New Business Models Are Required for the Internet of Things

Networks of collaborating companies, customers, people, systems and devices linked in border-crossing relationships are the true creators of connected opportunities.
Products and services, while complementary, have historically had opposite strategic goals and divergent operational models. As a result, each function has had to seek out its own distinct strategies. The traditional manufacturing-driven business defined services and after sale support as subservient to the product, as no more than a “bootstrap” business with little up-front investment. This model is rapidly disappearing driven by the networking of every manufactured thing.
New Business Modes for Smart Systems

Products and services, while complementary, have historically had opposite strategic goals and divergent operational models. As a result, each function has had to seek out its own distinct strategies. The traditional manufacturing-driven business defined services and after sale support as subservient to the product, as no more than a “bootstrap” business with little up-front investment. This model is rapidly disappearing driven by the networking of every manufactured thing. The ability to closely couple products and a wide variety of after market services has emerged as a requirement to stay ahead.

The two thrusts need to be mutually supportive without inhibiting one or the other. However, trying to coordinate and leverage the respective roles of products and services often creates contention. Many leading manufacturing organizations have come to understand that each have distinctive strategies, operating modes and organizational requirements, and most importantly, that services cannot rely on products to be its “role model.”

The best companies have come to see the continuously evolving relationship between products and services as a fertile ground for innovation. The two need to be interwoven and mutually supportive, and increasingly, success in either goes to the company that effectively utilizes the combined potential of both in a networked context, but only when services has been designed for its own unique “connected” destiny.

Smart Services Versus Smart Support

Apple and some of its peers in consumer space present an interesting case for how Smart Business models are developing. Apple is primarily a consumer-focused tech vendor, with no need for the vertical industry capabilities required in B2B applications. Still, Apple provides a model for creating a Smart System solution that pulls together technologies from multiple domains and packages that solution in a way that wins buyer acceptance. Looking beyond Apple to Google, Amazon, Facebook and other players coming from their roots in the evolving consumer mobile internet arena, there are a variety of new business models emerging from cloud and related services platform players that are the embodiment of Smart
The momentum from these players is creating via collaboration with their app communities: Amazon has over 100,000 developers building applications and businesses; Apple’s App Store has created a phenomenal lead position – they are all driving entirely new forms of collaboration and peer product development.

The traditional notion of M2M applications has largely grown up in a B2B context – equipment manufacturers developing remote services and support automation tied closely to their equipment services contracts. These models are focused almost exclusively on customer support and automation – not on new Smart Services value beyond support. As these two classes of business models inch closer to each other in the marketplace it is increasingly evident that consumer Smart Business models provide many lessons for the “cloistered” equipment manufacturers in B2B arenas. The business benefits of large scale collaboration and social networking tools in the B2B arena are finally being recognized.

Three Families of Opportunities

The business models that will inform Smart Systems opportunities will extend beyond ideas about new products and services to the very manner in which business is conducted. To discover, design and develop smart systems, organizations will need new business design tools and methods. The trick is in knowing how to think about how new business models will impact how markets might develop.

The easiest place to start is with the customer, and a great deal of progress will be made by asking just three questions about the customer:

1. What are the activities the customer engages in, to procure, own, use, and dispose of our product?
2. For each of these activities, what else is the customer close to or in contact with when performing the activity?
3. Is there a community of participants who interact with the equipment beyond the primary vendor and the immediate operator of the equipment or device?
The first question leads to what we call “Life Cycle Opportunities;” the second and third lead to “Adjacency Opportunities” as well as “Collaboration Opportunities.”

