The Internet of Things Journey

A Research Report on the Evolving Challenges & Opportunities Underlying Business Adoption of the Internet of Things

xively by LogMeIn

Smart Systems Design | Harbor Research

Companies across every industry are entering to a new era of connected business. One characterized by the ability to connect any object, device, person, network, or action to the Internet, a concept often termed the Internet of Things (IoT). Harbor Research found some 4.3 billion devices came online in 2015 alone, signaling activity, investment, and adoption in the Internet of Things is at an all-time high.

But despite this frenzy of activity, the reality is that few executives and business developers are actually confident in their Internet of Things (IoT) strategies—never mind the steps and resources required to effectively navigate execution against such strategies. Moreover, there is a pervasive need, not just to understand and strategize around the potential benefits of IoT, but to truly recognize the challenges associated with such initiatives.

To aid in this understanding, LogMeIn's Xively Division, the IoT Advisory Board for Xively, & Harbor Research conducted a joint research study, surveying some 600 product manufacturers to gain a deep understanding of their motivations, developmental resources, challenges, and critical collaborations driving successful connected product deployments.

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EXECUTIVE SUMMARY

1 THE INTERNET OF THINGS IS TRANSFORMING THE PRODUCT COMPANIES

» 61% of product manufacturers are actively embarking on the IoT journey; An additional 20% surveyed plan to be within 12-18 months

2 CONNECTED PRODUCT MANUFACTURERS REPORT MASSIVE IMPROVEMENTS IN CUSTOMER INSIGHTS AND BUSINESS PROCESS EFFICIENCIES

» 95% of connected product manufacturers report improved customer insights; Moreover, some 9/10 surveyed cite improvements to customer support, product performance, even revenues as a direct result of connected product data

3 THE IOT JOURNEY IS NOT WITHOUT DIVERSE CHALLENGES, VARYING BEFORE, DURING, AND AFTER LAUNCH

» Early on, product companies struggle with designing connected systems and launching connected products

» As deployments mature, manufacturers face the ongoing challenge of innovating and scaling deployments securely

4 CONNECTED PRODUCT MANAGEMENT TOOLS INTEGRATED WITH EXISTING BUSINESS APPLICATIONS SUPPORT THE CHALLENGE (AND OPPORTUNITY) OF MAKING DATA ACTIONABLE

» Product Manufacturers cite CRM, Analytics, and Security systems as essential integrations for developing new services and efficiencies, but report integration and data management as the top barriers to taking action with connected product data embarking on the IoT journey; An additional 20% surveyed plan to be within 12-18 months

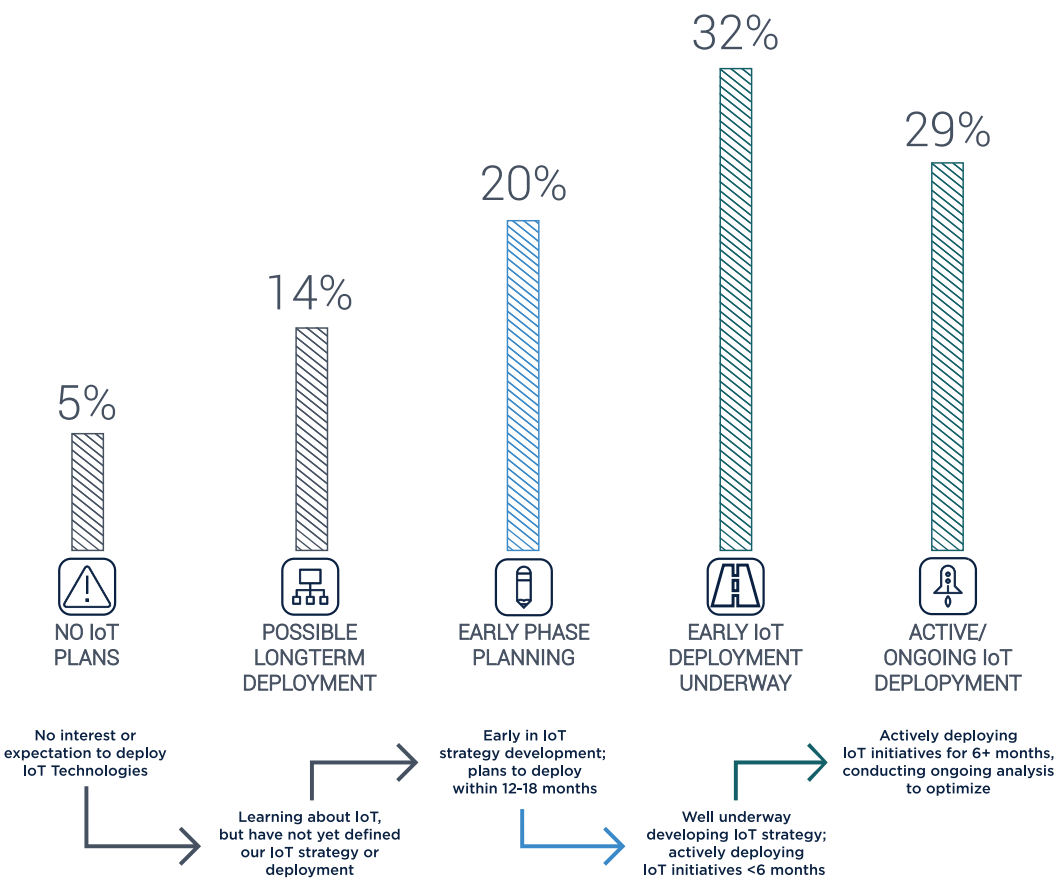
DATA REVEAL PRODUCT MANUFACTURERS ARE ACTIVELY PLUNGING INTO IOT

Awareness of this phenomenon is growing rapidly. Having observed the far-reaching impacts digital (e.g. social media, cloud, mobile, etc.) has had already, organizations are looking ahead and actively engaging with emerging technologies. Investment in the Internet of Things grew some 35% in 2015 alone. Our research finds a strong majority (65%) of product manufacturers are well familiar with the concept of IoT. In fact, of the 600 product manufactures we surveyed for this research, about 30% were actively underway with connected product deployments having been so for six months or more. Another 52% report they are actively planning IoT strategies and initiatives for deployment over the next 6-18 months. (Reference Exhibit 1.)

This is a sea change for the manufacturing sector. That some 81% of product manufacturers—producing everything from wind turbines to toys—are already planning to or already underway with connecting their previously analogue products, suggests a massive transformation is sweeping through manufacturing.

But despite such intentions, many organizations fail to realize that connected product deployment is uniquely complex and often without any precedent. To deploy IoT is not about purchasing some sensors and software licenses and checking IoT off the list of technology investments. It is not a 'set and forget' investment. Effective IoT deployments are not a destination, but an ongoing journey; one for which value is continuously defined and refined along the way, across products, services, processes, stakeholders, and end users. This new era of technological and business architectural alignment requires a new way of thinking.

Exhibit 1: Manufacturers' Participation in the Internet of Things



Q. On a scale of 1 to 5, how would you characterize your business' current interest and deployment plans with the Internet of Things? Base = 508

Source: Harbor Research

THE INTERNET OF THINGS TRANSFORMS PRODUCT COMPANIES

Although IoT investment is skyrocketing, the reality is many product manufacturers are still viewing it [reactively] as another technological investment to make in their relentless quest to extract more value and efficiencies. Our research finds that when "selling" the IoT initiative internally across key stakeholders and leadership, companies surveyed anticipate efficiency gains as the single greatest benefit. (Reference Exhibit 2.) Companies begin their IoT journeys focused on efficiency… but IoT is about more than efficiency gains.

