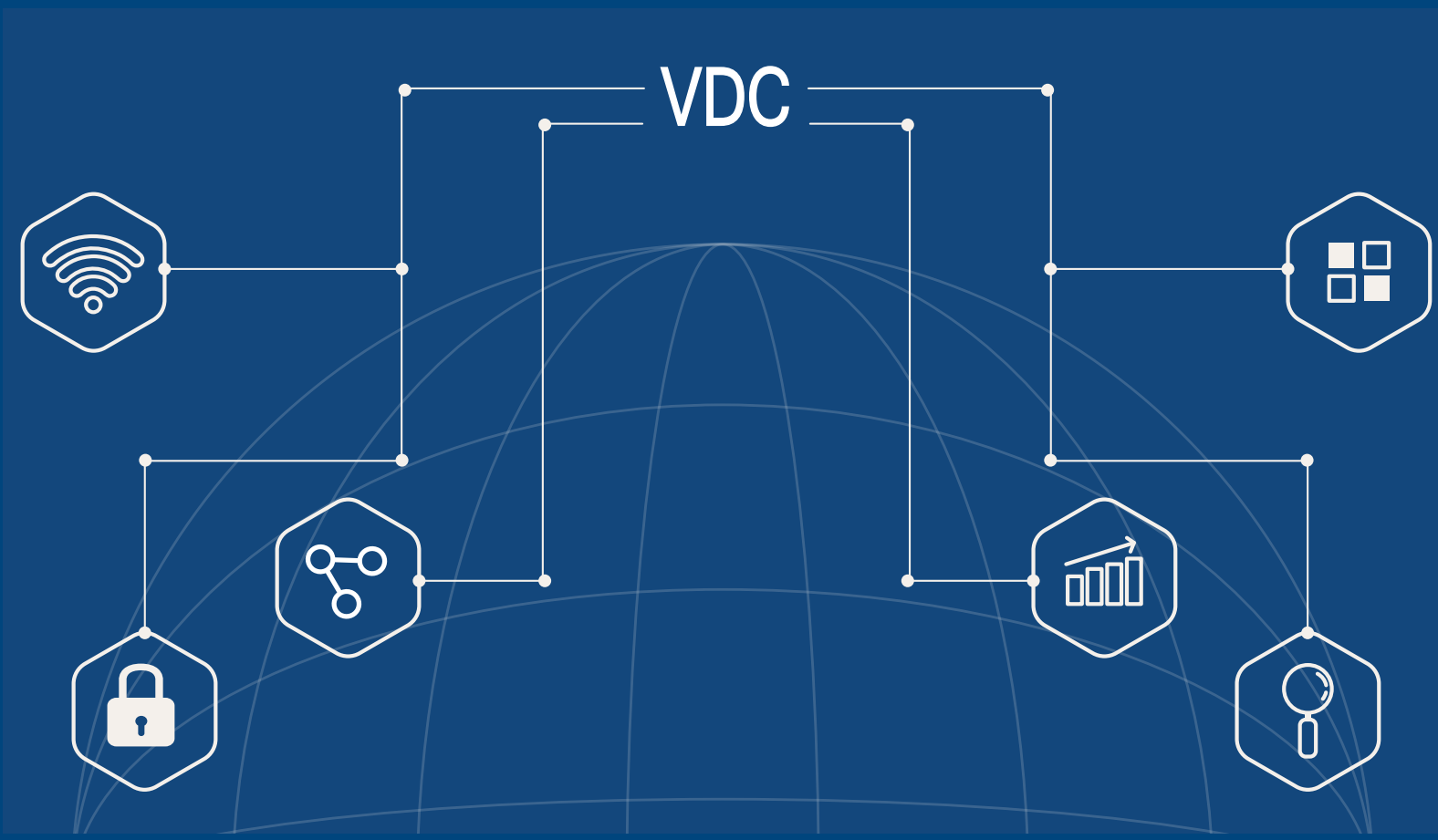
GROWING RECURRING REVENUE WITH INTELLIGENT DEVICES & IOT



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VDC Research

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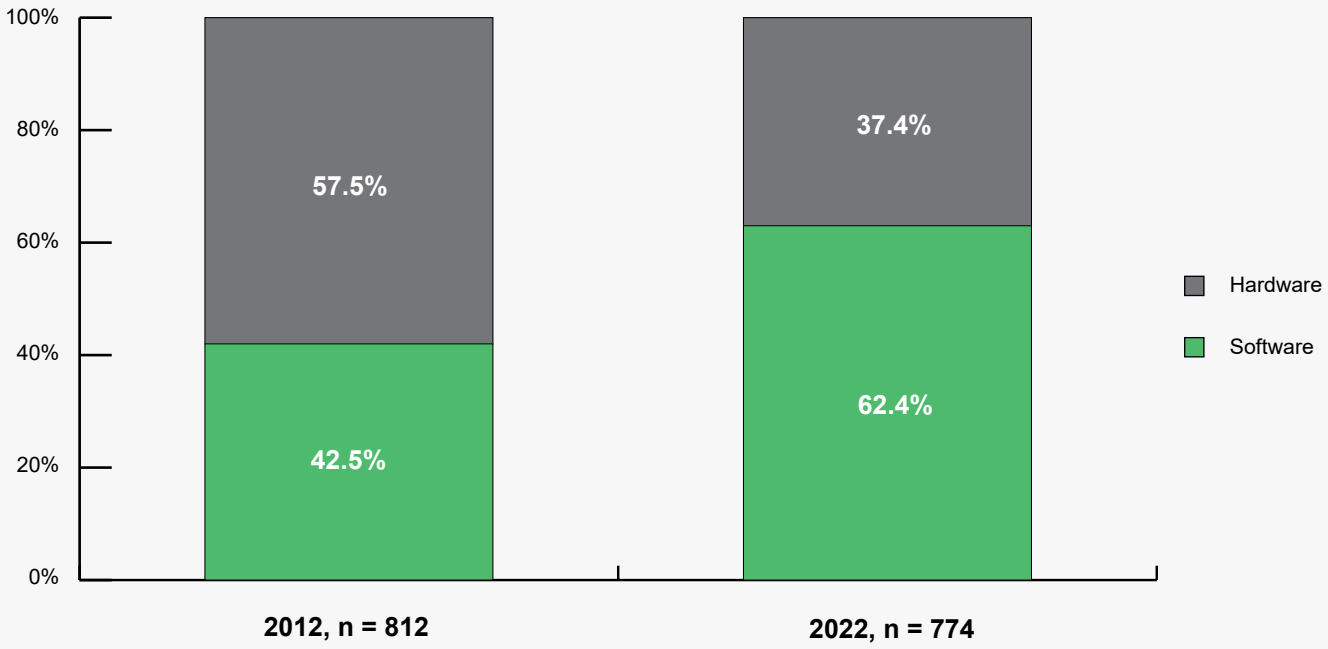
PRODUCT DEVELOPMENT HAS FUNDAMENTALLY CHANGED

Today the technical and business promise of the Internet of Things is redefining the tech ecosystem. While its fingerprints can be seen from IT datacenters to boardrooms, its greatest impact appears within traditional embedded or industrial markets. There, the IoT is changing device functionality requirements, displacing standard technologies, and overturning established vendor value chains. No area of that value chain has faced greater change than the role of software in product development and the growing part it plays in driving new areas of corporate revenue, profitability, and differentiation.

Figure 1: Estimated Distribution of Development Costs
