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OEMs' Guide to Winning with IoT

White Paper



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OEMs' Guide to Winning with IoT

By Lee House



In the current industrial marketplace, marked by continuous innovation and dynamic shifts, industrial OEMs are facing an unprecedented opportunity – and challenge – for long term differentiation. With enterprise customer demand for the economic advantages of Internet of Things (IoT) and Smart Product solutions now at full maturity, the Original Equipment Manufacturers (OEMs) that achieve strategic differentiation with such solutions can lock-in a long-term competitive advantage.

This whitepaper delves into the transformative power of IoT adoption for OEMs, exploring how it shapes their competitive edge.

Lee House, Founder and CEO at IoT83, lends his visionary insights to this exploration. With a track record of recognizing technology trends and delivering gamechanging enterprise solutions, Lee provides OEMs with a pragmatic guide as to the importance of this IoT megatrend and the alternatives available to OEMs move ahead of their competition.

Lee's leadership spans GM and VP positions at GE, IBM, 3Com, and various Silicon Valley companies, backed by an MSEE and MBA from Duke University. Lee's role as a thought leader in the IoT domain positions him to guide OEMs into a future where connectivity and innovation redefine the industrial landscape.

Executive Summary

With advanced digitization, Industry 4.0, and the Internet of Things reaching full maturity, industrial OEMs (Original Equipment Manufacturers) have a strategic imperative to deliver smart products to customers. And, with more and more OEM offerings providing smart products, IIoT connectivity is fast becoming table stakes. More advanced solutions, including insight analytics, predictive maintenance, integrated diagnostics, and other operational optimizations, all increasingly including AI, are starting to define OEM products offering differentiation and competitive advantage.

First Things First: What is Industrial IoT?

The Industrial Internet of Things (IIoT) applies Internet of Things (IoT) technologies and methods to industrial settings, gathering data from diverse smart connected equipment, sensors, actuators, and systems, to drive operational efficiencies across multiple dimensions.

Once collected, the data undergoes cleansing, configuration, and analysis in the cloud, providing valuable real-time insights to managers, operators, and end users. In more advanced applications, these insights can generate predictive and descriptive solutions, and even initiate autonomous or semi-autonomous machine actions. These IIoT enhancements result in quicker, more efficient equipment and enterprise-wide solutions with reduced likelihood of human error, improving operational efficiency, product quality and value, boosting worker safety, and dramatically cutting costs.

Industrial IoT provides enterprises with the tools and systems to integrate multiple operational data flows, automate decision making via integrated custom business logic, optimize operations with simple or very advanced analytics, and to integrate existing systems into more coherent and complete OT and IT systems. IIoT can also leverage artificial intelligence (AI), machine learning (ML), and other computational tools to synchronize devices and platforms. This integration establishes a cyberphysical system, surpassing the efficiency and capability of traditional manufacturing monitoring systems.

Per IIoT-World, today, 67% of OEMs are providing some level of Device connectivity and simple data forwarding, 62% provide some real-time dashboards for streaming device data, 32% provide simple/ single-step actions (such as service-ticket requests for optimizing operations), and 47% have begun to implement AI (although primarily limited to only in-house data scientists at this point). So, there can be no doubt that OEMs need to look at investment – and success – with IIoT as a strategic necessity.

In the present environment, industrial enterprises seek to process, store, and analyze IoT data at the source to enable predictive maintenance, enhance quality control, improve worker safety, and more. Leveraging the capabilities of the industrial edge proves beneficial for addressing use cases with low

latency needs, optimized bandwidth usage, requirements for offline or autonomous operation, and adherence to regulatory guidelines. But like any other strategic investment, building this competitive advantage – and maintaining it – comes at a cost. This White Paper examines the options available to OEMs deliver these strategic capabilities and provides recommendations and salient justifications for using advanced Application Enablement Platforms (AEP) to create and sustain smart products and smart enterprise-grade solutions for sustained strategic advantage.

Business Justifications for IIoT Adoption

As illustrated in multiple OEM smart product surveys, adopting Internet of Things (IoT) solutions is no longer a trend; it's a strategic imperative. Enterprise customers are very familiar with IIoT's value to operational efficiency and the preservation of invested capital across multiple dimensions.