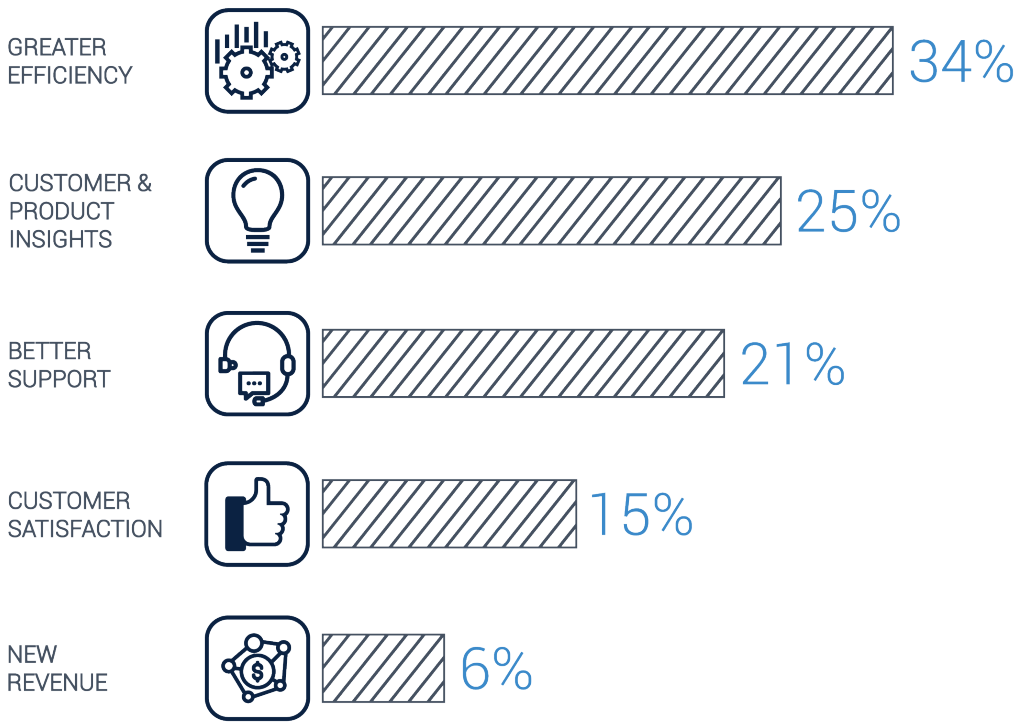
To become a data-driven business requires transformation of the very mode of thinking that has dominated product businesses since their inception:

The greatest value a product offers customers is no longer limited to the product. Rather, IoT requires product companies think about products as systems.

Product-centric companies must now think beyond the physical form of the product and consider how the data, function, and context of the product create new value through insight, services, and interactions. They must transform from product-oriented business models to service-oriented business models, enabled through product data. This is, understandably, a fundamental hurdle for traditionally product-centric organizations to overcome. After all, if the focus shifts beyond the product, product manufacturers and retailers must consider significant modifications or entirely new business models.

Although many of the world's leading manufacturers have been around for decades, they now face a sudden and uncomfortable reality: sticking to an analog product hinders their ability to be competitive in a digital world. Companies offering 'just a product' without data-driven service models to support innovation will become obsolete. Collecting and integrating data from products are the critical underpinnings to developing data-driven service models in the first place.

Exhibit 2: Most Anticipated Benefits of IoT



Q. When "selling" the IoT initiative internally across key stakeholders and leadership, what is/was the single most anticipated benefit? Base = 482

Source: Harbor Research

The risks of staying analog are far-reaching. They include:

» Inability to react to product or customer issues as quickly as competitors. Connecting products and integrating data sets become central to meeting customer expectations for rapid, even real-time decision-making and resolution.

» Inability to be proactive to support product malfunction, automate resolution, and prevent negative customer experiences. Without connecting products, manufacturers will never be able to preemptively identify, never mind resolve, issues before they occur.

» Inability to rapidly innovate products and services by leveraging real-time product and customer insights and interactions to streamline research and development. This eliminates the time-intensive guessing game of traditional market research methodologies.

Connected product data doesn't just accelerate product innovation, it becomes central to service innovation as well. As product data powers new service-related business models, manufacturers must provide new features, user experiences, and customizability if they wish to survive. That product manufacturers aren't typically in the service industry only compounds this competitive risk.

The opportunities the Internet of Things offers every business are manifold. One of the reasons the convergence of sensing, mobile, cloud, and networked technologies culminates in so much business value is because its impacts compound with each connection.

Connecting a product— a lightbulb for instance—doesn't just result in data derived from its on or off state. A connected lightbulb might also stense temperature, humidity, foot traffic, LED performance, mobile device presence, creating entirely new service opportunities for lighting manufacturers, commercial adopters, even end users.

These might include, but aren't limited to…

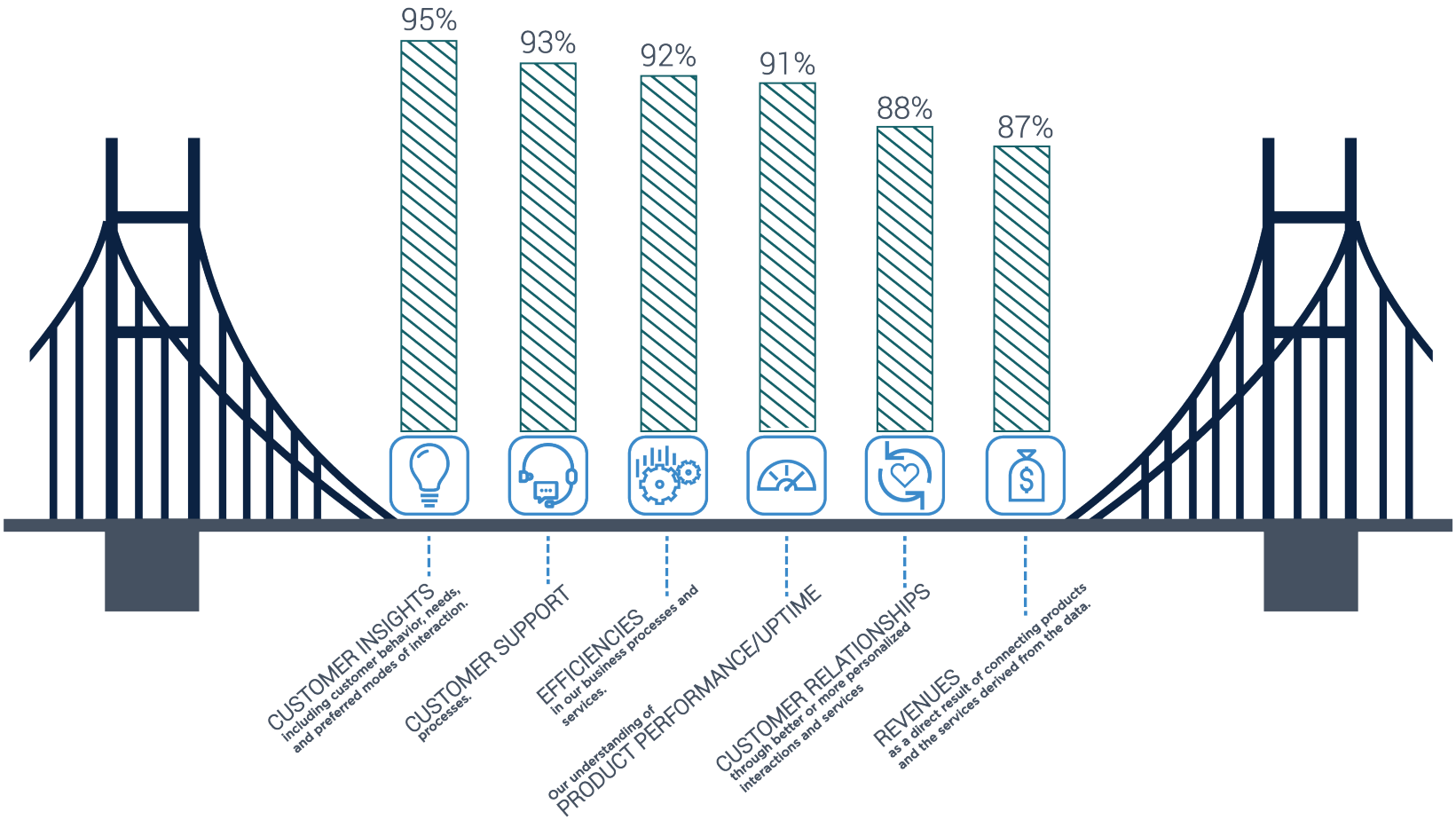
» Preventative maintenance
» Predictive maintenance
» Energy management and conservation
» Security services
» Automated control
» Performance reporting and analytics
» Occupancy detection and traffic monitoring
» Customer experience personalization and product engagement
» Interoperability with other RFID, GPS, mobile, beacon, or connected nodes