**Solo Opportunities**

In a solo opportunity, a single product is the dominant gateway to the opportunity. The three business models within this solo-opportunity category are differentiated by the scope of activities which make up the economic value of the overall opportunity. Where the scope is low, we call the company an Embedded Innovator or a System Professional. Where it is high, the company is a Solutionist. Our definitions for these models are:

» **Embedded Innovator:** The embedded innovator is the most product-centric of the models. Customers may still perceive

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**Smart Business Models Are Progressive**

Exhibit One
the physical product as the source of primary value, and they will expect to continue receiving the support services they have in the past (installation, warranties, maintenance contracts, and so on). Historically, manufacturers have bundled such services with their products to make sales. Thus, embedded innovators who decide to add connectivity to their products may have a hard time levying additional charges in relationships where everything was previously “included.” Because the embedded innovator has built intelligence and communications into its products, however, these goods become the company’s inanimate silent partners. The near-perfect visibility of products that can be remotely monitored greatly optimizes the delivery of services, eliminates waste and inefficiency, and raises service margins. Thus, it is largely in these areas that companies achieve ROI on their device-networking investments. (Think PepsiCo’s returns on its vending machines and fountain systems, and Emerson Electric’s returns on its backup Network Power systems.)

» Systems Professional: The system professional looks beyond networked enablement of a single class or category of product to a broader smart system offering -- groupings of products from a single vendor or manufacturer that are architecturally related in their delivery of value to customers. An example here might be Honeywell in its industrial controls business which utilizes network enablement across the whole product family to provide value (and lock customers into high switching costs).

» Solutionist: In the solutionist business model, a single product is still the dominant gateway to a business opportunity, but the scope of high-value activities associated with the product is broader. Think, for example, of all the activities associated with the life cycle of a product, including determining requirements, justifying purchase, installing the product, adapting the product, maintenance, training, upgrading and replacing the product to name a few. Each of these activities in the life cycle of a product may or may not be an opportunity.
most of the opportunities associated with the life cycle relate to service and support automation. This is precisely the situation into which GE Healthcare has stepped, positioning itself as a complete solution provider, or a solutionist.

There is a world of difference in the scope of services that could be offered with or through the connected device. What all three of these models have in common is the supplier is the dominant player in the activity/delivery chain -- whether it is a single device (a sensor embedded in a running shoe), or a family of devices (Apple). In each case the business model was driven as a solo opportunity.

Team Model Opportunities

The other two models are those in which the opportunity cannot be tapped by a single device and a single vendor. There are situations in which a device may collect valuable data, but not valuable enough in and of itself to create the opportunity. Instead, several disparate devices work within an environment, and only by connecting all or most of them is a body of data created that is of high value. An extreme example of this is a simple table lamp in a home. It can be enabled to sense and to communicate such data as when it is on and when off, the wattage flowing through it, perhaps even the age of the bulb or bulbs it is burning. This body of data may be of various kinds of interest, but not of economic interest because none of it is of high economic impact. Even if a table lamp burns a 100-watt bulb constantly in an empty room, the wasted electricity will hardly break most families, and if it would they would probably not need the lamp to tell them the waste is occurring.

The body of data becomes valuable in combination with data from other devices. If all the electrical devices in a home collect data, then that aggregated body of data can be of high value. The sum of all electricity that might be wasted in a home is worth a homeowner’s attention, and so an application that collects and deploys all that data may be of enough value to represent an economic opportunity. Further, there is value in a lamp’s not only sending data to an aggregating application, but also in its being controllable by that application. Here again, to make a single lamp remote-controllable is of questionable value, but to make all the electrical devices in a building controllable by a system that collects, aggregates, and processes data (in
new value at the intersection

other words, that reads and understands a lot of indicators), can be of very high value.

Where a system aggregates and processes data from a number of devices, there are two roles for a device to play in such a system: it can be central or peripheral; the hub or a spoke; the brains of the operation or an eye, an arm, or a finger; the team captain or a role player.

This last variable defines our fourth and fifth business models. When an aggregating system is required in order to define and tap an opportunity, then there will be a Value Chain Aggregator, who controls the application’s data aggregation and central processing power, and there will be Collaborators, whose devices contribute valuable data and/or functionality which is controlled by the application or service and its associated community of members and their interactions.

