ECOSYSTEM DESIGN in the AGE of SMART SYSTEMS
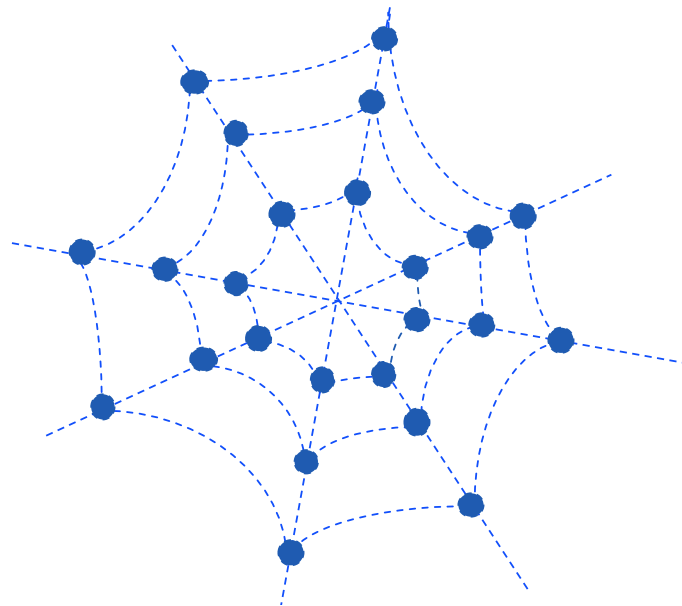
Alliances, ecosystems and collaborative development are hardly new but as rapidly evolving developer, contributor, and innovator communities embrace new computing architectures that leverage distributed intelligent sensors, machines and assets, radical new modes of value creation are emerging

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WHAT ARE SMART SYSTEMS?

A new generation of pervasive computing systems and information architecture that when combined with artificial intelligence, machine learning and Internet of Things technologies are breaking away from today's information, computing and telecom (ICT) paradigms to enable intelligent real-world physical systems to be integrated onto networks and the data from machines, sensors, video streams, maps, people, news feeds and more to become an integral part of all information systems. This new paradigm is driving all information systems and, more importantly, their interactions towards real-time, state-based, context-sensitive capabilities that integrate people, processes, physical equipment and knowledge to enable collective awareness and better decision making.

W e're trying to build a future on inadequate structures from the past. It's as if we're wandering through the uncharted jungles of the 21st century with reconnaissance reports and walkie-talkies from about 25 years ago.

For all the silicon-based "intelligence" permeating every aspect our lives, we still live in a brutally dumb world. That dumbness is starting to cost us—dearly. Every day, executives valiantly try to conduct smart business in a dumb world of wretchedly inadequate information and antiquated communications.

The vision we need is not in itself new. It has been freely available at least since the 1950s, when such thinkers as Jay Forrester (System Dynamics) and MIT's Norbert Weiner (Cybernetics and The Human Use of Human Beings) wrote landmark books describing a world transformed by automation, machine intelligence, and optimized systems.

If you applied this vision in a practical way to business, it might simply be called "electronic commerce." But the e-commerce we have today still fall's short - simple mechanisms that make certain B2C and B2B transactions, performed by human beings, somewhat easier, somewhat more convenient.

Genuinely Smart Systems should re-think the whole relationship of people, machines, and devices to business systems. It must be built upon true, across-the-board digital automation, accomplished by enabling everyday electronic devices to communicate with and control each other, along with a whole new generation of information tools ("killer apps") for managing rich, vast streams of meaningful data. The goal is to integrate people and devices into a new generation of systems that are self-sensing, self-controlling, and self-optimizing—without human intervention. It would not be far-fetched to call them "self-aware."

But how will all this really unfold and what new modes of innovation will be required to enable these smarter systems?   We believe that increasingly diverse networks of collaborators driving new modes of interaction and innovation will be the dominant force driving new smart systems and services growth opportunities, particularly for product OEMs.

CREATING THE DATA DRIVEN, GLOBAL SERVICES-BASED ECONOMY

Everyone agrees that the world is rapidly moving toward a global, services-based economy. But one rarely hears much detail about how this will come about, and how it will actually work. A global, data services-based economy represents a paradigm-shift that arises out of an equally important shift in underlying technologies—the shift from purely human-centric communications to open data and device-centric communication. The new realm of profitable services required by the new global economy will depend upon the availability of ubiquitous digital information from these newly connected devices.

The developments we see in global business have their origins in two basic phenomena:

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» Increasing hyper connectedness of physical and informational assets, both within the individual enterprises and across partners, alliances and services delivery chains.

» Increasing openness of technologies and standards, which makes possible increasing connectivity itself, as well as increasing information-sharing, data collaboration, and interoperability of systems and physical products in the field.