Primary/prototypical use cases across industry vertical markets include:

- 1. The Enhancement of Product Performance and Efficiency: Starting with connectivity and access to strategic sensor data, real-time visibility to smart products provides an operational understanding of product behavior, leading to iterative improvements, predictive maintenance, and overall operational excellence.
- 2. Operations Optimization and Increases in Revenue Streams: Smart Product insights enable iterative process optimization, reducing waste and enhancing overall quality. It increases profits and, through tangible quality gains, drives up revenue. Predictive maintenance, asset tracking, and remote monitoring become not just capabilities but strategic imperatives.
- 3. Creating Larger Competitive Edges and Value Chain Elevations: For Industrial OEMs, offering customers comprehensive IIoT platforms and solutions becomes a means to ascend the value chain. Beyond products, providing IIoT-driven services on an Enterprise-Wide basis becomes a differentiator, positioning businesses ahead of competitors.
- 4. Integration of IT/OT/BT for Automation and Intelligence: The convergence of Information Technology (IT), Operational Technology (OT), and Business Technology (BT) is a crucial IIoT advantage. This integration lays the foundation for the next level of automation and intelligence. It's not just about enhancing existing processes; it's about fundamentally transforming them and unlocking new possibilities for efficiency and innovation.

In summary, the business justifications for wide IIoT adoption are compelling. The potential to enhance product performance, optimize operations, gain a competitive edge, and integrate IT/OT/BT

for Enterprise-Wide solutions positions IIoT as a transformative force. IIoT is a catalyst for Industrial OEMs to gain a competitive edge and elevate and extend their value chain. Across multiple industry verticals, IIoT is now pivotal in transforming industrial landscapes and the strategic value that comes with it. However, the journey to IIoT adoption has its challenges. The benefits are profound, but scaling IIoT beyond proof of concepts to build enterprise-grade solutions is complex. Issues like development costs, risks, time to market, integration complexity, vendor support, and life cycle management pose hurdles that require strategic navigation – all to be covered in this White Paper.

End-Customer Needs & OEM Success Drivers

Any serious OEM IIoT and Smart Products strategic initiative needs to squarely address the real-world needs of enterprise customers and how IIoT delivers them concrete economic value. Connecting sensor data and providing real-time application dashboards is a great beginning, but it is only a start. Enterprise customers are looking for more competitive solutions to solve real business issues. OEMs need their smart products to provide the data to enable this, but also with the means to add custom business logic, applications and system context, process specific analytics and more. Plus, their IIoT solutions need the flexibility to fully meet diverse customer needs as they change over time.

Common Enterprise use cases seen across multiple industry vertical markets include:

- 1. Asset Monitoring & Management: This can range from simply providing operators with visibility as to system health, to automated threshold monitoring of telemetry data, to complex systemlevel analytics using custom rules or even AI/ML modeling. And, in enterprise applications Monitoring & Management applications will span diverse data feeds from multiple devices with multiple contexts in processes or systems. Further, enterprise customers will often want to integrate data feeds from other software systems expand the enterprise-wide intelligence of Monitoring & Management solutions.
- 2. Adaptive Predictive Maintenance: By running custom analytics on IIoT telemetry data received, customers can anticipate device or full-system failures before they happen, with dramatic benefits to system uptime, the cost of service, and the avoidance of catastrophic losses to high-cost capital equipment. Predictive Maintenance solutions can range from the relatively simple (is this vending machine almost out of Coke?) to far more complex analytics running on multi-device systems monitoring anything from manufacturing lines to oil rigs to jet engines. Adaptive is a key word here as customer needs vary highly, and OEMs need flexibility in their solutions to quickly adapt to the customer's end needs.
- 3. Logistics and Fleet Monitoring: In Industry 4.0 applications IIoT applications include automation

of materials movement throughout a factory, interworking with OT and IT systems to drive materials procurement and customer deliveries, automating quality validation throughout production, analyzing workflows for production improvements, and monitoring & analyzing the operational health of the production systems themselves. IIoT Fleet Monitoring applications are similar, but more focused on the location, health, and utilization of capital intensive equipment, whether applied to transportation, freight, agriculture, or other industries.

- 4. **Systems Integration:** Because IIoT solutions typically bring more modern software technology to industrial settings, IIoT software is also heavily used by customers to integrate multiple existing systems to make enterprise-wide solutions "smarter". Operational Technology (OT), Internet Technology (IT), and Business Technology (BT) systems can be integrated to deliver far greater value when operating as a seamless whole. For example, product health data and analytics can optimize service calls, customer demand for products can drive procurement, product failure analytics can drive engineering change orders ... The opportunities for business optimizations through IT/OT/BT integrations are enormous.
- 5. Environmental Management: Applications here range from managing safety in industrial areas, wastewater treatment, and food services to smart agriculture and many other customer needs. By collecting IIoT sensor data and performing analytics, OEMs can solve simple or complex business use cases that profoundly impact operations, revenue, and profits. For example, the result of IIoT in smart agriculture or food service is enormous.

It is essential to understand that customers often adopt multiple IIoT use cases in concert to realize their business objectives. This is another crucial reason for OEM solutions to be flexible enough to adapt to custom customer needs. According to a McKinsey estimate for 2030, IIoT can enable a global worth of \$5.5 trillion to \$12.6 trillion, including the amount collected by consumers and users of IIoT products and services, with B2B applications generating around 65 percent of the total value created.