(Average of Responses)



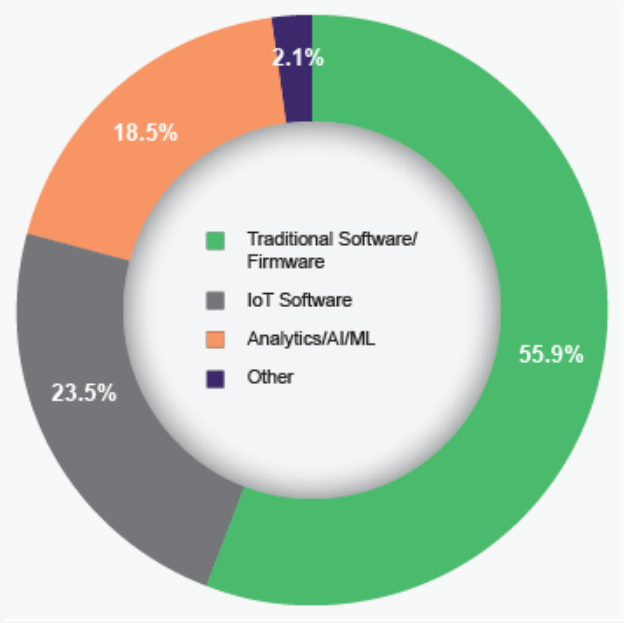
The areas of needed focus and investment become clear when looking at project development costs and how engineering organizations expect them to change in the future. For years, software has gradually encompassed an increasing portion of engineering's development budgets, displacing spending on electrical and mechanical component development as more end-product functionality was defined by software. Now, software has become the single largest cost center, representing nearly two-thirds of development costs and generating a seismic shift in the needs and labor focus of product engineering. As a function of this growing focus on software, engineers surveyed by VDC expect in-house developed lines of code to grow at over 30% for their next project – a substantial rate of change in its own right, furthering pressures on taxed development organizations.