Most product manufacturers working to develop Smart Systems, Services and IoT solutions would likely agree that the future of their businesses will be shaped by new, significant revenue opportunities emerging from the availability of the data and information provided by these newly connected devices. Smart connected systems that allow diverse assets and machines to be integrated into new solutions has set the stage for new services business models.

So why has this been so challenging to product OEMs? Why have the large diversified industrial businesses like GE, Bosch and others has such a difficult time trying to create and launch new businesses and software-focused models?

The concept of "connectedness" is less challenging than the concept of "openness." Many OEMs who manufacture high economic value equipment have already attained a high degree of connectedness with their customer base. Much of that connectedness, however, has been accomplished to date with closed, proprietary systems. This is partly because dependable open standards and technologies have only recently become available. But more significantly, "openness" represents uncharted and risky terrain for most product OEMs. Increasing adoption of "open" standards and systems for connectedness presents significant business risk while providing access to the new growth and services opportunities driven by IoT. The question is how to minimize risk while moving away from proprietary, closed solutions, and while making more and more enterprise information available for cross-enterprise sharing.

PRIVACY AND SECURITY ARE THE FIRST CONCERNS

Increasing connectedness and openness means great opportunity but also great risk. Security and privacy remain large concerns that could severely inhibit open data sharing and large scale collaboration. Security of enterprise data and the privacy of customer information are among the first concerns of potential OEM adopters. These challenges have evolved to become very visible and controversial concerns mostly, we believe, because of the very uneven understanding of the underlying technologies that enable security and privacy. Most adopters of new Smart Systems and Services technologies will not move toward greater openness without solid validation of robust data integrity and security.

BUSINESS CULTURE IS AN EVEN BIGGER HURDLE

Not surprisingly, potential adopters concerns are more complex than simply technological worries. In the existing culture of most manufacturing-based businesses, competitive advantage is usually perceived—to one degree or another—to lie in ownership, secrecy, and sometimes

adversarial relationships with suppliers. It goes without saying that such a culture does not blend well with the notion of "openness."

Over the last several decades, the role of digital information technology in business has evolved from being first a luxury, then a mainstay, and finally what it is today—nothing less than the DNA of the evolution of business itself. We are presently undergoing an historic paradigm-shift from human-centric to device and machine-centric use of global computing and networking. The "infosphere" of digital data generated by connected devices will soon become the very air that business breathes. Product OEMs that do not find ways to live in this global information atmosphere, and to share it with partners and alliances, will simply not survive.

But how do businesses who become more open and connected, change their underlying concepts of "ownership," and yet remain distinct and profitable entities?

PLATFORM STRATEGIES ARE DRIVING NEW STRATEGIES and ROLES

The dis-integration of traditional enterprises driven, in part, by the decades long wave of outsourcing, is restructuring businesses into three broad segments or roles: platform players, horizontally focused providers of outsourced "professional services" and, vertically focused "specialist" product and service businesses.

The influence and disruptiveness of platform companies affect much of the business world these days. Platforms can come in many types, including a de-facto standard such as Cisco's network operating system or Microsoft's Windows (or Azure today), or the immense scale of Facebook's user base enabled by social relationships and interactions.

Platform business models that creatively combine elements of dis-intermediation, new relationships, shifting profit pools, new recurring services, customer transparency or other maneuvers are all disrupting existing business and operating models - just consider the scale and impact of technology-based platform models like Google, Apple, Amazon and Facebook.

The growing influence and disruptiveness of platform models is forcing all businesses to think more carefully about their future role and, since not all businesses can be platform players, which role suits them and which players (in the other two categories) can they form win-win partnerships and drive collaboration to maximize value for customers.

STRANGE BEDFELLOWS - CREATIVE COLLABORATION FOR BUSINESS

As businesses come to understand that future enterprises will all be part of ecosystems and new value delivery networks largely comprised, in varying combinations, of these new roles, they are recognizing the era of "command-and-control" alliance and partnering strategies of the past will not be effective in the complex, instantaneous, interwoven digital economy.

The key lever to opening, accessing and leveraging the data necessary to inform new applications in a data-services economy is the formation of collaborative communities which

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bring complimentary systems, players and data streams together to benefit diverse users, participants and stakeholders. Ecosystems, collaborative communities and new value networks will be self-organized by people who are motivated to explore and develop ideas they care deeply about.

New architectures and technologies are enabling collaborative innovation that will extend beyond ideas about new products and new services to the very manner in which business is conducted. New collaborative communities and ecosystems will be designed and driven by many diverse and often unfamiliar types of businesses; what we like to call "strange bedfellows."

