



INTELLIGENT SYSTEMS — CONNECTING DATA, DEVICES AND PEOPLE

THE PLANET IS GROWING A CENTRAL NERVOUS SYSTEM. Humans, natural systems and physical objects have always generated vast amounts of data. But until recently, even if that data was captured, it was difficult and time-consuming to use and analyze it in an intelligent and useful way.

No longer: There are now more things on the Internet than people. The “Internet of Things” means physical objects are seamlessly integrated into the information network, becoming active participants in business processes while still protecting security and privacy.

That is one of the major trends in information technology that can drive competitive advantage for enterprises.

For modern enterprises, therefore, it is no longer adequate to have individual technology solutions for various aspects of their businesses — back-end processing, business applications, data capture and others — that can’t “talk” to one another. Those solutions need to be connected in an intelligent way.

The pressure for intelligent connection is also coming from a second major trend — the “consumerization of IT,” in which customers, collaborators, suppliers and employees are all demanding integration of their multiple smart devices onto a uniform platform.

According to International Data Corp., the market for intelligent systems will grow from 19 percent of all electronic system unit shipments in 2010 to more than one-third of all systems by 2015.

That kind of intelligent interconnectedness unlocks the power to gather “big data” like never before. The *Boston Globe* reported in January that more than 100 companies in Massachusetts alone are focused on big data. They expect to

add up to 15,000 jobs over the next six years in a sector that McKinsey Global Institute recently estimated is worth \$64 billion and could add 1.5 million jobs nationwide for workers with the right skills.

The *New York Times* also reported recently that big data was a major topic at the January 2012 World Economic Forum in Davos, Switzerland. A report by the forum, “Big Data, Big Impact,” declared data a new class of economic asset, like currency or gold.

Big-data analytics will be a challenge — traditional databases and software are not equipped to handle it. But its value in predicting customer needs, improving supply chain economics, adapting business practices to user preferences and behavior, and helping an enterprise position itself more effectively in the market are well worth the investment.

In short, the route to competitive advantage is an “intelligent system” that connects devices that operate on the edge of a business to the core infrastructure, in a continuous, two-way flow of information.

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It should be no surprise, then, that the 2012 “State of the CIO” survey found that CIOs report spending the majority of their time and focus on aligning IT initiatives with business goals (60 percent), implementing new systems and architecture (49 percent) and cultivating the IT/business partnership (43 percent).

Among the major initiatives they expect to complete in the coming year are in business intelligence (49 percent), mobility (48 percent) and SaaS/cloud solutions (40 percent), all of which indicate that the cloud, mobile and big data will have a major impact on the future role of the CIO.

» Introducing “intelligent systems”

The route to an intelligent system starts with connecting “embedded systems” that are now well established in both the business and consumer world. IDC forecasts that the volume for embedded systems will outpace any other mainstream system type, reaching 8.9 billion unit shipments by 2015.

Indeed, 98 percent of computing devices are now embedded in electronic equipment and machines, vastly outnumbering those on the desktop. They include credit and debit card readers; security and energy systems in homes; sensors for traffic; cars that communicate their location in the

event of a crash or theft; and multiple “smart” devices that people use in their business and personal lives.

For enterprises, just a partial list includes the mobile devices used by employees; radio tags on products sold to consumers; the registers used to record sales; the sensors that can do everything from tracking shipments to making buildings operate more efficiently; and all the multiple devices that serve as interfaces between a business process and a user, from digital signs to ATMs, manufacturing controllers or X-ray machines.

The data generated by those systems can significantly impact business success, but only if it can be accessed, understood, shared, and then acted upon — in a timely fashion and from anywhere.

“Data is really the new currency for enterprises,” says Barb Edson, senior director of marketing and business development for Microsoft’s Windows Embedded. “And connectivity is what makes an intelligent system possible.”

That system must enable data to flow across an enterprise infrastructure, spanning the devices at the edge, where data is gathered from employees and customers, to the back-end systems where that data can be analyzed and translated into timely insights and action.