BACKGROUND ON VDC's RESEARCH

VDC has been covering the product development technology market since 1994. The analysis and supporting discussions in this paper are based on VDC's ongoing research in this market and by findings from VDC's *2023 Voice of the Engineer* survey of 774 product decision-makers and engineers from a range of IoT markets. This global survey offers insight into leading business and technical trends impacting product development organizations as well as the best practices implemented to address them. Figure 1 also leverages data from VDC's *2013 Voice of the Engineer Survey*, which had 812 respondents.

Now, a new vector for differentiation has emerged. While traditional on-device software still generates over 50% of software development costs, it represents a shrinking portion of the software fabric OEMs must weave for the next phase of their innovation. IoT- and Analytics-focused software have already reached 42% of software costs. They have become the domains expected to generate the most growth in investment and, ultimately, innovation in the coming years. In fact, the IoT leaders surveyed expect 30% of their overall product development costs (which also includes mechanical and electrical system engineering) to be related to these areas within the next three years. This value shift has translated to more investment and headcount, while the IoT is simultaneously also changing the profile of engineering organization skillset required for success.

Figure 2: Estimated Distribution of Software Development Costs
(Average of Responses)



However, continuing to blindly scale internal development resource spending is unsustainable. Organizations must find new ways to improve the efficiency of their development teams and focus software developers on roadmap items that deliver the most value to end customers. Beyond this fundamental need to control development costs, engineering organizations must now also architect a foundation for the continuous delivery of business value through a new and dynamic medium, the IoT.

The process and technology change required for success in the IoT varies greatly due to the heterogeneous nature of the market. Software as the differentiating component of hardware-based systems is still relatively new, as is its direct connection to revenue generation. With this magnitude of change, it is critical for engineering organizations to focus on things other than monetization. Third-party commercial software platforms will become an increasingly vital component of both revenue maximization and cost control strategies.

Although the specific use cases vary across industries, the evolution of market demands are driving more organizations to recognize the value of third-party platforms to help them meet next generation product functionality and business goals. We highlight a few examples of solution selection journeys below:

Medical Device

New technologies have allowed the medical device industry to bring more real-time insights and personalized care. This change has also changed the way device manufacturers have looked to monetize the functionality their solutions provide. One large medical device OEM cited greater than 20% in project time reduction when leveraging commercial integrated systems for the development of its patient monitoring system. This company had decided to sell blood analyzers as a service due to a desire to move away from transactional hardware sales. The heart of their system refresh rested on the need to create a new, secure way to manage firmware updates for their system, which can often be deployed in environments where the connectivity options are unreliable at best. Recognizing a need to implement new software technologies to partition and securely manage the updates, the company ultimately reevaluated their entire solution stack and invested in new hardware and software to serve as building blocks for innovation. Not only did the aforementioned reductions in development time produce hard cost savings, but it also fostered increased business agility with lower time-to-update systems and a commercial support ecosystem.

Smart Building

In the smart building space, there is increasing demand to support and share data and insights with building managers, building system operators (e.g., lighting, HVAC, safety, etc.), and end users. Organizations not only need to manage increasing demand for high fidelity information, but they also must find ways to scale and accelerate real-time data insights. One organization in this space interviewed for our research used containers to easily link and manage connections with a variety of public and private clouds. Through this process, they were able to build in new capabilities and services around analytics, AI, and machine learning, as well as application-specific features. Working with a commercial platform provider enabled this organization to become a larger part of the value chain with access to new data customers, enabling a multi-cloud service architecture opened data revenue streams to more players.