Evolving Smart Systems and IoT Ecosystems and Collaborative Communities
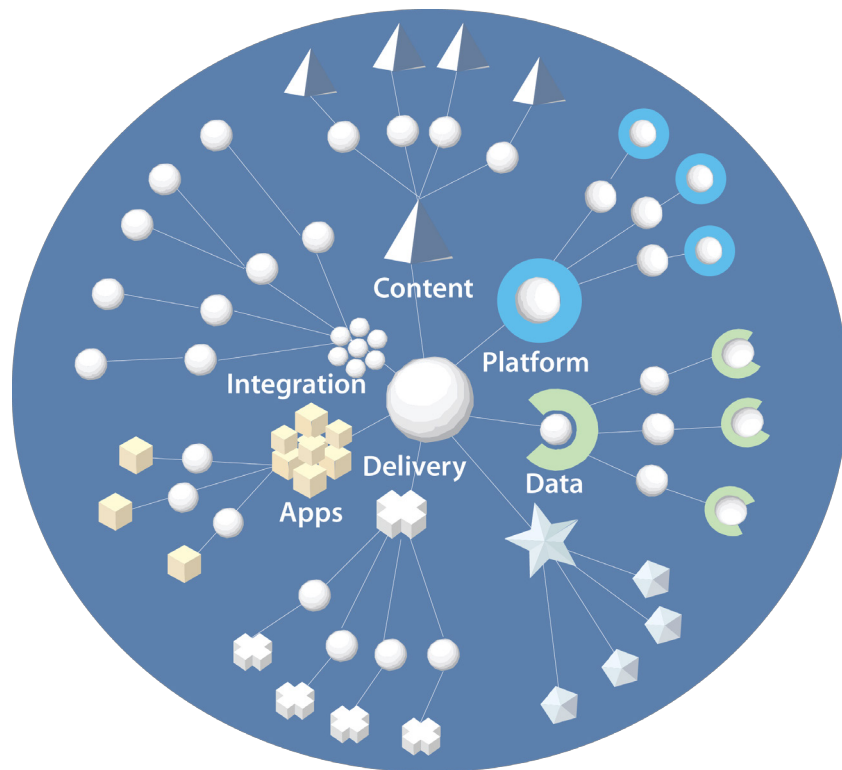
The drive to adopt more ubiquitous and open computing and communications technologies and partner with strange bedfellows presents enormous cultural challenges to the product OEMs that have often built huge after market services and parts businesses based on closed, proprietary systems and technologies.

OPEN SOURCE AS A MODEL FOR NEW MODES OF COLLABORATION and COMPETITION

Industry thought leaders suggest that an answer lies in the evolution of Open Source software. Not too long ago, Open Source was widely viewed as the province of hacker kooks who were somehow "against profit" and wanted to "give everything away." That was, of course, a gross misunderstanding. Early Open Source advocates simply understood that core digital technologies would quickly become as fundamental to life and business as electricity itself, and that monopoly-enforced standards would be as bad as the market-fragmentation that results from no standards.

The Open Source concept caught on and evolved so rapidly partly because it had a great "demo": the Internet itself. Every time you send email or visit a Web site, you are using open technology developed and maintained by a global collaboration of software designers and network engineers. Even though it was originally private and closed, developed with military funding, the Internet is now a decentralized and open network. Today, Open Source has transformed the policies of the largest software companies in the world, and will continue to do so because it represents a fundamental evolutionary force.

The Internet and successive Open Source developments—e.g., the Linux OS, the middleware engine PHP, the MySQL database manager—have demonstrated that ownership of core enabling technologies is not a requirement for maintaining competitive advantage.

In fact, seen in the proper light, forgoing ownership at the core level is a great liberation. Why? Because it's hard to maintain a profitable business trying to sell people core technologies. Those technologies—the network itself, access to the network, operating systems, code languages, database managers, and so on— quickly become part of the taken-for-granted fabric of reality, i.e., commodities with steadily declining profit.

Buckminster Fuller saw this general phenomenon decades ago and called it "ephemeralization": the tendency of evolving technology to become less and less material. More brains, less brawn; more metaphysical value, less physical value. At one point in human history, you have the Egyptian pyramids—perpetuity via lots of brawn (mass). Many years later, you have the Eiffel tower—Less brawn (mass), more brains (laws of physics). In information technology, the exponential miniaturization of integrated circuits and the virtualization of many software and data management functions are obvious examples of "emphemeralization".

In the era of Smart Systems and the Internet of Things, there will be nearly infinite potential applications for cheap, embedded, self-organizing sensors. Their widespread adoption is inevitable. But that doesn't mean that every market participant will automatically be shaking a money tree.

We think that profitable vendor activity in Smart Systems will replicate the tendency we've seen for decades in digital technology and more recently in other kinds of product businesses— less and less physical value (hardware and products), more and more metaphysical value (data

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and services). Investment in the future will flow more to creating value networks and new collaborative relationships rather than technically closed systems.