Connected lighting also enables energy and cost efficiencies for its operators—residential or commercial— by automating its state based on motion or proxemics sensing. Taken in aggregate, networks of connected lightbulbs also enable broader efficiency gains for utilities providers operating municipal energy grids. What all of this compounded value means is that the Internet of Things doesn't just enable new opportunities at the product level, but it transforms the entire product and customer lifecycle.

OPPORTUNITIES FOR PRODUCT MANUFACTURERS ON THE JOURNEY FROM THINGS TO SYSTEMS

Organizations already underway with IoT initiatives report significant improvements from IoT implementations. Despite anticipated efficiency gains (reference Exhibit 2), product manufacturers that have already deployed connected products cite actual improvements far beyond— in customer and product intelligence and support.

Exhibit 3: Business Improvements as a Result of Connected Products



Q. Having connected your product, indicate with which of the following statements you agree?

Base= 308

Source: Harbor Research

OPPORTUNITIES FOR PRODUCT MANUFACTURERS ON THE JOURNEY FROM THINGS TO SYSTEMS

IMPROVED CUSTOMER INSIGHT IS THE MOST FREQUENTLY REPORTED BENEFIT OF IMPLEMENTING CONNECTED PRODUCTS

To transform from an analogue product to a connected product transforms manufacturers' visibility into how customers interact with their products—the nature, time, location of each interaction, each user, their use cases, preferences, and ongoing needs across the lifecycle of the product.

Not only do connected products enhance customer insights, this is the most immediate benefit product manufacturers report. Interestingly, our data suggest that product data may yield improvement to insights about customers faster than about products. Although still a high percentage overall, 87% of those in the first six months of IoT deployment cite product performance improvements compared to 96% of six months+ into their deployments, whereas 95% of respondents in the early and active phases point to improved customer insights as top benefit.

CUSTOMER SUPPORT IMPROVEMENTS RESULT FROM GREATER CUSTOMER INSIGHTS

Because companies can provide better, more personalized reactive and proactive support. Insight into product usage, functionality, and uptime enables product manufacturers to see when products are faltering. Such data also yield visibility into how customers are using associated product or mobile apps for support content, Q&A, support inquiries, etc. Thus it's not difficult to see how connected product data integrated with critical support tools like CRM provide actionable context for service organizations.

EFFICIENCIES ACROSS BUSINESS PROCESSES & SERVICES IMPROVED FOR 91% SURVEYED

Collecting data directly from products and customers, feeding data into relevant systems drives significant efficiencies across multiple operational processes. Common connected product data integrations our research finds:

- Supplement up-sell and support context for agents through integration with CRM systems
- Incorporate real-time analytics into product lifecycle management systems
- Integrate orders for replacement parts into inventory and invoicing systems

Efficiencies gained across the above examples impact multiple business functions in the process—Sales, Marketing, Service, Finance, Operations, Supply Chain, and Product, etc.

PRODUCT PERFORMANCE IMPROVEMENTS ARE THE INHERENT OPPORTUNITY OF CONNECTED PRODUCT DEPLOYMENT

Companies' ability to better understand product uptime, downtime, and functionality is, central benefit of connected product deployments. Although deeper intelligence of products' and customers' behaviors and lifecycle needs enable longer term benefits, visibility into product performance is the foundational step (and enabler) to driving new services and business models.

OPPORTUNITIES FOR PRODUCT MANUFACTURERS ON THE JOURNEY FROM THINGS TO SYSTEMS

CUSTOMER RELATIONSHIP IMPROVEMENTS FLOW NATURALLY FROM IMPROVED CUSTOMER INSIGHTS, SUPPORT, AND EFFICIENCIES

Nine out of ten connected product manufacturers report improved customer relationships in both the early and more mature phases of IoT deployment. (Reference Exhibit 3.) Such relationships improve when companies can better wield customer and product data to create more integrated, anticipatory, efficient, even invisible value for end customers.

Of course, companies must align more than technology systems and data to achieve deeper relationships. They must align stakeholders, partners, and channels, and have the adequate resources in place to deliver on customer expectations. Lest, the impact on customer relationships will trend opposite from improvement…

IMPROVED REVENUES REPORTED FROM 87% OF CONNECTED PRODUCT IMPLEMENTATIONS

Connected product data can at once decrease costs and/or increase net new revenues, for example:

- Increased efficiency in labor costs for service agents and field technicians
- Increased revenue and/or customer retention through timely upsells (e.g., preventing product/ service malfunction and customer frustration)
- Faster identification of issues in product or service experience
- Increased efficiency in supply chain management

Although our survey found just 6% of companies are justifying IoT investment through guaranteed new revenue, some 87% of those who had deployed connected products report increases in revenue as a direct result.

While IoT presents opportunities beyond revenue generation, our study suggests revenue results from nearly nine out of ten deployments.

PRODUCT MANUFACTURERS' JOURNEY FROM PRODUCT-CENTRIC TO SERVICE-CENTRIC REQUIRES A BROADER PERSPECTIVE

The benefits IoT offers organizations aren't just monetary; from customers, products, and services, to business functions, partners, and processes, they span the entire business. As connected products become part of broader systems and multiple functions help support their success in these systems, connected product deployments are best viewed as business initiatives, not solely Product or IT or Marketing or Sales initiatives.

While awareness and investment in IoT opportunities are growing, the reality is that many companies struggle to fully embrace the scope and support required to fully recognize such benefits, never mind the diversity of challenges along the way.

CONNECTED PRODUCT DEPLOYMENT CHALLENGES VARY BY PHASE OF JOURNEY

The challenges companies deploying IoT face cannot be understated—They are diverse, complex, often unprecedented, and vary widely given the backdrop of each organization's context, culture, and existing IT and business architectures. Underscoring this complexity, data reveal challenges can vary based on where companies are in their connected product deployments.