Traditional business intelligence, Edson says, involved a person like a financial analyst analyzing the data coming from the edge devices of an enterprise. An intelligent system can operate from “machine to machine,” to provide predictive analysis and actions, rather than needing a human in the middle. For example, instead of simply collecting information on sales and inventory, an intelligent system will enable an enterprise to analyze customer behavior, and therefore more accurately forecast product sales.

Millions of digital sensors are another critical piece of the intelligent connection chain. When installed in shipping crates, they can measure and communicate location, movement, temperature, humidity and even chemical changes in the air.

An example of that, Edson says, is a large fruit importer who puts sensors on crates of bananas being shipped to the United States that will tell how much each crate has been exposed to sunlight and warmth during transit. Then, when the shipment arrives, “they know if a crate should go directly to a store or if it needs to go to the warehouse for further ripening. It offers so many ways to improve the supply chain.”

» Key attributes of an intelligent system

That kind of data flow and analysis is enabled by Microsoft’s Windows Embedded, a comprehensive suite of operating systems and tools that can help solution providers reduce time to market and improve intelligent system capabilities. Its technology powers embedded systems that enable organiza-

HOW TO UNLOCK BUSINESS VALUE

An enterprise thinking about unlocking more hidden value by extending the intelligence of its systems should consider the following:

1. Which systems in your business are still discrete, stand-alone? Which other systems can use the data being collected by that system?
2. What is the best way to connect the devices and systems in your company? Are you able to cost-effectively connect your systems? What additional benefits might that yield?
3. Can you remotely manage the devices at the edge of your system? Would you benefit from being able to conduct remote updates to your devices or change device configuration?
4. Are you using the data you already collect effectively? What other pieces of intelligence can you leverage to drive your business forward?
5. Will you benefit from having more capacity and capability in your back end available to you on demand?
6. If you were able to connect your company’s systems and extend that into “the cloud,” what would you do?

Visit www.unlockintelligence.com for more information.

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— 2012 World Economic Forum in Davos, Switzerland

tions to increase business process efficiencies and improve customer satisfaction.

Microsoft says the kind of intelligent system that delivers sustainable competitive advantage will have six key attributes, which it classifies into two groups:

Foundational attributes are identity, security and connectivity. They already exist in current systems, but they must change and improve as intelligent systems evolve.

Advanced attributes are manageability, user experience and analytics. They occur when business adds new capabilities to its devices. While elements of these are still in the early stage of the innovation cycle, they are the ultimate goal of an intelligent system. The ability to collect data from the user experience and then analyze it leads to improved products and competitive advantage.

Taking those attributes individually:

Identity enables businesses to collect and deliver the right data in the right context to the right person or device, making the organization more effective and improving customer service. But managing identity becomes more complex as inputs increase across users, devices and discrete subsystems. Companies must balance the risk of that greater complexity with the increased value of more data flowing in the intelligent system.

Security was simpler when systems or devices had well-defined boundaries, so the number of entry points to a system could be tightly controlled. Today’s business value is in more open and connected systems, generating more data available to be analyzed.

That increases the cost and difficulty of security. The more devices connecting to a system, the more vulnerable that system becomes because each type of device has a different way it connects and has different security capabilities.

An intelligent system will make those connections and security capabilities span hardware, applications and data, from edge devices to back ends, and therefore make them all more secure.

Connectivity used to mean one-way communication, where devices responsible for capturing data sent it to the back-end system. Advancements in mobile communications have now made that communication two-way.

However, the cost of having all devices or sensors connected all the time to the back end can be prohibitive. An intelligent system can let companies control when and how its edge devices are connected to the back end, thereby increasing the ROI.

Manageability, specifically the ability to manage and update devices and systems remotely, can make a company more nimble. Edge devices will no longer be “passive” – only capturing data to send to the back end. Instead, devices will be able to be updated, managed and even reprogrammed remotely from any location, ensuring continuous safety and security, and enabling customization to a company’s requirements or different users’ preferences.