Collaborative Innovation Community Roles			

	Internal To Enterprise / OEM		External To Enterprise / OEM
Content Creation	**Internal Collaboration** Allows various employees & functions to collaborate on capturing and utilizing knowledge, sharing best practices & coordinating responses	**Broad Problem Solving Sourcing** Search & source solutions and problem solving capabilities across diverse participants and experts internal and external to organization and across entire value network and delivery chains	**External Collaboration** Provide external participants and collaborators access to and enablement of product design/development, supply chain interactions, services and support inputs as well as feedback
Communities and Collaborators	**Build Large Internal Collaboration Communities** Prompt and enable cross functional communities where experts and thought leaders can be found and invited to participate		**Build Customer, Partner and Channel Collaboration Communities** Develop explicit communities of interest with broad diverse groups for design inputs, sourcing expertise, service collaboration and support expertise
Decision Support and Problem Solving	**Utilizing and Leveraging Experience, Information, Community and Expertise** Gather and aggregate inputs, opinions, knowledge and related to support a wide variety of decision making – real-time decision analytics		

SOCIAL NETWORKS: PARALLEL UNIVERSE TO B2B SMART SYSTEMS

The creation and evolution of social networks are excellent examples of collaborative alliances that will shape significant future opportunities—in this case, provoked in large part by the grassroots success of kids and parents alike collaborating and creating content value.

To date, most of the successful collaborative communities and platform enabled models are more "consumer" focused; few, if any, B2B markets have really embraced this type of model. But we believe the model is spreading. Freight logistics, genetic sequencing, travel, order management, customer relationship management, asset management, etc.. The same values that social networks have created will evolve into the B2B arena; pervasive embedded intelligence and connectivity in the business and industrial worlds creates many new diverse growth opportunities previously unimaginable.

While some people will always choose to stay with the status quo, we believe that leading product OEMs will vigorously embrace the power that lies within self-initiated communities. Particularly as customers begin to expect the immediate gratification or responsiveness to their problems that collaborative networking of participants and systems enable, companies will want access to an ever increasing scope of the data and content necessary to deliver

the full customer experience. All indicators are pointing to this opportunity as having an enormous impact across virtually every market.

Creating "collaborative communities" of partnerships and alliances has always sounded like a good idea. Given the rapid shift to openness and complex connected assets, much like the concept of smart cities engenders, new types of communities with many new and diverse participants will quickly become a minimum requirement to be in business.

Product OEMs will come to understand that pursuing alliances and relationships that involve shared risk, shared incentive, and mutual benefit will be the fundamental organizing principle of their new business and operating models.

The technical innovation driven by digital and IoT technologies coupled with diverse and changing relationships between and among complementary players will likely lead to changes in market structure as well as shifts in the sources of profit and value creation. The tendency towards openness, dispersion and decentralization will scare many companies, but smart OEMs will move quickly to define and design new business models and identify the new skills, capabilities, and organizational relationships that will be critical to success.

THE ERA OF "FLYING SOLO" IS OVER

Customer and technological changes are bringing an end to traditional command-and-control strategies among companies. The days when a company could generate value simply by building a better product (with a few alliances and channel partners) have given way to an age of interconnectedness in which value is built as much by collaborating with the right peers as by providing great products and services. Companies in the software business were among the first to build complex ecosystems and "webs of influence" across industries and computing platforms.

Today, the expansion of the Internet uniquely positions companies in the information management and communications technology arenas to build new collaborative ecosystems. And although many companies have employed alliances as a partial supplement to their strategies, the greatest opportunities can be realized by forging true collaboration among peers. Participants pointed out that several market conditions have eroded the strength of the "fly-solo" strategy. Three forces are at work:

First, the pace of change in technology, particularly with the advent of digitally enabled smart systems and IoT technologies, is too great for any single company to provide end-to-end solutions. Monolithic, proprietary technology platforms are giving way to increasingly open technologies.

Second, customers seek to avoid binding relationships with suppliers, which increase switching costs and place buyers at the mercy of vendors' judgment about technology, feature sets, and so on. Paradoxically, these customers of enterprise systems—computer networks, telecommunications infrastructure, IT systems, manufacturing and ERP systems, etc.—

have evolved to demand increasingly vertical solutions tailored to their particular business requirements. As a result, enterprise customers have increasingly begun to understand the value of open systems.

Third, good management requires companies to focus on doing one thing well—product innovation, low-cost manufacturing, or developing knowledge of customers, for example—while customers reward companies that excel (or appear to excel) at all aspects of their businesses. In short, companies can't focus on innovation and operations and marketing in a meaningful way without getting distracted and serving too many masters. Customers and investors, however, reward companies that deliver great prices, margins, high-quality products, technical innovation, and vertical knowledge.