Oil & Gas

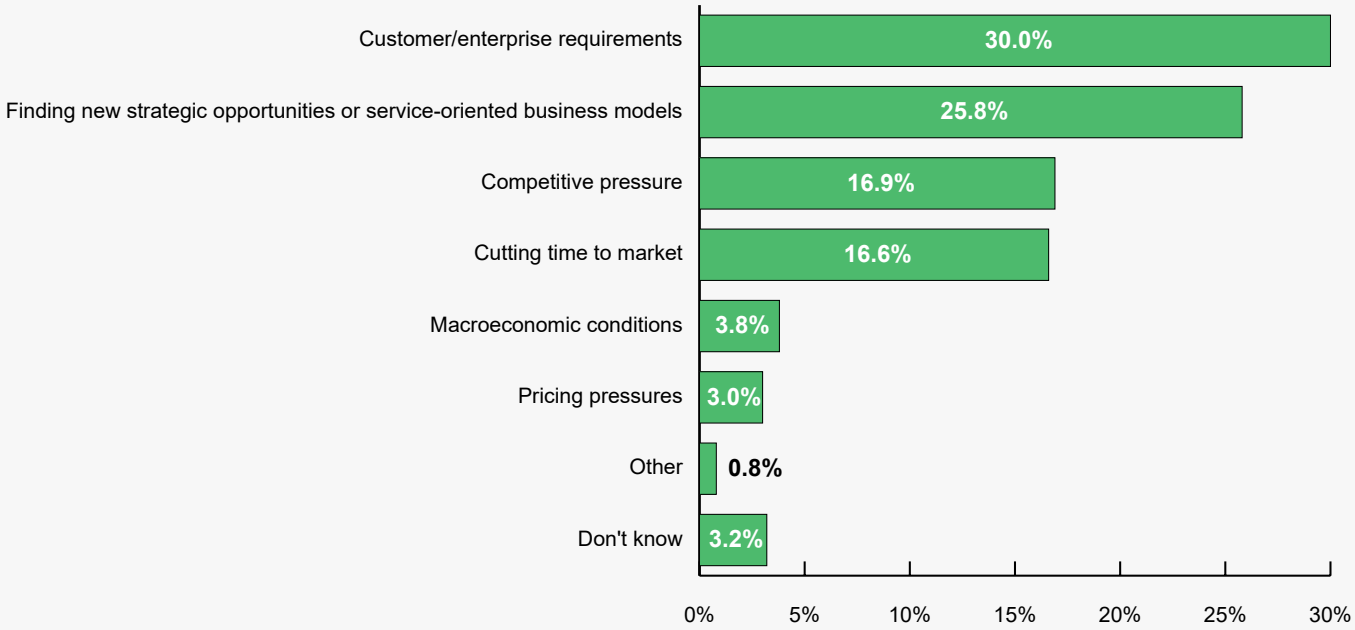
In the energy and power sector, many organizations are already adapting their solution selection strategies amidst accelerating business model transformations that increasingly incorporate both remote monitoring and data brokerage. While there has been a long-standing need for remote service for assets such as gas turbines and oil rigs, the potential business value from optimizing these assets has now come under acute focus. One such company in the market built a new edge analytics solution deployed on micro-servers for hydrocarbon drilling. In a move to shift their value proposition away from only delivering hardware systems, the company began to sell different packages of data streams to different customer types. Effectively, this new solution transformed and monetized data inputs from a wide variety of legacy and connected systems that were previously only part of operations management. In addition to more accurate estimates for oil and gas asset owners, the new solution platform created a data store able to feed data and visualization devices on the rig to support on-site contractors and operators. To enable this new approach, the company opted for more cloud-based compute and storage, but also paired that with a third-party platform-as-a-service solution to manage client data interfaces and billing.

Ultimately, there are many reasons for IoT transformation and ways through which organizations can generate new revenue and business models as well as individual considerations regarding market position, legacy intellectual property, and bespoke customer requirements. Organizations that embrace third-party partners to help them navigate this heterogenous landscape and transformation have the best success.

WHY IoT?

IoT is composed of much more than smart watches, thermostats, and self-driving cars. Manufacturing centers, utility infrastructures, and healthcare systems are just a few of the other industrial sectors that are part of this larger, interconnected web of devices. Already, more than one third of engineers are currently using IoT. In some cases, this adoption is still relegated to relatively simple pilot implementations of machine health/operation monitoring, while other organizations are completely reshaping the delivery and articulation of their value proposition through usage- or subscription-based business models. Although the implementation of IoT use cases can take many forms and there is a sliding scale in their sophistication, the magnitude of its adoption is unquestionable. Our data shows that within two years, IoT will be the new normal with over three-quarters of engineers adopting it by that time. No matter how universal the definition may be, the market is transforming and doing so rapidly.

Figure 3: Primary Factor Driving Organizations Towards Utilizing and/or Providing IoT Solutions
(Percentage of Respondents)



Organizations establish IoT initiatives for a wide range of reasons, ranging from needs for real-time operational insight, to competitive pressures, to customer requirements, among others. However, a growing portion of OEMs are adopting IoT initiatives specifically to change their business model, with over a quarter of respondents indicating that was their primary reason for moving to the IoT.