Given the McKinsey report and the additional statistics below, it is clear that end-customer demand for IIoT solutions is well established, rapidly growing, and is driving a strategic need for OEMs to participate in this mega-trend with IIoT and Smart Products. Given this mega-trend, the benefits to Industrial OEMs of adopting a strategic focus on IIoT, Smart Products, and Enterprise-Grade solutions are multifold.

Currently have an IIoT solution in place



20% solution this year Plan to implement an IIoT



77%

44% have used IIoT for 12 months or more



98% of adopters indicated their solutions are very or somewhat important for their company

×	

33% established their lloT solution in the past 12 months

Source: IIoT-World

Looking through the eyes of OEM customers and their growing embrace of - and even insistence onthe benefits that IIoT and Smart Products provide them, underscores the strategic criticality of OEM IIoT solution leadership for long-term success. IIoT solutions are now strategically essential for both Industrial OEMs and their customers:

- 1. Customer Long-Term Success: The IIoT / Smart Product mega-trend has spread across many industrial sectors and product types, and OEMs risk future success by not investing here.
- 2. Meeting Customer Demand and Satisfaction: With the new customer expectations driven by the IIoT mega-trend, meeting this demand has become synonymous with IIoT adoption. Delivering Enterprise-Grade and flexible IIoT solutions is now core to customer-centricity.
- 3. Operational Efficiency and Productivity Gains: Customers who understand the economic gains they will accrue through IIoT will insist on this business advantage. Like their customers, OEMs need this efficiency in their operations and will reap these rewards.
- 4. Creating New Revenue Streams and Business Models: While customers may recognize the opportunity IIoT brings to create new revenue and expand their business, this is a massive opportunity for OEMs. With a strategic embrace of IIoT solutions, OEMs become central to their

customers' IT/OT/BT operational optimization execution and future planning, moving the OEM further up the value chain. Additionally, OEMs can monetize IIoT data in many ways, with opportunities for how Industrial OEMs generate value. Now, it is not just about selling products and hardware; it's about offering comprehensive solutions that resonate with evolving market demands and customer transformations.

5. Customer Loyalty and Long-Term Success: OEM customers' integration of OEM IIoT and Smart Products drives much deeper customer loyalty and integrates the OEM's solutions into the customer's operations. It gives the OEM a solid competitive edge and a trajectory towards sustainable growth.

Summary: Given the mega-trends of Industrial IoT and Smart Products, it's evident that the strategic adoption of IIoT is more than a business strategy—it's imperative for Industrial OEMs. The subsequent sections provide insights into the competitive facets of IIoT adoption, guiding OEMs on how to keep pace and lead in the current age.

Industrial IoT and the Network Effect

For Industrial OEMs, the strategic opportunity is enormous; however, most business leaders do not yet fully appreciate how large an impact this will have in the near-term years to come – all due to IIoT, Smart Products, and the Network Effect.

As IIoT devices become increasingly interconnected, a vast network of devices that can exchange data and perform various tasks autonomously is created. These devices are being connected to other networks of OT, IT, and BT applications across and between enterprises. This interconnectivity is already driving explosive growth through a "Network Effect" of these technologies and systems working together, and this effect is expanding at a very rapid rate.

The Network Effect is a well-known phenomenon where the value of a product or service increases as more people use it. In the case of IIoT, increasing the number of devices connected to the network increases its overall value. This is because each device on the web generates data that can be used to improve the performance of other devices on the network. For example, a smart thermostat can use data from other devices on the network, such as a smart meter or weather sensor, to optimize its performance and reduce energy consumption. And, when interworking with multiple IT/OT/BT systems and applications, the value of this network effect grows even faster.

The Network Effect of IIoT is driving explosive growth in several industries. For example, in the healthcare industry, IIoT devices are used to monitor patients remotely, eliminating the need for regular hospital visits and improving patient care. In the manufacturing industry, IoT devices are used

to optimize production processes, reduce downtime, and enhance the quality of the products. IIoT devices are used in the transportation industry to optimize logistics and improve supply chain efficiency.

As more devices are connected to the IIoT network, the Network Effect will continue to drive explosive growth in these and other industries. The value of the network will increase as more devices generate more data, which can be used to improve the performance of other devices on the network. It will develop new opportunities for innovation and growth and new challenges for businesses and consumers.

For Industrial OEMs, fueling the Network Effect of value creation for customers accelerates product adoption and customer loyalty while steadily increasing the value of the products provided, moving the OEM's value proposition up the customer's value chain.

What it Takes to Win in Industrial IoT

A critical insight from many business leaders who have learned the hard way is that IIoT and Smart Product Proofs of Concept or Minimum Viable Products are just that and in no way compared to what is required in Enterprise-Grade solutions. It is easy to build proof-of-concept IoT solutions that look quite powerful but need to be more robust for Enterprise deployments. Enterprises will only use proven solutions validated for security, scalability, flexibility, and maintainability, and delivering IoT and Smart Product solutions that meet this bar is very challenging.

