutions, the likelihood of which is high due to the popularity of mobile apps among consumers and thus provides one of the most accepted forms of user interface for connected solutions.

Conclusion

Our research points to a number of findings pertaining to trends influencing organizations with their plans to develop IoT applications and connected products and services:

- **Main drivers for IoT development.** The two main drivers leading organizations to develop IoT-connected products and applications are enhanced customer service and opening up new business opportunities. These are followed by several more distant, but related, objectives, which include the possibility for new business opportunities and new lines of revenue; more direct revenue generation (via subscription services, dynamic pricing, etc.); the possibility of developing game-changing, industry-disrupting applications; increased brand awareness through dynamic marketing, and so on; and remote management/maintenance of products (e.g., predictive management, condition-based management).
- **Use of IoT applications, devices, and data.** The majority of organizations plan to use IoT technologies and practices for both customer-facing scenarios and internal business process optimization. Within 10 years, connected solutions will be widely utilized throughout the enterprise for both customer-facing and internal operations.
- **Main impediments to corporate IoT initiatives.** The biggest issues hindering organizations from their IoT plans and initiatives are (1) security threats, (2) difficulty with identifying potential benefits from deploying IoT practices, and (3) defining IoT business and use cases. The latter two issues will subside as organizations become better acquainted with IoT technologies and practices, and as more vendors and cloud providers introduce focused industry/application solutions. However, security is only going to become more troublesome as the IoT gains acceptance.

Part III of this *Update* series will focus on survey findings pertaining to the design and development of IoT applications and services, including trends with IoT infrastructure and data management and analysis platform implementation.

About the Author



Curt Hall is a Senior Consultant with Cutter Consortium's [Business & Enterprise Architecture](#) and [Data Analytics & Digital Technologies \(DA&DT\)](#) practices and editor of the weekly DA&DT Advisor. Mr. Hall's expertise includes BI, big data, business performance management, data warehousing, data mining and predictive analytics, text mining and analysis, and other analytic technologies and practices. He also focuses on the business application of social networking and other social media technologies, including social marketing and social media monitoring and analysis (i.e., "social CRM") as well as the use of smartphones and tablets in the enterprise (including for mobile BI and collaboration). Mr. Hall is coauthor with Paul Harmon of

Intelligent Software Systems Development: An IS Manager's Guide and a contributing author to James Martin and James Odell's Object-Oriented Methods: Pragmatic Considerations. Mr. Hall's work has appeared in various technical journals and IT publications. He can be reached at chall@cutter.com.