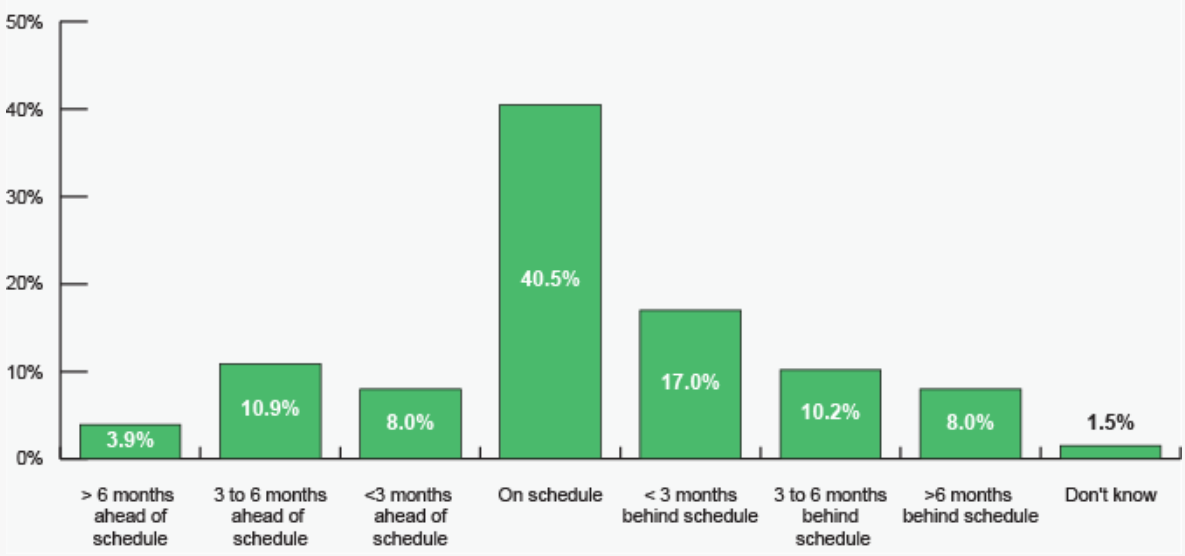
UNEVEN PROGRESS TOWARD IoT POTENTIAL

IoT has been part of the engineering market for years. The connected factory or battlefield is not a new concept. Now, however, the depth and richness of connections possible have caused both OEMs and deploying enterprises to rethink their business models, technology selection processes, and partners. Even though there is broad-based recognition of the IoT's potential and more engineers report their company's pursuit of the IoT opportunity, that pursuit does not mean success.

In many if not all cases, product engineering organizations need help on their IoT journey. Unfortunately, widespread recognition of the IoT's potentially transformative impact does not lessen the difficulties facing the organizations pursuing it. It is important to remember that for every new feature or business model change, OEMs often need to adjust their software or hardware platforms and strategies.

These new opportunities are bringing these organizations into uncharted territory, where their existing internal expertise and IP alone cannot suffice. In fact, many engineering organizations are already operating from a position of relative weakness, unable to meet schedule commitments for existing projects. The 2023 Voice of the Engineer Survey showed that over one-third of projects are already behind schedule. With IoT-driven business models, schedule delays not only drive increases in operational cost but also risk significant impacts on revenue accrual. To this end, the value of efficient product and service development has never been greater.

Figure 4: Current Project's Schedule Adherence
(Percentage of Respondents)