Collaboration Community Modes

	Command & Control	Collaborative Development
Open System	**Qualified Group of Innovators** A community where a focused player proposes a solution system and invites participants to add value (e.g. The Apple iPhone App Store)	**"Come One - Come All" Group of Innovators** A community where any and all participants can propose and design solution systems openly via diverse, fluid relationships (e.g. open source software projects, new AI/ML developer communities and platforms)
Closed System	**Select Group of Focused Innovators** A community where a focused player designs a solution system and chooses a group of select players with distinct skills to participate (e.g. autonomous vehicle development partnerships)	**Select Group of Focused Innovators** A closed or private community of developer/designers of system solutions (e.g. focused partnerships utilized to design large scale products such as new commercial airplane)

COLLABORATION BECOMES CENTRAL TO A PRODUCT OEM'S STRATEGY

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 fully visible or known opportunity. Rather, they are creating an environment in which a new emerging smart networked product or system 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, developers, users and stakeholders will 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.
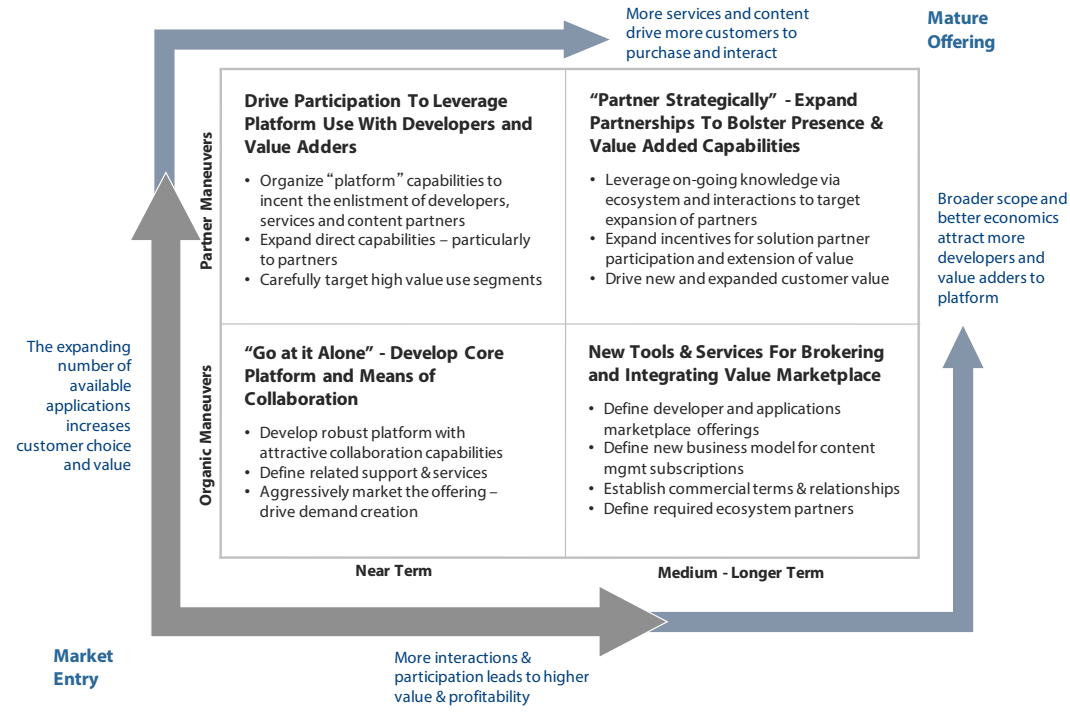
Forging collaborative communities means managing uncertainty. A product OEM needs a clear understanding of the forces at work between and among devices and people. They must try to identify those few "interactions" that make a difference. From this understanding enabled via new "state-based" and "real-time" interactions, early indicators of the true direction of customer needs and behaviors can be understood long before others.

To achieve success, 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:

» **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.

» **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.

» **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, management and disposal. By looking at the customer experience through the customer's eyes and the creativity of multiple parallel participants OEMs can gain a deeper appreciation of the viability of their offering, and potentially discover new opportunity areas as well.

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» **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.

» **Build Open Collaboration / Align Partner 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. Successful 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.

Developing and Scaling Collaborative OEM Ecosystems

More services and content drive more customers to purchase and interact

Mature Offering

Partner Maneuvers

Drive Participation To Leverage Platform Use With Developers and Value Adders

- Organize "platform" capabilities to incent the enlistment of developers, services and content partners
- Expand direct capabilities – particularly to partners
- Carefully target high value use segments

"Partner Strategically" - Expand Partnerships To Bolster Presence & Value Added Capabilities

- Leverage on-going knowledge via ecosystem and interactions to target expansion of partners
- Expand incentives for solution partner participation and extension of value
- Drive new and expanded customer value

Broader scope and better economics attract more developers and value adders to platform

The expanding number of available applications increases customer choice and value

Organic Maneuvers

"Go at it Alone" - Develop Core Platform and Means of Collaboration

- Develop robust platform with attractive collaboration capabilities
- Define related support & services
- Aggressively market the offering – drive demand creation

New Tools & Services For Brokering and Integrating Value Marketplace

- Define developer and applications marketplace offerings
- Define new business model for content mgmt subscriptions
- Establish commercial terms & relationships
- Define required ecosystem partners

Near Term   **Medium - Longer Term**

Market Entry

More interactions & participation leads to higher value & profitability

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 after market 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.