Definitions for team business models are:

» Value Chain Aggregator: Aggregator business examples include Deere (in agricultural and construction equipment), Eaton Electrical (in power quality and distribution equipment), or Rockwell Automation (in automation control equipment); they all provide remote monitoring and related Web-based services across channel, alliance, and customer-fulfillment networks. In other words, they bring their “secret weapon” to bear on all their business relationships, not just on their relationships with customers.

» Aggregators are still primarily product companies and don’t vertically integrate all aspects of their product life-cycle management. For example, they tend not to be involved in product recycling or disposal. Instead, they sell interested third parties smart-information services—or access to the data collected from networked devices—either for a fee or for a share of earnings. Where aggregators do choose to deliver services directly to the customer, they now own that relationship as never before, with distinct barriers to competition. Aggregators cannot be cut out of the services loop by competitors or channel partners because their possession of device-generated data allows them to offer services more intelligently and profitably than entities that cannot see into the status of the products in question.
» Aggregators will make larger investments in data warehousing and data mining than will embedded innovators, and they will achieve some of their ROI by providing smart services to their distributor and system-integrator partners. For example, a large percentage of installed uninterruptible power supply (UPS) devices contain dead batteries. Unfortunately, users discover this only when these devices fail to work during a power outage. In the embedded innovator model, a networked UPS device could initiate its own order for a battery replacement from the vendor—in itself, a smart service. But imagine how an aggregator could build on that opportunity. Eaton Electrical (a global leader in circuit breaker and power distribution technology), for instance, partners with companies selling power-quality devices, such as fire alarms, backup generators, and the UPS devices mentioned previously.

» Collaborator: It is possible to succeed in the age of smart services simply by providing intelligent devices that play well with others in more open systems. When you set out to create a product that can contribute valuable data or functionality to other connected products, you are pursuing a synergist model.

Consider the Dutch electronics manufacturer Philips, a world leader in lighting ballasts and controls. The company believes there is a huge opportunity for value creation if complementary manufacturers in buildingsystems equipment could share their data. That is, if data could be collected from all the electrical devices in a commercial facility, the aggregated information could then be used to create extraordinary levels of customer service. So Philips is helping to build a community of several parallel players in the commercial-building-management arena in order to leverage all the valuable data about usage patterns, potential energy savings, and the like. Central to this community’s plan is an implicit agreement that these systems be based on open technology standards.

There are other situations which are team opportunities, but are not completely characterized by multiple disparate devices. Rather, they are team opportunities because multiple vendors, most of whom are service providers, must be available to completely tap the opportunity. If there is a single device vendor whose device is the
gateway to the provision of multiple services, that company is in a preferred position, as most of the partnering service providers will pay for access to the customer. These types of applications, particularly where collaboration can extend the value, are a new topic for business models.

### Smart Systems and Services Business Model Summary

<table>
<thead>
<tr>
<th>“Solo” Business Models</th>
<th>“Team” Business Models</th>
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<tbody>
<tr>
<td><strong>Embedded Innovator</strong></td>
<td><strong>Value Chain Aggregator</strong></td>
</tr>
<tr>
<td>Largely focused on remote support automation &amp; data value for specific product</td>
<td>Collects, organizes data with aim to optimize interactions across single provider dominant delivery chain</td>
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<tr>
<td>Largely harvests product performance data to understand required features, functions and support needs – real-time “field intelligence” on products &amp; customers</td>
<td>Builds and extends value via collaboration with customers, channels and providers across collective delivery chains</td>
</tr>
<tr>
<td>Leverages services automation to feed diverse functional needs across family of related products</td>
<td>Owns product life-cycle and customer relationship. Co-designs, finances, installs, maintains, replenishes &amp; optimizes product usage.</td>
</tr>
<tr>
<td>Feeds device intelligence from field to support for efficiencies - offers pre-emptive maintenance &amp; replenishment via remote monitoring &amp; diagnostics of its smart, networked products</td>
<td>Offers new business process or application/ performance optimization values – sells life cycle and optimization capabilities – leverages partner interactions &amp; value across delivery based on “preferred access”</td>
</tr>
<tr>
<td>Builds broad support capabilities across the entire life cycle of target equipment or family of products</td>
<td>Enters the customer’s business as a problem-solving, value-creating partner who then collaborates to create new or extending values. Uses collective info &amp; community to continue to extend into new/ adjacent business process or application values</td>
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open systems have engendered new levels of collaboration

Smart Systems and Services Benefits

The Smart Business phenomena is giving rise to a whole new generation of technology and services enabling players who are linking users, producers and intermediary channels in new ways. These emerging combinations of players are acting in a truly disrupting manner in the marketplace.