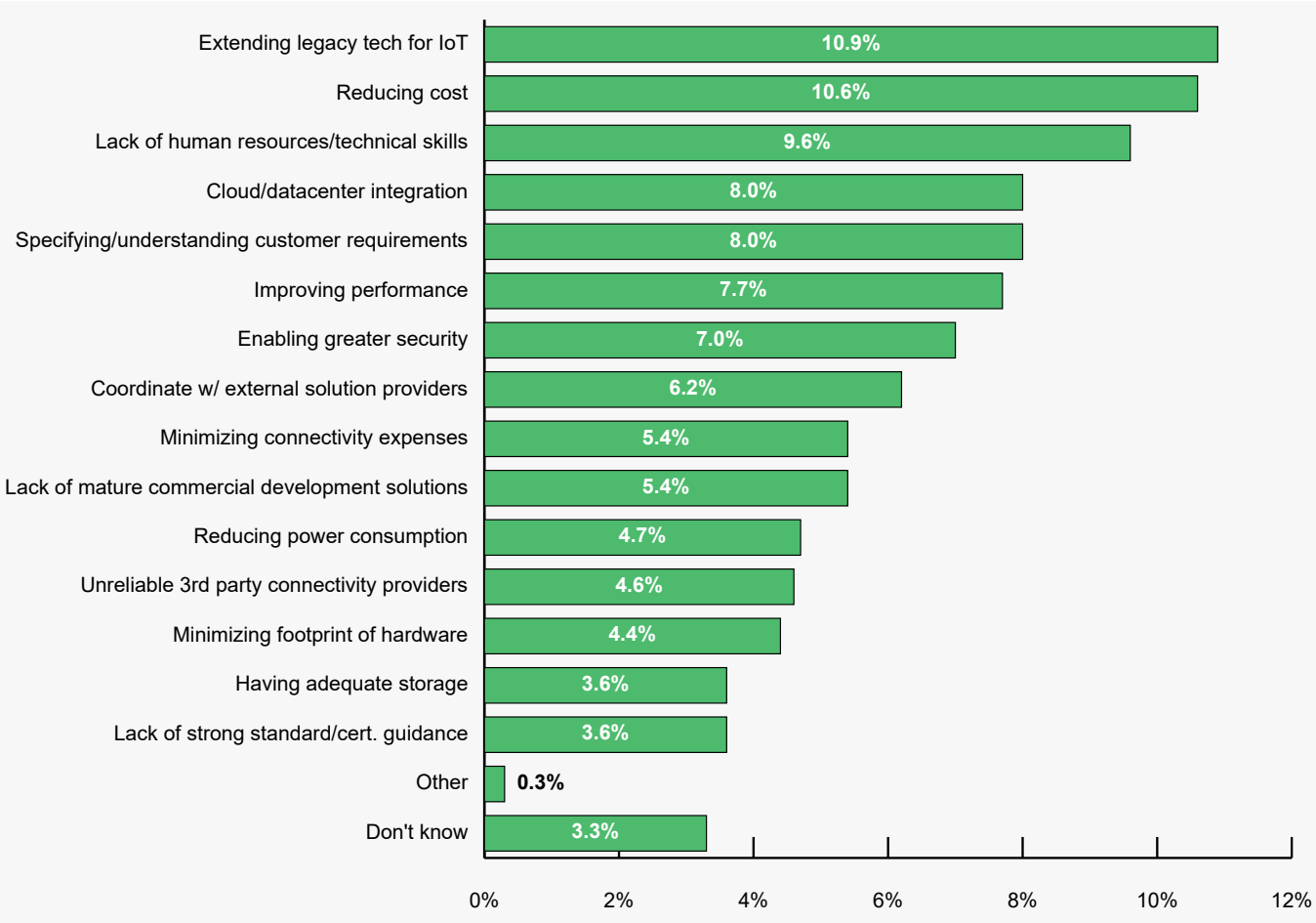


Many traditional technologies and design methodologies cannot satisfy expectations for today's designs, let alone scale to address the new challenges associated with developing systems for the Internet of Things. In fact, extending legacy technology for the IoT is the leading cause for project delay [See Figure 5]. As the IoT-enabling systems become increasingly complicated, the pressures causing schedule delays will only become more acute. The status quo no longer suffices.

OEMs were already experiencing a resource pinch due to the growing amount of software needed to be developed and are now seeking expertise in areas that they often have even less experience – connectivity, security, and new considerations such as business processes and product services that are now thrust into relevancy based on the growing convergence between IT and Operational Technology (OT) functions that the IoT creates. This dynamic of converging, dependent, and, at times, conflicting business goals creates a need for both new technology and often a requirement for third-party expertise and new solutions to help organizations navigate next-generation challenges.

Figure 5: Biggest Overall Challenge in Developing IoT Solutions

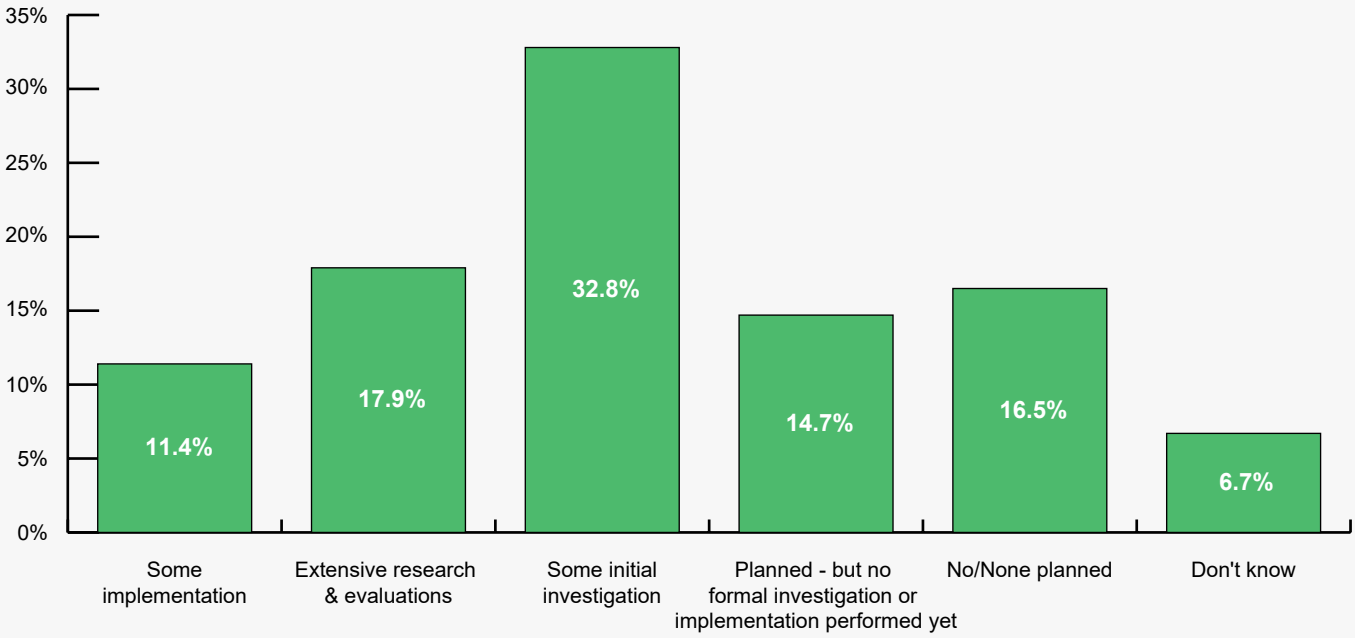
(Percentage of Respondents)