TECHNOLOGY DOES NOT NEED TO BREED COMPLEXITY

Technologically, the 21st Century began with a very big bang: the dot-com and Web boom and bust. Back then, the Web's value derived from people: people building Web sites; people "surfing" the Web; people looking at screens with their eyes; people typing on keyboards with their fingers. People, people, people.

Since then, multiple parallel technology developments have evolved that appear now to be increasingly reinforcing and accelerating one another. Cloud infrastructure resources are providing unprecedented computing scale. Mobile computing devices are extending the reach of computing. Machine learning and AI are bringing intelligence to diverse things. And, embedded systems and IoT technology are connecting and integrating a broad array of physical and digital applications.

Each of these technologies is powerful on their own, but creative combinations of these capabilities are multiplying their impacts. Human-connected devices and machine-connected IoT devices enable exponentially more data. The cloud then enables us to capture and analyze all that information through its computational capacity. Which, in turn, sets the stage for AI and machine learning tools to analyze and capture new insights.

These phenomena are not just about people communicating with people or machines communicating with machines: it also includes people communicating with machines, and machines communicating with people. The Internet's most profound potential lies in the integration of smart machines, networks, computation, software and people—its ability to connect billions upon billions of smart sensors, devices, and ordinary products into a "digital nervous system" that will smoothly interact with individuals, systems and institutions.

As the number and diversity of ecosystem stakeholders expands (users, sellers, supporters, benefactors, etc.), and the volume and nature of their interactions grows, the systems or "technology architecture" will need to become more closely coupled to the "business architecture" to inform and enable new information-driven services. These two "architectures" must be tightly interwoven and mutually supportive without inhibiting one or the other.

These advances require computing resources that are fully distributed, both for functional and for economic impacts (i.e. eliminating the latency involved in sending and receiving data from the cloud; reducing the costs and economic impacts on network infrastructure and computing resources; and, leveraging AI for language processing and image recognition to enable new time and context-dependent interactions between people and systems, to name a few examples).

Some things that look easy turn out to be hard. That's part of the strange saga of the Internet of Things and its perpetual attempts to get itself off the ground. But some things that should be kept simple are allowed to get unnecessarily complex, and that's the other part of the story. The drive to develop technology can inspire grandiose visions that make simple thinking seem somehow embarrassing or not worthwhile. That's understandable in science fiction. But it's not a good thing when defining and deploying real-world technology to deliver new innovation. This is where today's technologies and IT departments behaviors come into play.

For all its sophistication, today's corporate IT function is a direct descendent of the company mainframe, and works on the same "batched computing" model—an archival model, yielding a historian's perspective. Information about events is collected, stored, queried, analyzed, and reported upon. But all after the fact.

That's a very different thing from feeding the real-time inputs of billions of tiny "state machines" into systems that continually compare machine-state to sets of rules and then do something on that basis. In short, for connected devices and social networking to mean anything in business, the prevailing corporate IT model has to change.

The challenges of integrating complex systems and unifying communications in an inter-operable manner remains a hurdle. Interoperability is a key goal when evaluating new technologies, as wireless systems meld with legacy wired systems and developers integrate traditional enterprise software systems with new dispersed innovator and developer networks. The inability of today's popular enterprise systems to inter-operate and perform well in distributed heterogeneous collaborative environments is an obstacle that newer intelligent "distributed" architectures, platforms and edge computing can overcome.

Devices will need to host intelligent software components that communicate to other devices directly (peer-to-peer) or to logical collections of devices (peer-to-group) in any programming language, and do so autonomously. Combining the technologies that enable social networking and device networking helps bridge many gaps in today's enterprise systems.

Just as tides shift according to the gravitational pull of the moon, the distribution of computing resources needs to shift dramatically from centralized to decentralized to fully enable large scale interactions and collaboration. Just as the extensible, technology-neutral nature of the Internet has allowed it to scale so dramatically and gracefully with minimal central administration, we need a similar approach to enabling the diverse interactions between systems, data, institutions and people.