User experience expectations are higher, since workers today demand the same intuitive interactions and efficiency — fewer errors, better customer satisfaction and faster processing — from the technology systems used in business that they get from consumer devices. While still in its exploratory stages, natural user interaction capabilities, including touch, gesture and voice, are starting to appear in many devices that connect to intelligent systems. These capabilities can increase ease of use, reduce training time and make employee and customer experiences more enjoyable; therefore, organizations can capture data never before available and make it accessible to the whole system.

Analytics is the ultimate goal of any intelligent system, since it can provide better business intelligence from the expanded data captured by the system. Edson, noting again that data is “the new currency,” calls analytics, “the last mile of driving the business advantage.”

Companies will need to consider a strategy for their analytics, stretching beyond the information they historically have analyzed. With the advent of cloud computing, companies can also create strategies for storing and analyzing vast amounts of new data directly from edge devices — making decisions and acting on them in real time.

»» The big picture

The benefit of intelligent connectivity is business intelligence: smarter, timely decision making, yielding better productivity and therefore competitive advantage.

While intelligent connectivity is still in its early stages, Edson says some real-world examples show its potential. “If you’re a trucking company, you can have sensors that tell how fast the truck is going, how many stops it makes and if the drivers are sleeping as much as they should be,” she says.

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— Barb Edson,
senior director of marketing and business development
Microsoft's

Such data recording has existed for decades, but it is now possible to report it to a central location in real time.

Jonathan Hutchison, a group program manager for Windows Embedded, cites another example — a large manufacturer of ATM and cash machines in Europe that is running Windows Embedded within its ATMs. “They are using analytics on the device to predict impending failures of the components,” he says. “Software running on the device monitors the subcomponents and looks for patterns that would lead to a failure. That then allows the company to send a technician to repair components before they fail.”

The system is also being used for fraud detection, Hutchison says. A number of cameras look at how and where bank cards are used, to detect whether a user is trying to guess a PIN. This is an example of intelligence on both sides of the system: Not only does it monitor its own internal workings, but it also monitors and analyzes the behavior of outside users.

Yet another example is a major international billboard advertising company that has branched out into bicycle rentals. It subsidizes the rentals through billboard and street furniture advertising space. The company is using Windows Embedded to collect data on how the bikes are used — where they are picked up and dropped off.

“This lets them know the kinds of ads they want to run,” Hutchison says. “If there are more commuters or tourists, if they’re going to a university or a financial district — that demographic data lets them do more effective advertising.”

“And that’s not even getting to the tip of the iceberg of what is possible,” Edson says. “There is a paradigm shift in the [IT] ecosystem.”

She says much of the focus until now has been on mobile devices and what they can do, “but now it is no longer just about the device. It is about the whole system behind it.”

Part of that system, of course, includes the cloud, which removes the limit on collecting and analyzing the “big data” generated by edge devices. The cloud can function as everything from a data repository/warehouse to providing apps and SaaS.

But Edson says while the cloud is a critical component, it is just one of many “nodes” in an intelligent system. “I don’t think all the intelligence is in the cloud,” she says. “The device also has to have a lot of intelligence on it. It is not just a dumb sensor,” but one that can analyze data itself and independently act upon it.

» Conclusion

The value of — indeed, the necessity for — intelligent systems can be summed up in a single statistic: The first Internet experience for the next billion users will not be primarily on a PC. They will use mobile devices to browse, social network, entertain and conduct commerce.

This means mobile apps will continue to explode. Consumers will have them on multiple devices, and will expect to have the same rich experience on every device they own.

It takes intelligent systems to deliver that experience, and those who do so will gain significant competitive advantage.

Capturing and holding that advantage will take evolution and adaptation of the foundational attributes of identity, security and connectivity. It will take an aggressive pursuit of the advanced attributes of manageability, better user experience and analytics.

The benefits of such systems are just beginning to be realized, but they all flow from the ability to collect, communicate and analyze data in ways that will predict customer preferences and behavior, giving the enterprise an ability to be proactive instead of reactive.

Windows Embedded makes that possibility a reality. ■