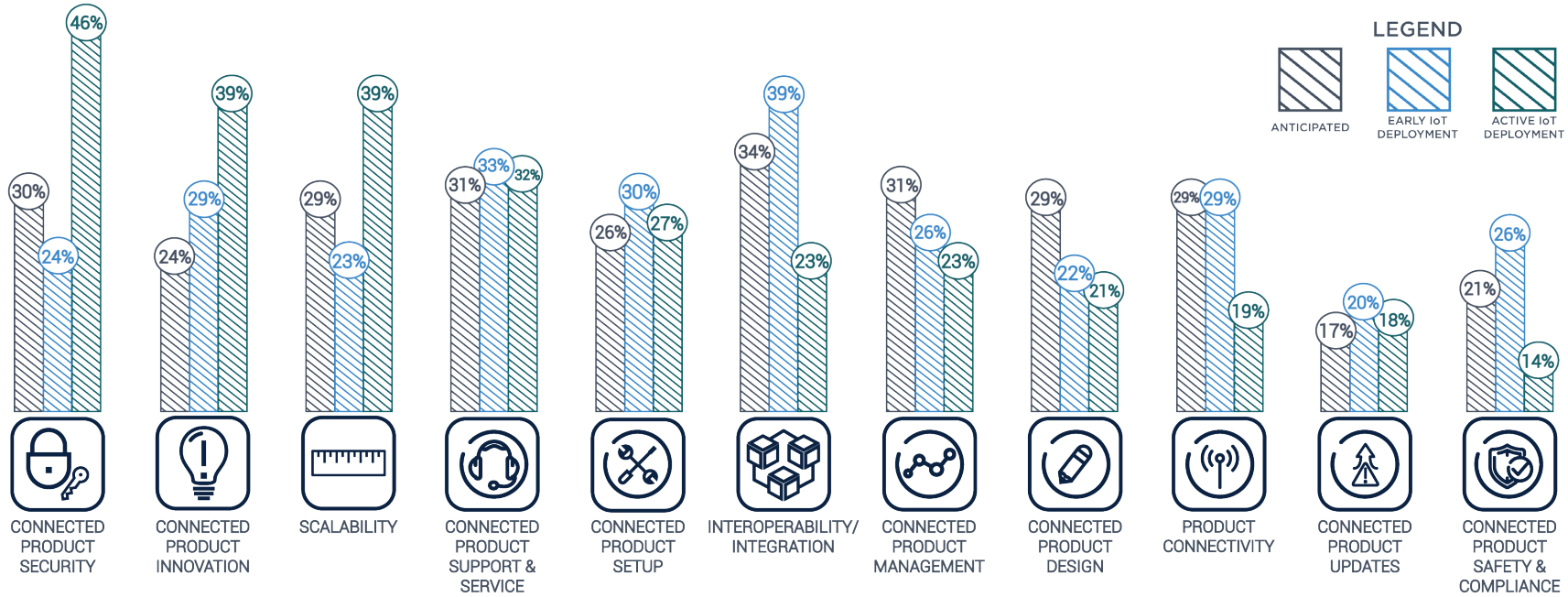
Along any journey, different challenges and roadblocks spring up at different times—some expected, others unexpected. As manufacturers move from planning to implementation, from implementation to ongoing management, challenges shift. We asked manufacturers to identify their primary challenges across three phases:

» **Anticipated:** During the connected product planning and development phase

» **Early IoT Deployment:** During the first 6 months of product deployment

» **Active IoT Deployment:** Connected products have been deployed for 6 months or more

Exhibit 4: Greatest Challenges of Connected Product Deployments



Q. Having deployed / where do you anticipate the greatest challenges/friction in developing your connected product? Base = 482

Source: Harbor Research

PRODUCT MANUFACTURERS FACE DIVERSE CHALLENGES ALONG THE JOURNEY TO IOT

EARLY ON, COMPANIES FACE CHALLENGES AROUND THE DESIGN OF BOTH PRODUCT & SYSTEM

Product manufacturers in the planning phases (i.e. not yet deployed) anticipate their greatest challenges center around aligning the product with its vision. Top challenges reported reflect concerns around properly designing, integrating, and managing connected products in order to be able to extract value in the first place. The top three perceived challenges reported during the planning phase are:

» Interoperability
» Connected Product Management
» Connected Product Support

Focusing heavily on design in the planning phases, data suggest a key challenge product companies underestimate is the ability to deliver product innovations over time.

"Designing a system to integrate everything we do is challenging and time consuming for us. Our biggest need is to improve on the interoperability and fully integrate with current systems."

For those in the early phases of deployment, data suggest a transition from anticipated challenges to actual challenges, where the focus shifts from design of products and systems to actually making them work. The top three challenges for those in the early stages of deployment are:

» Interoperability
» Connected Product Set-Up
» Product Connectivity

Ensuring reliable set-up and installation of connected products is critical for driving adoption, whether consumer or employee. In addition, issues around connectivity stifle any hope of extracting the core benefits of IoT (Reference Exhibit 3.) Finally, interoperability is most challenging in this phase because it sets a precedent; product companies typically begin by integrating connected product data with their existing business applications (e.g. CRM, ERP, etc.). If issues crop up here, the likelihood for integrating with other systems and devices suffers; as does the potential for richer context, measurement, and user experiences enabled through interoperability.

AS DEPLOYMENTS MATURE, PRODUCT COMPANIES ENCOUNTER THE ONGOING CHALLENGE OF INNOVATING AND SCALING DEPLOYMENTS SECURELY

Once companies are well underway with their deployment, the most common challenges reported reflect longer-term objectives. They underscore the ability to provide ongoing support across the most critical areas for product evolution. The top three challenges reported by companies whose deployments were underway for six months or more were:

» Connected Product Security
» Connected Product Innovation
» Connected Product Scalability

Each of these areas requires ongoing attention, management, and investment. Securing connected products and systems is a 24/7/365 requirement to safeguard against ever-evolving cyber threats. Meanwhile, innovation and scale are imperatives driven by customer, partner, and shareholder demand. If these needs remain unmet, product companies don't just suffer waning costs, they risk competitive usurp.

"Our biggest roadblock has been security. Our consumers often download programs and apps on their devices, sometimes those programs and apps come with malware, and these can affect our products that were installed in our customers' homes."

PRODUCT MANUFACTURERS FACE DIVERSE CHALLENGES ALONG THE JOURNEY TO IOT

ACROSS THE BOARD, RESPONDENTS EMPHASIZE CONNECTED PRODUCT SUPPORT & SERVICE

Finally, for companies across each of the above phases of the connected product deployment journey, Connected Product Support & Service emerged as a critical need. To navigate connected product deployment effectively, companies must anticipate support and service needs not just along their journeys, but their customers' journeys as well. Just because a previously analog product now connects to the Internet doesn't mean it's inherently better. In many ways, the ability to provide adequate support structures are paramount for delivering initial and ongoing value to end users.

It is also worth noting the relatively low variance between challenges. This suggests businesses are running into a variety of significant roadblocks during connected product deployment. But challenges also don't end there.