NEW SERVICES OPPORTUNITIES EXPANDING POTENTIAL

The most widely-recognized goal associated with the Internet of Things is the ability to enhance customer engagement and retention and create new revenue streams through connected services. Beyond the net new on-demand or connected services offered through IoT, it is also worth noting that professional services remain a huge, related business cog for many IoT OEMs and deploying enterprises. The newness of the IoT and the magnitude of business change that often accompanies it is driving a big need for professional services. Over the longer term, however, the adoption of services for integrated billing, tracking, and product lifecycle management is poised to accelerate.

Figure 6: Investigation/Implementation of Continuous Post-Deployment Content & Service Support
(Percentage of Respondents)



IoT-enabled service offerings, such as remote monitoring and control, predictive maintenance, and usage-based business models are already being adopted in relatively high frequencies. IoT enablement and functionality integration, however, are quickly evolving from differentiating features to competitive imperatives. For example, today only 11% of engineers are currently implementing post deployment content or service. The responsibilities of product development organizations now extend far beyond device shipment. Many companies recognize that this is a key mechanism for future value within their solutions and value add can continue to evolve over time, post deployment. Businesses must be able to develop, deploy, and manage devices to both meet customer expectations as well as to boost pressured profit margins.

The groundwork is laid for further adoption of this cornerstone of IoT functionality. Already 26% of engineers incorporate Firmware-over-the-air (FOTA) capabilities into current projects. In fact, over three-quarters of engineering organizations plan to integrate post-deployment content and services. This type of functionality, and the business models that accompany it, are a foundation of IoT functionality and future OEM technology investment.

BUSINESS MODELS ARE CHANGING

IoT-fueled differentiation has become critical for product sales and, as a result, corporate success. OEMs are under increasing pressure to embrace IoT simply to keep pace with evolution of the competitors' portfolios. In fact, over one-third of respondents indicated that they intend for IoT to help them sell more products, albeit less often with a related premium. However, the biggest appeal of IoT transformation is the ability to offer new connected services. In fact, 75% of engineers currently or plan to deploy IoT services. The use of data to augment both business intelligence and business models is becoming increasingly critical in markets with shrinking margins. With many of these services provided on demand or as a function of use, the value and need to change business models are even more apparent. As a result, new processes and automation platforms are often needed to manage new IoT business functions such as IoT commerce, Service Level Agreements (SLAs, and more complex software supply chains.

Figure 7: Ways IoT Most Impacts Organization's Business Prospects
(Percentage of Respondents)