PRODUCT OEMs NEED TO AGGRESSIVELY EMBRACE COLLABORATIVE INNOVATION

Many product OEMs we have spoken with are keen to harness new digital, IoT and smart systems technologies, and are experimenting with the tools or deploying them in pilots and the like. We believe these technologies are having a more far-reaching organizational impact than enterprise, cloud and infrastructure technologies adopted in the last cycle of IT systems. New tools and new models of innovation demand a mind-set different from that of earlier IT programs, which were instituted primarily by edicts from senior managers.

Earlier technologies often required expensive and lengthy technical implementations, as well as the realignment of formal business processes but, in the end, were pretty linear and predictable in their implementation and use. But these new "smart systems" tools are different.

Collaborative Communities and Ecosystems for Product OEMs
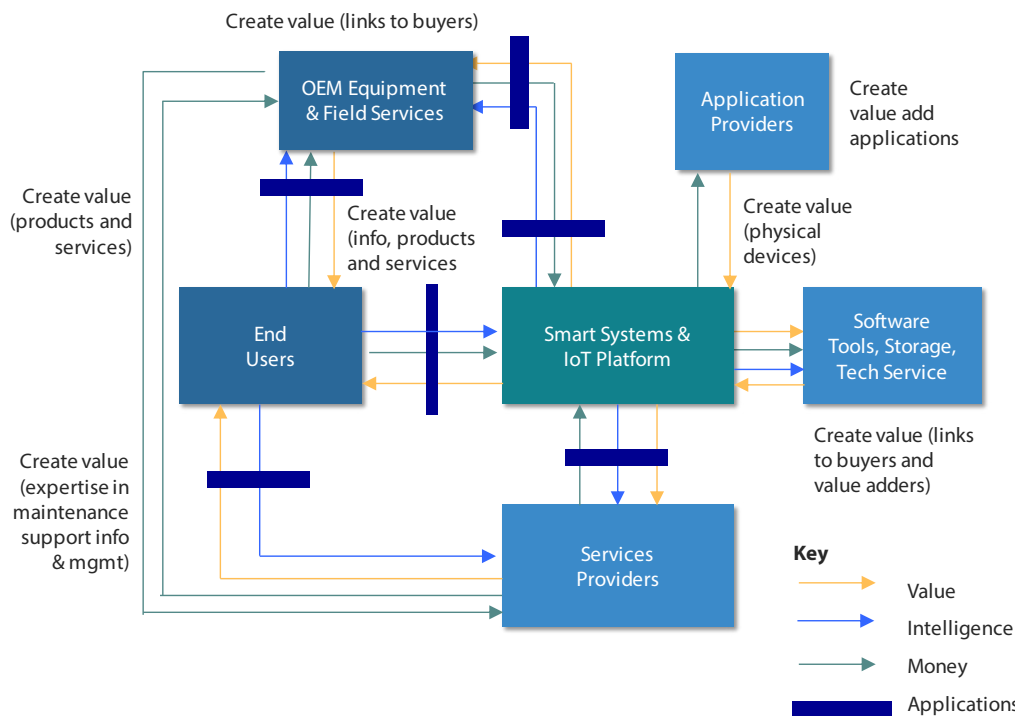
What distinguishes collaboration networks is their "distributed" nature; the fact that these systems need to align and compliment entirely new modes of innovation, are more interactive and require users and developers to collaboratively develop new applications that generate new data types, information and content is, in the end, vary foreign to today's typical OEM.

Executives in many product manufacturing companies are only just beginning to understand the opportunities driven by the complicity between collaboration tools, networked device

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

But this raises many questions concerning the mode of collaboration a company should consider focusing on developing. For example, should a company open up its traditionally proprietary product design technology to a community of collaborators? 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.

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. 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 embrace new technologies are surpassed by those who take advantage of the latest innovations.

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 and with the users, customers collaborators themselves. 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.

A TRUE "INFORMATION AGE" FOR BUSINESS

OEM businesses that are adopting new Smart Systems and Services technologies all are vigorously debating the evolving nature of business and profit models driven by digital, smart systems and IoT technologies. 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.

Defining Ecosystem Scope and Attributes
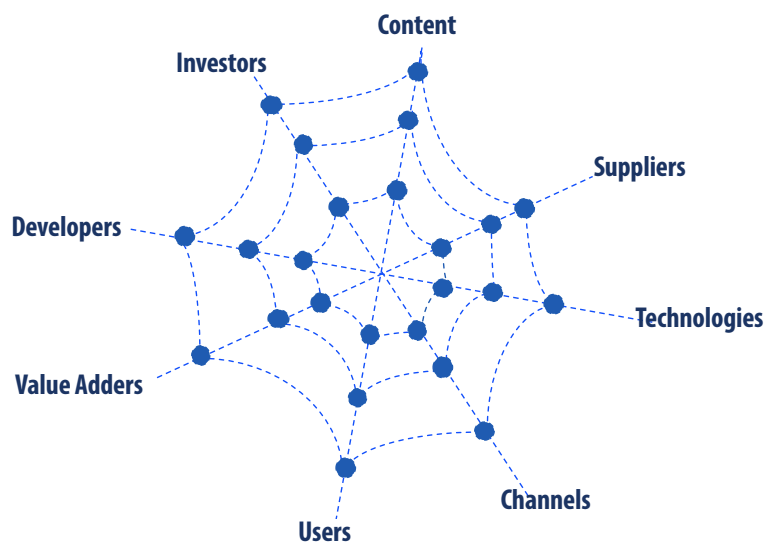
Economic or Business Ecosystem