CONNECTED PRODUCT-RELATED CHALLENGES DON'T END AT DEPLOYMENT

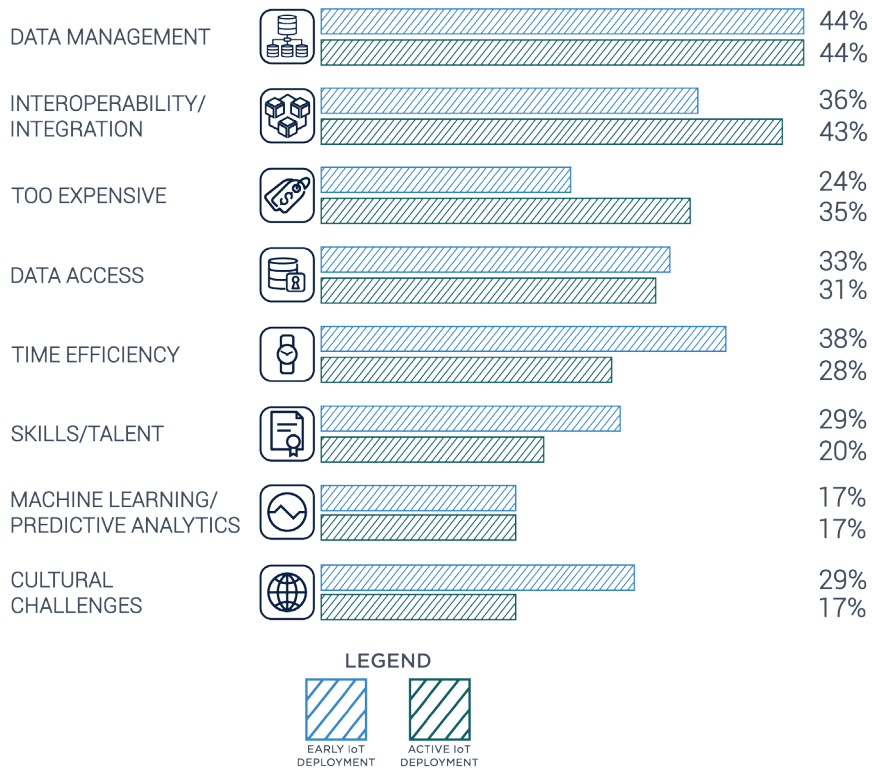
As more and more objects come online, more and more data becomes available. More than 1.8 trillion gigabytes of data were created globally in 2011, and this figure will grow 50x by 2021. Harbor Research found that the amount of data stored from connected devices grew by 18 exabytes in the past year alone, an increase of 37%. Of course, the issue of making actionable mountains and mountains of raw data is not exclusive to connected objects and devices. But it is compounded by them.

We may be collecting more data, but to what extent are we actually using it to make better decisions?

WHEN IT COMES TO ACTUALLY USING DATA, MANAGEMENT IS THE CENTRAL ISSUE

Managing data, never mind knowing how to properly activate it for better decision-making, is the paramount challenge for most businesses today. Our survey of connected product manufacturers reveals that the same is true for those deploying IoT initiatives.

Exhibit 5: Challenges of Using Connected Product Data



Q. What have been the biggest challenges you`ve faced when it comes to actually using the data you collect to make better decisions and improve processes and services?

n = 308

Source: Harbor Research

Connected product manufacturers report Data Management and Interoperability as the top two areas stifling their ability to effectively act on data collected.

PRODUCT MANUFACTURERS FACE DIVERSE CHALLENGES ALONG THE JOURNEY TO IOT

THE CHALLENGE OF DATA MANAGEMENT IS A FUNCTION OF ITS COMPLEXITY

Why is data management such a challenge? The usability of data is a direct function of an organization's ability to capture, store, and analyze it effectively. Yet, managing data introduces a complicated set of needs, skills, and challenges for which many product companies are inadequately prepared.

First there is often unprecedented learning curve of data science related to connected products. How do we manage the transition of a product from one state to another? What influences that state transition in the first place, and how do we measure its effectiveness? Such solutions require rules engines and orchestration to make the most of data in the analysis and service automation process.

Even once rules and structures are established, there is usability of the data itself. Multi-faceted datasets generated from multiple sources possess different standards, formats, and granular variances which make rapid analysis, (never mind automation) of such data sets an ongoing challenge. Datasets from external sources are subject to format changes and revisions, which require source-checking. Then there is the risk of analyzing inaccurate or inconsistent data, rendering and then acting on false knowledge—which is, at best, useless, and at worst, damaging or dangerous.

Data management also accounts for critical builds to address compliance, emissions, and data security, two of the most complicated areas of connected product implementations given the evolving nature of data architectures and Internet jurisdiction.

Without proper capabilities for data processing, data environments become wastelands of fragmented information. To extract value from connected product data, to render the information actionable requires data are usable in the first place, especially when integrated with other enterprise applications. Without sophisticated data management, greater volumes of data simply will not translate to greater intelligence.

CONNECTED PRODUCT COMPANIES REPORT INTEROPERABILITY A CORE CHALLENGE TO BUILDING & DECIPHERING CONTEXT

The goal of data-driven business intelligence is to feed data into other business applications (e.g. operational systems, trade and risk applications, sales, marketing, supply chain systems, invoicing, and so on) in order to better build and decipher context for users to make decisions. But integration is easier said than done. Our research found that those actively deploying IoT emphasize the Interoperability of all that data as the greatest hindrance to effective use of data.

SYSTEMS INTEGRATIONS—FOREMOST CRM— ARE FOUNDATIONAL FOR ENHANCING EXISTING CUSTOMER & PRODUCT DATA SETS

The imperative for Interoperability isn't just with other products or devices—a central challenge to realizing the value of systems over products— it is also with other IT systems. Our survey found that companies are planning integration of their connected products with a variety of systems. Yet, the reality is for those getting underway with connected product deployment, CRM and Data Analytics tools are most commonly integrated systems. As deployments mature, respondents point to these additional systems integrations critical for new services and efficiencies:

- Security systems
- Enterprise Resource Planning (ERP) systems
- Product Lifecycle Management (PLM) systems

Challenges around effectively wielding data evolve as IoT initiatives evolve. For those early in IoT deployment, the struggle to manage data effectively inhibits efficiencies due to the time it takes to process data as well as a general lack of adequate talent to mine the data. Internal cultural barriers often add to challenges hindering usability of data especially before early pilots achieve tangible return on investment (ROI).

PRODUCT MANUFACTURERS FACE DIVERSE CHALLENGES ALONG THE JOURNEY TO IOT

Effective IoT deployment is hardly a simple recipe; adding a layer of analytics on top of an internet-connected product is not the ticket to achieving the vision IoT promises. What product companies must realize is that connecting devices is only the beginning. The ongoing management of data, products, device and user identities, security, storage, insights, integrations, etc. is central to the very function and scalability of the deployment. That connectivity, ongoing management, and support are at once rife with challenges, yet foundational to the success of IoT initiatives, underscores the importance of the collaborations and partnerships to guide and support product companies along the way.

The realization that products must now become data-driven systems underscores both the opportunities inherent to connected product data, but also the importance of collaboration and alignment in the face of significant challenges.

"It's been really tough to analyze and make sense of all the data. From that standpoint, a lot of success comes down to finding the people or partners with the talent to make the system fully functional."

"A big struggle of getting this off the ground has been achieving interconnectivity between connected product data and other systems. Another has been ensuring truly skilled on-site labor."

"Dealing with the massive amount of information generated in a structured and formalized manner... that has been a paradigm shifting struggle."

PRODUCT MANUFACTURERS' TRANSFORMATION FROM PRODUCTS TO SYSTEMS REQUIRES COLLABORATION

INTERNALLY, CONNECTED PRODUCT INITIATIVES REQUIRES A CROSS-DISCIPLINARY STRATEGY

Internally, connected product initiatives require cross-disciplinary collaboration from day one. To understand connected product opportunities is to realize they require the insights, systems, and resources of multiple business functions.

Although our research finds less than 1/10th of product manufacturers surveyed have a dedicated cross-functional 'IoT Committee" team to lead strategy development, the reality is that such multi-disciplinary collaboration helps accelerate IoT initiatives. Based on our extensive client experience, Harbor Research recommends this as a best practice in order to gain awareness, accountability, ideation, and ultimately buy-in from all relevant business units as soon as possible. Data-driven use cases are best served through alignment, measurement, training, and incentive across all relevant functions.