In general, the potential benefits for a particular company are any or all of the following:

» Cost and service time reduction. A product, such as an elevator, breaking down can immediately advise its service center (which could be the manufacturer) of this as an alarm. The service center can then interrogate the product remotely to find out what happened and ensure that technicians are equipped with the correct spare parts before making a visit to site, thereby reducing the number of site visits and technician time whilst improving the service response time. Other machines, such as vending, can signal that they are short of stock and need replenishing. Ticket machines can indicate when they are full of change and need emptying. These actions obviate the need for constant checking while at the same time ensuring maximum availability of the service the machines are offering.

» New or better services. With performance data available at any time for their products working on site, service providers are in a better position to predict possible future failures (e.g. bearings need replacing) or to advise on a course of action to save cost (e.g. interval metering showing peak usage trends). Combining GPS with wireless enables tracking of people or assets. Cattlemen in the US, for example, are beginning to implant chips and transmitters in their herds to keep track of their whereabouts. Dog owners are too. Even an insurance company is experimenting with selling individuals car insurance with a deep discount if customers allow the company to monitor their driving via GPS and a wireless link. In many cases, individuals seem to be willing to trade privacy for a lower rate.

» Speed and flexibility. A wireless billboard can introduce changes instantly to many different billboards at once,
offering a service timed for peak viewing of the target audience. Vending and ticketing machines can be updated with new software, pricing and display information at any time at low cost.

» Customer relations. Customers typically buy products and are then on their own. Instead, the manufacturer or supplier can maintain an ongoing relationship and create input for a CRM system, for example. This might increase the chances of a car owner buying the same make next time around, for example.

» Incremental sales. A connected photocopier can sell paper and toner. A connected vending machine can cater for credit card purchases, opening the

**Collaboration Communities - Participants & Roles**

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<tr>
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<th>Internal To Enterprise / OEM</th>
<th>External To Enterprise / OEM</th>
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<tbody>
<tr>
<td><strong>Content Creation</strong></td>
<td>Internal Collaboration Contributions</td>
<td>Broad Problem Solving Sourcing</td>
</tr>
<tr>
<td></td>
<td>Allows various employees &amp; functions to collaborate on capturing and utilizing knowledge, sharing best practices &amp; coordinating responses</td>
<td>Search &amp; source solutions and problem solving capabilities across diverse participants and experts – both internal and external to organization and across entire value and delivery chains associated with device or product</td>
</tr>
<tr>
<td><strong>Communities &amp; Collaborators</strong></td>
<td>Build Large Internal Collaboration Communities</td>
<td>Build Customer, Partner and Channel Collaboration Communities</td>
</tr>
<tr>
<td></td>
<td>Prompt and enable cross functional communities where experts and thought leaders can be found and invited to participate</td>
<td>Develop explicit communities of interest with broad diverse groups for design inputs, sourcing expertise, service collaboration and support expertise</td>
</tr>
<tr>
<td><strong>Decision Support &amp; Problem Solving</strong></td>
<td>Utilizing and Leveraging Experience, Information and Expertise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gather and aggregate inputs, knowledge and related to support a wide variety of decision making – real-time decision analytics</td>
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prospect of higher value sales such as iPods and other electronics. In the toy market, products could sell upgrades for themselves. For example, dolls whose personality matures over time.

» Competitive product offering. Rather than selling just a product, companies can sell a solution or capability. Cars that self-diagnose and warn of potential difficulties before a long journey is undertaken. Washing machines that can predict their own breakdown. These are examples of sensors connected wirelessly to larger systems that can then process the sensor data and provide a better support service.