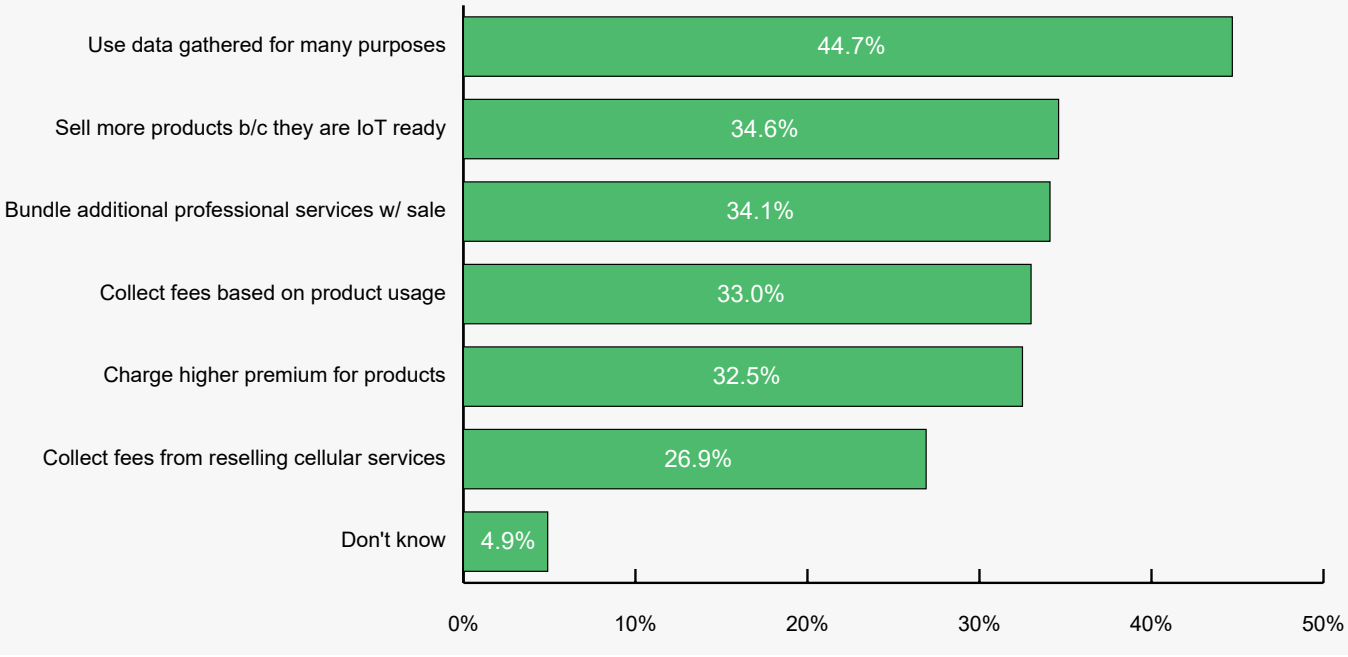


Figure 8: Types of IoT/Cloud Services Being Used to Support Customers on Current Project
(Percentage of Respondents)

	Connectivity	Remote monitoring & control	Data Collection & Storage Services	Data Analytics	Other IoT/Cloud Services
	66.8%	50.1%	43.6%	35.9%	17.2%
Percentage Thereof:					
Reselling Service	22.3%	27.5%	25.6%	28.7%	16.2%
Planning to Resell Service	27.0%	30.5%	25.1%	22.5%	27.0%

Many organizations are also monetizing both simple and more advanced functionality and otherwise looking for ways to resell IoT services to add new value and or increase their customer retention. However, these companies have not traditionally needed to manage let alone think about these issues. Often then they do not have (or even yet recognize) the need for an infrastructure and dedicated solutions to manage these new services and functionality.

With this level of service transformation, engineering organizations must focus on things other than monetization. Licensing and its management should effectively be invisible to both engineering teams developing IoT devices as well as the end users of those devices. To that end, it is critical to identify partners, such as Revenera, with platforms that can address this need and that also have expertise navigating this transition – allowing OEMs to better focus on the differentiating parts of their IoT system/value stack.

FINAL SUMMARY & RECOMMENDATIONS

The IoT is catalyzing rates of change that we have never before encountered in the broader engineering ecosystem. Many OEMs, vendors, and enterprises are trying to adapt their product and business model strategies to stay ahead of the pack. The new market dynamics, however, have magnified traditional challenges around complexity, time-to-market, and quality.

With the market dynamics evolving rapidly and reshaping customer requirements, engineering organizations must not only focus on differentiation, but also equally importantly, recognize what is beyond that scope. New features, use cases, and value delivery streams present engineering organizations with more than enough mechanisms for transformation, with their underlying development generating a number of operational challenges. By relying on the experiences of partners with monetization expertise, one can focus on their own core competencies, delivering the system functionality customers value.

The foundation of technology evolution is always rooted in automating business process needs. To this end, engineering organizations have traditionally placed a premium on solutions such as integrated hardware for optimization and commercial runtime software to replace internal development labor. Now, that same search for optimization-driven efficiency must be focused on new challenges as organizations embark on the creation of products whose in-field functionality is directly tied to revenue generation. More than ever, it is critical to recognize both the value from and the need to manage connected device services. This recognition, in turn, reinforces value from commercial platforms from companies such as Revenera that help organizations automate and simplify revenue generation and management.

ABOUT THE AUTHOR

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Chris leads VDC's syndicated research programs and consulting engagements focused on development and deployment solutions for intelligent systems. He has helped a wide variety of clients respond to and capitalize on the leading trends impacting next-generation industrial and device markets, such as security, the IoT, and engineering lifecycle management solutions. Chris has also led a range of proprietary consulting projects, including competitive analyses, strategic marketing initiative support, ecosystem development strategies, and vertical market opportunity assessments. Chris holds a B.A. in Business Economics and a B.A. in Public and Private Sector Organization from Brown University.

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Insights for the Connected World

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