IT & PRODUCT TEAMS LEADING IOT STRATEGY DEPLOYMENT... BUT NOT WITHOUT CROSS-FUNCTIONAL COLLABORATION

Our research finds that IT, Product Management, & Operations are leading the IoT charge for the majority of companies deploying IoT today. These functions dominate strategic development during both the early and more active phases of deployment. In practice, the extent to which different functions are involved in deployments depends on the phase and maturity of the deployment. Respondents in the early phases, for instance, list Sales and Marketing as key contributors, as they design new business models, value propositions, and messaging to support new offerings. Customer Support is also integral throughout planning, implementation, and ongoing management of IoT initiatives. In fact, our survey found Customer Service functions were among the top departments leading IoT strategy for nearly half of those in the planning phase.

Developing alliances and partnerships isn't just critical within the walls of the organization, but increasingly through external partnerships as well.

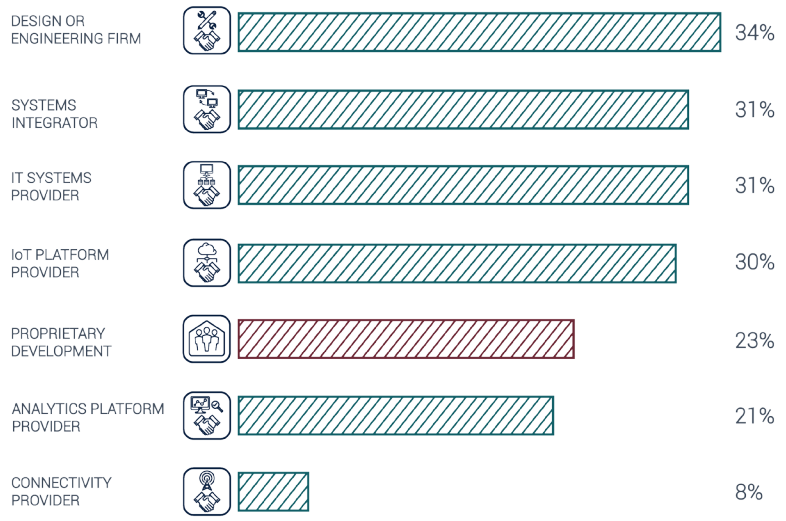
EXTERNAL ALLIANCES EMERGE AS THE LONG-TERM COMPETITIVE ADVANTAGE

The transformation from products to systems places greater emphasis on the broader ecosystem. Our research at Harbor finds that the best IoT strategies aren't executed alone;

Companies need partners to serve multiple phases of the IoT deployment journey.

Our research found that the majority of companies surveyed are partnering with a variety of technology partners to manage connected device data. Data suggest a fairly even split across Design & Engineering firms, System Integrators, IT Systems providers, and IoT Platform providers. (Reference Exhibit 6.)

Exhibit 6: Departments Leading IoT Strategy Development



Q. Which department or function is leading your company's IoT strategy development? Base = 482

Source: Harbor Research

PRODUCT MANUFACTURERS' TRANSFORMATION FROM PRODUCTS TO SYSTEMS REQUIRES COLLABORATION

When it comes to the ongoing management of connected product data, many product companies today underestimate the need for dedicated support, security, and intelligence. (Reference Exhibit 5.) Rendering data actionable is easier said than done, and often partnerships offer product companies the leverage, expertise, and peace of mind to expend less on new skill development and more on innovating core competency.

MANUFACTURERS DEVELOPING PROPRIETARILY RISK DERAILING THEIR OWN CONNECTED PRODUCT PROGRESS

Despite the significant challenges spanning the entire connected product deployment journey, our research finds that nearly a quarter of product manufacturers are still developing connected product initiatives themselves, through proprietary efforts. Those developing solutions themselves report top challenges around product management and product set-up, and point to cost and skill inefficiencies when it comes to extracting value from the data their internally built products generate.

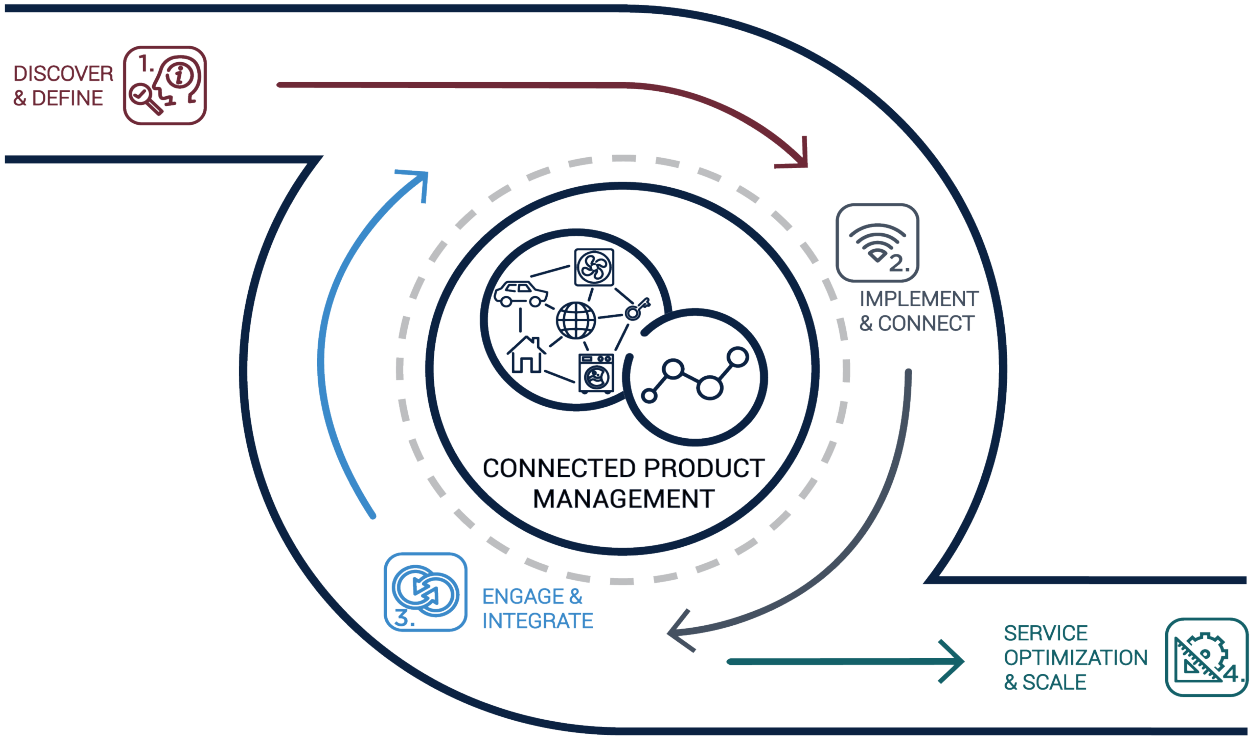
Product manufacturers risk derailing their own progress, resource efficiency, and ability to scale by solely developing internally. To see beyond what may have once been a competitive threat or waste of resources is to understand the inherent strength of leveraging the ecosystem. What product companies must remember is, whether partnering or building proprietary, focus must remain on the core strengths, differentiators, and competencies of the brand.

THE ROAD TO DESIGNING & MANAGING CONNECTED PRODUCTS

With the emergence of connected products and information-based services, more and more complexity underlies the design of systems and services as well as in the core of the product. Harbor Research strongly believes this environment requires combinations of several disciplines, partners, and methods in order to adequately architect and manage connected products and the smart systems they enable.