An economic ecossytem is a set of companies that use a common architecture to deliver independent elements of an overall value proposition that grows stronger as more companies join the set

Examples

Enterprise IT
Embedded systems
Internet of Things (IoT)
Industrial automation systems

Technology Ecosystem

Technology ecosystems are centered around architectures or platforms that the users have for the particular economic focus being described -- the different approaches companies take in providing the broader economic web

Examples

Infrastructure
• Azure
• Amazon
• Google
New Developer Tools

Value Solution Ecosystem

Value ecosystems are combinations of companies that compete with each other based on the technology web they have chosen

Examples

SalesForce

Company Ecosystem

A company ecosystem is the set of a company's relationships that contribute to its competitive position

Examples

Microsoft
Intel
SAP
Cisco

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Differentiation, value addition, and brand-identity will now occur at a higher level, not at the core. 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.

Rather than owning declining-profit commodities, companies will own their particular innovations, whether in technology or services, and they will also own the stream of device-data coming in from their connected systems in the field. Most importantly, thanks to that device-data, companies will "own" their relationships to customers in ways never before imagined. What happens after that point depends upon the strategy adopted. A company could, for example, "lease" part of its stream of customer-information—and thus part of the customer relationship—to another company wishing to provide value that is not part of the first company's business. Other relationship owners could lease relevant parts of their own customer information back, or share information in a joint venture or some other arrangement.

Collaborative communities are such a valuable strategy because they offer many decisive advantages:

- **Uniqueness:** There is a central tension in technology markets. Revenue growth requires collaboration, but sustained profits requires uniqueness. Collaboration requires that knowledge be shared. Participation speeds the flow of information and knowledge (driving growth) without foreclosing all opportunities to achieve unique advantage (driving profit).

- **Scale and Scope:** Fast! Collaboration communities "fast-track" the development of new markets when the network of contacts acts as the "market" before such a market exists, keeping all interested parties effectively linked as the whole opportunity takes shape. Communities ensure that the environment provides the parallel and enabling capabilities needed for success.

- **Coordination in Undeveloped Markets:** The heart of any not-yet-existent market is a changed view of how people might use that technology to achieve desired goals. Networks bring together sources of expertise and provide coordination so that each "strand" of the community can work on a distinct piece of the total solution.

- **See the Future:** Plotting an effective course in emergent markets requires great peripheral vision. A collaborative community connects many participants and knowledge, some of which may have no direct impact on their business today, but any of which may be keys to success tomorrow. Efficient management of these informational links is critical to the success of individuals, businesses, and the community as a whole.

- **Help Shape the Future and Ride the Next Wave**: Collaborative communities are clear expressions of the "power of knowledge." Those with the best position in the community can influence what others believe, and hence, what they do.

ABOUT HARBOR RESEARCH

An internationally recognized strategy consulting, design and technology research firm, Harbor Research has predicted, tracked, and driven the development of Smart Systems, Services and the Internet of Things since our inception in 1984. While our history is long, our strategy is simple: create value for our clients by combining creative facilitation with rigorous analysis and systems-focused thinking. It is this mindset that has given us the privilege of working with leaders in some of the greatest companies in the world. In the same way that the market has flexed and grown over the years, our services and experience have evolved to better serve our clients. We work with clients in a variety of ways including strategy consulting, business model development, solution design services, advisory, research and content development and collaborative facilitation.

THOUGHT LEADERSHIP

We provide our clients with rigorous analysis and unique insights to support the development of new growth strategies and solutions. Our research, content and modeling work provides an ideal context for discovery and ideation. We combine market intelligence with creative decision making forums in a mutually supportive mode.

UNIQUE PROCESSES

There is no simple "linear" process to drive new smart systems innovation. Iterative, nonlinear methods are important because design innovation is a process of exploration and discovery. Our methods facilitate new thinking and unexpected concepts and ideas that drive tangible customer and market impact.

VIBRANT COMMUNITY

Building new smart systems and digital growth ventures requires new and different modes of design, development and collaboration. We tap our community of innovators and thought leaders to help organizations push the boundaries of collaboration to include new and unfamiliar participants that help foster new insights and creative perspectives.