» Advertising space. A connected product can be used as an advertising medium. Vending machines equipped with displays can show advertising, local information of interest, special deals or even film trailers, perhaps immediately after a purchase is made. A particular advantage of this channel over traditional media is the opportunity to target a message according to the target group, time of day, etc.

» Collecting valuable information. A machine can be used to collect information that might have a commercial value. A product development function can gain immediate feedback on how a particular product is used, which features are most popular and what problems typically arise. This may shorten the lead time to an improved or updated version, providing a competitive edge.

Impact of Collaboration On Business Models

Executives in many product manufacturing companies are only just beginning to understand the opportunities driven by the complicity between collaboration tools, networked device intelligence and service business design and it is this set of relationships, not the technological shift, that will benefit but also challenge many product manufacturers.

What product manufacturers looking to leverage collaboration or benefit from connecting “smart products” to the Internet need to understand is we have entered a phase in the marketplace where ideas...
successful partnerships should differ-erentiate an organization and build sustaining value

can emerge from anywhere in the world; new network and IT tools have dramati-cally reduced the cost of utilizing them. The bottom line: no single company should look to innovate on their own.

But this raises many questions concern-ing the mode of collaboration a company should consider focusing on developing.

For example, should a company open up its traditionally proprietary product de-sign technology to a community of col-laborators? Should companies focus on encouraging collaboration with a select group of partners or a broad federation of participants? Often, companies will jump into relationships without considering these questions and their potential impacts.

**Collaboration Communities - Participants & Roles**

<table>
<thead>
<tr>
<th>Open System</th>
<th>Closed System</th>
</tr>
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<tbody>
<tr>
<td>Qualified Group of Innovators</td>
<td>Invited Group of Focused Innovators</td>
</tr>
<tr>
<td>A community where a focused player proposes a solution system and invites participants to add value</td>
<td>A community where a focused player designs a solution system and chooses a group of select players with distinct skills to participant</td>
</tr>
<tr>
<td>(e.g. The Apple iPhone App Store)</td>
<td>(e.g. smart building systems eco-system)</td>
</tr>
<tr>
<td>“Come One - Come All” Group of Innovators</td>
<td>Select Group of Focused Innovators</td>
</tr>
<tr>
<td>A community where any and all participants can propose and design solution systems</td>
<td>A closed or private community of developer/designers of system solutions</td>
</tr>
<tr>
<td>(e.g. open source software projects)</td>
<td>(e.g. vertical solutions for hospital)</td>
</tr>
</tbody>
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**Federated Participation**

**Command & Control**
Executives need to consider the mode of collaboration and make informed decisions about the nature and types of relationships that can build sustaining value and differentiation. Determining the degree of openness and participation and the “design” of the system and user experience will be key.

As revolutionary and far-reaching as the collaborative device-networking paradigm shift is, the greatest opportunities usually involve the greatest risk. When you open yourself to relationships, and connect to other people, you can get hurt. The real-world risks of open technology and asset connectedness include the following possibilities:

» Increased commodification of your own products and services.

» Dilution of your identity and brand-recognition.

» Loss of control over your customer relationships.

However, the risk of idly standing by and doing nothing remains the greatest risk of all. Time and time again, we see that companies that fail to are surpassed by those who take advantage of the latest technologies.

Most companies looking to connect their tangible and intangible assets still view themselves largely as “product-centric” businesses. This puts many organizations in a very precarious position, with one foot in the new world and one in the old world. Making the move from product-centric to a collaborative services-centric culture will not happen automatically. It’s a major transition that will demand different strategy and culture than most product businesses have known before.