Like any great journey, the road to effective connected product deployment requires well defined objectives, milestones, and a willingness to discover and adapt along the way. We recommend product manufacturers chart their connected product development journeys over four essential phases.

Exhibit 7: The Road to Connected Product Success

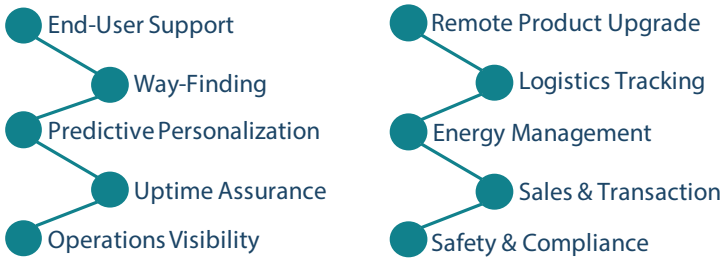


Source: Harbor Research

1. DISCOVER AND DEFINE THE CONNECTED PRODUCT OPPORTUNITY

The discovery phase lays the groundwork for new thinking and context to forge the alignment of business and technology architectures. This is also the time to align with other key business functions. Product companies must begin by looking at the growth and disruption opportunities, how they can wield technological disruption and market uncertainties as competitive advantages, and assess readiness and return within these contexts. Once companies have a [re-] evaluated their customer needs, interaction opportunities, and competitive positioning, they must identify, and define the solution's objectives, use cases, and initiatives. Data-driven use cases for connected products are diverse; companies must assess opportunity, feasibility, and prioritize.

What many companies quickly realize is the solution to strategic prioritization for IoT lies in an assessment and gap analysis of current feasibility and organizational resources.



In an effort to accelerate the due diligence process, Xively and Harbor have developed a simple checklist. (Reference Exhibit 8.) This checklist is tool designed both to identify the most significant challenges product manufacturers face during connected product deployment, and 'take inventory' of the organization's ability to address these challenges. It's important to assess feasibility not just during implementation, but along the entire product and data management lifecycle.

Exhibit 8: Assess Feasibility Against Common Connected Product Lifecycle Challenges

IDENTIFY CHALLENGES		FEASIBILITY (RESOURCES•TALENT•METRICS)	KEY PARTNERS
CONNECTED PRODUCT SECURITY	ARE WE ABLE TO PROVIDE ADEQUATE SECURITY TO OUR CONNECTED PRODUCT, IN THE EVENT OF HACKING, MALWARE, DATA BREACH, OR OTHER THREATS?		
CONNECTED PRODUCT INNOVATION	ARE WE PREPARED TO PROPERLY HARNESS FEEDBACK VIA ANALYTICS, CUSTOMERS, OR OTHERWISE TO OPTIMIZE THE PRODUCT FUNCTIONALITY OR EXPERIENCE?		
SCALABILITY	ARE WE PREPARED TO DEPLOY CONNECTED PRODUCT CONCEPTS OR CAPABILITIES TO OUR FULL SUITE OF PRODUCTS, OR ACROSS OUR OPERATIONAL ENVIRONMENTS?		
CONNECTED PRODUCT SUPPORT & SERVICE	ARE WE ABLE TO ADEQUATELY SUPPORT AND SERVICE OUR CONNECTED PRODUCT AND ITS USERS (E.G. INBOUND ISSUES, FIELD SERVICE PRESENCE, FIELD SERVICE KNOWLEDGE, DIAGNOSTICS, TROUBLESHOOTING, ETC.)?		
CONNECTED PRODUCT SETUP	ARE WE ABLE TO GET PRODUCTS SET UP AND PROVISIONED, INCLUDING SERVICE ACTIVATION, NETWORK ACCESS, USER, DATA, AND SYSTEM ACCESS, PLUS ANY OTHER REQUIREMENTS TO AMEND, OR REVOKE, OR MANAGE THESE?		
INTEROPERABILITY / INTEGRATION	ARE WE ABLE TO INTEGRATE CONNECTED PRODUCT DATA, FUNCTIONALITY, OR SERVICES TO ENSURE SEAMLESS INTEROPERABILITY FOR USERS AND CREATE NEW AUTOMATED BUSINESS PROCESSES?		
CONNECTED PRODUCT MANAGEMENT	ARE WE ABLE TO ADEQUATELY MANAGE OUR CONNECTED PRODUCT(S) ONCE DEPLOYED VIA ACCESSIBLE, ACTIONABLE TRACKING, ANALYTICS, AND DATA VISUALIZATION?		
CONNECTED PRODUCT DESIGN	ARE WE ABLE TO ENSURE EFFICIENT DESIGN OF OURCONNECTED PRODUCT HARDWARE, SOFTWARE, AND/OR FIRMWARE?		
CONNECTED PRODUCT CONNECTIVITY	ARE WE ABLE TO ENSURE THE APPROPRIATE AND "FUTURE-PROOF" CONNECTIVITY CAPABILITIES FOR OUR CONNECTED PRODUCT(S)?		
CONNECTED PRODUCT UPDATES	ARE WE ABLE TO PROVIDE UPDATES TO OUR CONNECTED PRODUCT(S) SOFTWARE AND/OR FIRMWARE 'OVER THE AIR'/REMOTELY?		
CONNECTED PRODUCT SAFETY & COMPLIANCE	ARE WE ADEQUATELY RESOURCED TO BE ABLE TO KEEP UP WITH AND ADHERE TO THE NECESSARY REGULATORY/COMPLIANCE MEASURES TO SAFEGUARD OUR CONNECTED PRODUCT?		

Source: Harbor Research

When companies have a clear sense of the objectives, use cases, competitive forces, and advantages guiding their connected product initiatives, the time to specify, validate, and develop solutions begins. To ensure deployments get underway smoothly, product companies should begin by mapping the functions, data integrations, connectivity, identity, and security needs. Prototyping, validating, iterating on connected product and experience designs are a critical part of the development process. Taking products from designs to reality—a phase companies report immense challenges— is typically when partners become essential.

2. CONNECT & IMPLEMENT SMART PRODUCTS WITHIN SMART SYSTEMS

Connecting products is the next logical stage of IoT deployment. But this phase isn't just flipping an on-off switch. Reliable connectivity is the foundation to connected product viability. Thus, it must incorporate requirements beyond the product itself. Key solutions product companies must support during this phase include, but aren't limited to…

- **Failovers in case of Downtime:** What happens and how will we provide support in case of downtime?
- **Operational Costs:** What are the financial, labor, and storage costs associated with initiating and ensuring connectivity across product lifecycles?
- **Scale:** Are we adequately prepared to scale connectivity securely over time?
- **Future-proof Connectivity:** How will we ensure our product won't grow obsolete as new or additional (more efficient) connectivity protocol emerge?

To gain early traction, businesses should start small with tightly scoped pilots or minimum viable products (MVPs). Start in areas (i.e. segments, products, locations, use cases, and processes) that are most likely to embrace and directly benefit from new offerings, form factors, services.

These early phases are also the critical time to evangelize and iterate on cross-departmental and channel governance, including training, crisis or downtime protocol, knowledge-sharing, metrics, etc. The deployment process doesn't just bring to life the connected product, but also helps the broader smart system to take shape.

