Executive Summary

Developing Connected Products and Services for the Internet of Things

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Implementing connected products and services can enable a company to extend and enhance its relationships with customers, streamline business processes, and create new lines of revenue and new business models. But although the possibilities appear dazzling, capitalizing on the Internet of Things (IoT) requires more than just slapping some sensors on existing products and watching the data stream in.

As we explore in the accompanying *Executive Report*, assembling the technologies and practices necessary to implement, deploy, and manage IoT applications represents a complex, multidisciplinary process. It begins with identifying the business and use cases and evolves to selecting the proper mix of components, connectivity, and development platforms for building the connected device. This is followed by implementing the supporting IoT operational infrastructure and data management systems, creating end-user and operational applications, and defining security and customer privacy procedures.

A COMPLEX, MULTIDISCIPLINARY PROCESS

Identifying Business and Use Cases

The process begins with brainstorming different scenarios of connected product use cases and how they benefit the organization, and then defining the business case that supports their development. Companies will initially consider how connecting existing products could lead to enhanced relationships with customers; however, they should also examine how creating new game-changing applications might leap-frog them ahead of the competition. Companies should also look beyond customer-facing applications and investigate how IoT solutions can optimize internal processes.

Next, organizations should develop a solid business case that supports the development of the connected device by mapping out the product/service strategy. This includes determining the specific goal(s) for the connected product: Will it directly generate more revenue, increase brand awareness, or enable better customer experience? Or all of the above? This stage also requires scoping out possible features and design and development issues, as well as budget constraints.

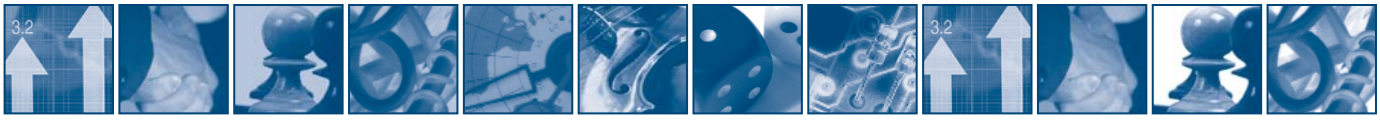
Implementing the Connected Device

Connected devices typically rely on low-power processors, an embedded OS, sensors, and wireless capabilities for connecting to Internet, cellular, or other communications. Here, organizations face several choices and considerations to implement the device, including selection of boards, modules, and development environments; sensors; communications (gateways); and wireless/network protocols.

Building the IoT Infrastructure

The IoT infrastructure involves all the foundational components required to support connected products and services as well as integration with enterprise systems. This includes customer-facing (end-user) applications and operational applications for deploying and managing connected systems.

It is certainly possible for organizations to build the infrastructure required to support the connected product or service. This, however, represents a considerable undertaking for most mainstream businesses (i.e., those outside the industrial or engineering realms). This is because the IoT concept is still very new, and



most mainstream businesses have limited experience building and operating sensor-enabled products. Consequently, the trend is for companies to utilize a commercial cloud platform that provides the foundational infrastructure necessary for building, connecting, and managing IoT applications and services.

Data Management, Analytics, and Rules Automation

Achieving business value from the high volumes of data generated by connected products requires big data storage and analysis technologies that can scale to meet constantly increasing demands. Such technologies include Hadoop, NoSQL databases, high-performance analytic/in-memory databases, hybrid relational databases with embedded MapReduce, streaming analytics, predictive modeling, machine learning (ML), and business rules engines (BREs). Some organizations will build their own systems for managing and analyzing the vast amounts of data generated by their IoT applications. Others will use a commercial provider's solution. Whichever you choose, I recommend that you deploy IOT applications in cloud environments to take advantage of the flexibility, scalability, and performance offered by cloud architectures and services to facilitate the integration of IoT solutions with enterprise applications.

End-User and Operational Applications

End-user apps include mobile apps and Web apps that customers use to interact with connected products. Concerning mobile app development, companies must decide whether to outsource design and development or go inhouse. The former is often the case with mobile apps intended for consumers because they expect a slick design that provides a rich and intuitive user experience. Service providers/companies use operational apps for ongoing operation and maintenance of the connected solution.

Security and Customer Privacy

Security and customer privacy are paramount for IoT applications. To alleviate security concerns, IoT platforms should implement an end-to-end security strategy that covers network, device/equipment, user, and data security. Organizations should carefully define procedures for ensuring customer privacy.

ISSUES AND CONSIDERATIONS

Connected products offer significant benefits, but they also have their own issues and considerations. Offering connected products typically requires a company to reinvent itself from a product-oriented business into a service-oriented business. Developing/supporting connected products often requires companies to acquire new skills and personnel, including those possessing an understanding of mobile and sensor technology development techniques and new data analysis methods (i.e., ML). Customers may initially not understand how to fully take advantage of new connected products. Thus, it is necessary to educate them as to what they may expect and how they should begin. Many organizations will require outside help for IoT implementation.

CONCLUSION

Companies and organizations across every line of business can expect the IoT to impact them. Consequently, it is time to start preparing your organization to benefit from deploying connected products and services. Because organizations face numerous technical and business considerations when implementing connected solutions, I recommend becoming familiar with the various components comprising the connected device ecosystem. An understanding of the latest data storage and analysis technologies used for IoT applications is also advised.

Data Insight & Social BI Practice

FOR MORE INFORMATION

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