But there is one truth inherent in ubiquitous collaborative communities—the risks of openness are reduced when companies consciously “design” their collaborative systems with an integrated approach — that is, when strategy, positioning and the uniqueness of the customer experience have been determined in close coordination with the mode of collaboration. For those product OEMs who have moved forward with this opportunity, the benefits of real-time collaboration combined with product usage intelligence are nearly revolutionary.
Collaborative communities of customers, partners, and employees will increase engagement and extend innovation

Collaboration Becomes Central To Competing

The structure of an emerging collaboration network must evolve together with a product OEM’s strategy. It does not flow from the strategy in a traditional linear way. Why? Because companies are not prosecuting a known opportunity. Rather, they are creating an environment in which a new emerging smart product or service opportunity can flourish. They cannot know in advance exactly which aspects of the opportunity will evolve at what speed and in what order. Therefore, structure, modularity, and multiple points of contact (with real-time communications) are essential to growing the opportunity.

Collaborative communities both inform and express the strategy. Built to pursue multiple aims simultaneously, a dynamic network of connected products and people drive new information values which, in turn, create new influences in the marketplace. Power in human and device collaboration structures falls to those who best understand how to use this information and influence to get and keep a key position.

Forging collaborative communities means managing uncertainty. A product OEM needs a clear understanding of the forces at work between and among devices and people. They must try to identify those few “interactions” that make a difference. From this understanding provided via real time interactions, early indicators of the true direction of customer needs and behaviors can be understood long before others.

To create and capture value, companies will need to recognize the new opportunities for innovation driven by a collaborative community—from customers, from partners, from your own people. This will require new thinking, including:

» Understand the Entire Customer Experience By Inviting The Customer To Participate: Companies often fail to make products with the right benefits because they don’t have a good understanding of what their customers are trying to achieve and how they want to achieve it. Customer behavior is complex, but a product OEM can increase its chances of success by understanding the “customer lifecycle experience”: discovery, purchase, first-use, ongoing-use, man-
ful communities are usually composed of proactive participants, not simply a group of companies in and around a particular market space. Accordingly, a community’s design needs to allow participants to invest resources and reap rewards—indeed, to innovate openly with one another—while pursuing individual interests.

» Target the Highest Value Customer Segments: Many great ideas fail because companies focus on the wrong customer segments. Marketers often get distracted by the sheer size of a particular market segment or because of the marketers’ familiarity with it. In the process, they often miss the segments where collaborative communities could deliver the most value.

» Act Early; Act Often: Assembling a collaboration community calls for a balance of timing and participants. Most community opportunities will fail and re-form as learning grows. These communities do not necessarily have a finite window but they need to be initiated early and gain momentum before a competitive network emerges in its place.

» Look for Non-Conflicting Business Models That Will Encourage Collaboration: Collaborative communities differ from today’s social networking models as well as those born from the remote services being created today by product OEMs. They are coalitions of self-motivated market participants that pursue a common goal, not mere subcontractors tied to a “command and control” scheme. Success will depend upon understanding and choosing new or modified business models.

» Build Open Collaboration / AlignPartner Behaviors: Seemingly superior offerings can also fail because a product OEM’s partners have no incentive to participate. The customer is buying an experience with a desired result, and the OEM and partners must work in concert to create a superior experience that provides tangible benefits to all participants. Success-determining the degree of openness and participation will be key
Communities create value and strengthen market leadership by increasing customer intimacy, creating operational efficiencies and enabling new product innovation. This value is manifested in several ways, including:

» Increased revenue and competitive differentiation through device based aftermarket services.

» Significantly lower cost of service, maintenance and customer support.

» Increased customer intimacy through collaborative interaction and problem solving.

» Low impedance path to unexpected innovation and sophisticated services.

» Valuable market feedback, based on an open dialogue with customers, that will drive new product and service innovation.

**Impact of Collaboration On Business Models**

Technology adopters are vigorously debating the evolving nature of business and profit models driven by pervasive connectivity and open, collaborative systems. Everyone agrees that after the shift from closed and proprietary to open and connected, competitive advantage and profitability will lie in creative use of shared, non-owned commodities and the real-time customer contact and services they make possible. Differentiation, value addition, and brand-identity will now occur at a higher level, not at just the core product. Obviously, companies will continue to prosper in open, connected landscapes, but they will do so in different ways—some of them variations on old models, some entirely new.

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