3. ENGAGE & INTEGRATE TO DEVELOPECONNECTED PRODUCT DEPLOYMENTS

As connected products come online and begin generating (lots of!) data, product manufacturers face a simultaneous challenge and opportunity: translating data to insight to create value and make smarter decisions. This is coupled with a simultaneous onslaught of visibility— often unprecedented insight into customer interactions, product usage, performance, issues, and so on. As our survey found, the greatest barriers to actually using data are data management and integration (reference Exhibit 5). These challenges represent opportunities at both user and systems levels. Integrating connected product data with foundational business applications such as CRM, ERP, analytics tools, etc. provides a two-way benefit:

- Teams gain cross-functional context, thus…
- Teams and systems can better support, even automate, connected product services and innovation

Ongoing engagement and integration is essential to the evolution of connected products within the business ecosystem. Without the proper tools and support to process, analyze, and make sense of all these data, companies risk wasted investment, greater inefficiencies, and an even worse customer experience.

4. OPTIMIZE & SCALE CONNECTED PRODUCTS & SMART SERVICES

Although connected product deployment is growing ever-more common, our research finds many product companies underestimate the importance and complexity of ongoing connected product innovation. The imperative to constantly innovate and improve is one of the central reasons IoT is best viewed as a journey and not a destination.

Optimization doesn't just mean adding new features or workflows, it means incorporating the feedback loops inherent in sensor application, data integrations, and customer insights into the strategic evolution of the product. It means having the expertise and tools in place not only to capitalize on the direct value of connected products, but to identify and act on the indirect value enabled through connected product data. Finally, optimization means developing the platform and infrastructure that enables rapid scaling of future connected products and services. Just as Sales optimization requires a central data and workflow management platform—a CRM solution—scale and optimization of connected product deployments require the structure, accountability, and efficiencies connected product management solutions can offer.

CONNECTED PRODUCT MANAGEMENT HELPS PRODUCT MANUFACTURERS NAVIGATE THE IoT JOURNEY

Managing the data, workflows, automations, and learnings from connected product deployments is synonymous with having an IoT program. As product companies consider when, where, and with whom to partner, they must assess how their own feasibility varies from initial deployment to ongoing management. Consider, for example, the internal availability vs. investment required for ongoing:

- **Safeguards:** Product security, data security, network security, storage security, data privacy, user identity
- **Compliance:** Current product and region-specific compliance measures as well as dedicated monitoring of relevant changes to regulatory compliance measures
- **Data management:** Data processing, automation, sourcing, architectural considerations, measurement expertise, analysis, reporting
- **Integration & interoperability:** With other devices, data sets, systems, networks, etc.
- **Data-driven decision-making resources:** Reporting, data visualization, accuracy, intelligent or predictive automation, innovation

As product manufacturers plan, implement, integrate, and optimize IoT solutions, they must anticipate diverse roadblocks along the way and take steps early on to architect the infrastructure and support needed to actually leverage all these new data and insights.

ENDNOTES

i. "The Top 18 IoT Trends to Watch in 2016." Harbor Research. http://harborresearch.com/harbor-research-the-top-18-iot-trends-to-watch-in-2016/ Accessed May 28, 2016.

ii. "Funding in IoT Start Ups Has More than Doubled in Six Years." CB Insights Blog. https://www.cbinsights.com/blog/internet-of-things-startup-funding/ Accessed May 16, 2016.

iii. Respondents in this survey were asked to rate their participation with IoT deployments on a scale of 1-5, where 1 was No Interest/Plans to Deploy and 5 was Ongoing Deployment/Optimization. Some charts in this report compare respondents who selected "4" (High Interest/Deployment Underway) with those who selected "5" (Ongoing Deployment/Optimization); they are indicated as "Early IoT Deployment vs. Active IoT Deployment."

iv. Our survey found some 92% of those in the "Active" phase of IoT deployment report increased revenues as a direct result of deploying connected products.

v. "Business Intelligence forecasts global manufacturing spend on IoT will increase from $29B in 2015 to $70B by 2020." Business Intelligence. http://www.businessinsider.com/internet-of-things-in-manufacturing-2016-2 Accessed May 17, 2016.

vi. Respondents were asked to rank their top three challenges in order. Percentages in Exhibit 7 reflect an aggregate of 1st, 2nd, and 3rd ranked challenges.

vii. Mearian, Lucas. "World Data Will Grow by 50X in the Next Decade, According to IDC." ComputerWorld. http://www.computerworld.com/article/2509588/data-center/world-s-data-will-grow-by-50x-in-next-decade--idc-study-predicts.html Accessed May 17, 2016.

viii. Harbor Research 2015-2016 Forecast Report. Harbor Research. http://harborresearch.com/2015-smart-systems-forecast/ Accessed May 4, 2016.

ix. Noronha, Andy, Robert Moriarty, Kathy O'Connell, Nicola Villa. "Attaining IoT Value: How to Move from Connecting Things to Capturing Insights." Cisco Systems. http://www.cisco.com/c/dam/en/us/products/collateral/cloud-systems-management/data-analytics/iot-whitepaper.pdf Accessed May 18, 2016.

x. Respondents in this question were asked to select the two most critical partners assisting with their connected product data management. The read as follows: "With which type(s) of partners are you working with to collect, manage, analyze, and act on data from your connected product/IoT initiatives?"

xi. Data from this research was segmented to isolate those who developed solutions proprietarily. We compared this segment against a random selection (approximately equal in sample size) of those who developed solutions with partners to ascertain variance in top deployment and data utilization challenges.

ABOUT THE REPORT

REPORT METHODOLOGY

Harbor Research and LogMeIn's Xively Division partnered to conduct a research to assess the journey manufacturers undergo during connected product development and deployments. Harbor Research led the development of the research strategy, survey, and resulting artifacts, while soliciting collaboration and insights from Xively and the Xively Advisory Board which helped shape this research. Through Xively's IoT advisory board, this study captures inputs from connected businesses like NEB, SATO, Symmons, and Cognizant.

The survey targeted 600 midsize to enterprise product manufacturers across a wide range of industries, for which their primary headquarters were based in the United States. The survey was fielded in collaboration with a professional survey panel provider which uses a three-part opt-in for consent and vetted respondents through database segmentation and screeners. It was fielded through an online survey tool proprietary of the survey panel provider. The survey was fielded between March and May of 2016.

ABOUT XIVELY

LogMeIn is headquartered in Boston's Innovation District with offices in Australia, Hungary, India, Ireland and the United Kindom. Xively by LogMeIn enables companies to securely and robustly connect their products, manage data from those connections, and engage more closely with their customers. To learn more about the change of customer service expectations in the connected world, contact Xively.

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ABOUT HARBOR RESEARCH

An internationally recognized research, technology, and business development consulting firm, Harbor Research has predicted, tracked, and driven the development of the Internet of Things since our inception in 1984. Today, we continue to work with C-level executives and top management across successful companies and innovative startups, in a variety of ways including consulting, advisory, research and content development, workshop facilitation, and beyond.

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Jessica is a regular speaker, moderator, and panelist at IoT industry events. She is also a regular contributor to numerous 3rd party blogs and news/media outlets. Jessica is contributing member of the International IoT Council and FC Business Intelligence's IoT Nexus Advisory Board. Jessica is featured on Onalytica's top 100 influencers in the Internet of Things. For more about Jessica, visit her blog at jessgroopman.com, follow her on Twitter @jessgroopman.

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ABOUT XIVELY'S IoT ADVISORY BOARD

Xively's IoT Advisory Board is a group of advisors which brings together strategic partners, customers, and IoT industry leaders to exchange ideas, advocate for the IoT industry, and help share future IoT solutions. This group provided strategic inputs on the development and direction of this research project. Find out more about the board here.