This section focuses on exploring and defining what it means to be Enterprise-Grade.

Enterprise-Grade Table Stakes

First, let's explore the basics of what an Enterprise needs in terms of security, scalability, reliability, flexibility, and lifecycle maintainability to set the stage:

- Security: Enterprises require IIoT solutions to be cyber-secure from a secure connection perspective and a total development, deployment, and lifecycle management perspective. Validation of all IoT platform components, platform penetration testing, fast ISO 27001 development processes, data security at rest, sophisticated Identity Access Management Integrations, Role Based Access Control, and many other security dimensions are required. To be successful in Enterprise opportunities, OEMS must entirely pass this hurdle.
- 2. **Scalability:** While scale can vary from thousands of devices to millions, the complexity of devices, the amount of data sent, data update frequencies, and the different types of data communications

vary widely. So, scalability is a multi-dimensional animal. As a result, an OEM's Enterprise-Grade IoT solution needs to handle scalability across multiple dimensions, or the OEM will constantly implement workarounds to address diverse requirements.

- 3. **Reliability:** For an Enterprise, reliability is demonstrated and proven. An OEM needs to demonstrate success with deployments similar to what a new customer envisions but also be prepared to verify that a customer's application is running at scale before closing large-scale deals and certainly before deployments. And, because all large enterprise solutions will fail due to hardware or software defects, the solution must handle such failure gracefully and recover. As such, OEMs need to have high confidence in the reliability of their solutions and ensure that they have proven high-reliability fault tolerance built into them.
- 4. **Flexibility:** When engaging with Enterprise customers, flexibility is hard to pin down, but it is crucial to successful deployments. Some key flexibility attributes include:
 - **Open Systems:** The solution can easily interwork with other software through secure APIs, handle multiple IoT device protocols, and is broadly adaptable via an available systems approach.
 - Multiple Deployment Options: The system can be deployed in various cloud alternatives such as AWS, Azure, Google, Private Clouds, or appliances.
 - **Customization:** Almost all Enterprise deployments require at least some, and often a lot, customization to meet solution requirements fully. Such IIoT systems must provide customizable look and feel, dashboarding, custom business logic and analytics creation, interworking with existing systems, and flexibility.
- 5. Lifecycle Maintainability: Enterprise-grade solutions must be easy to maintain via integrated DevOps tools, providing complete visibility of the Platform's health and easy management of scalability as demand increases. Further, it is essential to Enterprises that the system evolves quickly as new requirements are introduced. Finally, operating the solution cost-efficiently is necessary, preventing spiraling costs as an application grows over time.

These are not all the hurdles an OEM must handle to deliver Enterprise-Grade solutions and participate in the massive growth trajectory of IIoT-connected and Smart Products, but this provides a good overview. The critical point here is that starting with a prototype and building all of this capability is prohibitive from skills, cost, risk, and time to market for all but the most long-term players, and even these will require interim solutions as they deploy such an implementation.

However, even bypassing these significant hurdles, highly competitive solutions will require

differentiation on multiple dimensions. The way such differentiation is implemented can vary, but conceptually winning differentiation includes the following:

- 1. **Multiple Solution Templates:** These can be templates of "near-ready" solutions that must only be customized to meet customer requirements.
- 2. **No-Code Applications:** Applications that can be customized for specific customer deployment needs simply through the application's configuration. While often inflexible, no-code Applications can quickly provide scalable, reliable, and secure solutions.
- 3. Low-Code Workflows and Toolsets: Low-Code Tools allow rapid application customization to enable quick creation of custom logic, analytics, dashboarding, or solution integration to other applications. Such low-code tools can be powerful but must provide customers with complete platform customization flexibility.
- 4. Advanced Pro-Code APIs and SDKs: While differentiation is rarely offered, this support provides full access to the underlying platform capabilities for complete flexibility to rapidly build full-custom applications far beyond what low-code or no-code solutions can offer.
- 5. **Integration of Multiple Database, Opensource, and Connector Libraries:** Because Enterprise IoT solutions can have such widely diverse requirements, this is an extension of the open systems approach to allow fast integration of different databases, validated open-source components, or connectors to various device types, protocols, services, etc., to expand the capabilities and dimensions of the solution.

At this point, it is essential to consider not only what an enterprise customer may want from an OEM but also what the OEM may require for themselves to be able to build, validate, and deploy highly reliable systems flexibly and efficiently as commercial offerings. To this end, all of the above are essential differentiators to consider.

IIoT Platform Alternatives Available for OEM Success

Primarily, there are four types of alternatives available for Industrial OEMs to leverage for the creation of Enterprise-Grade IIoT and Smart Product applications and solutions:

- 1. Vertical Market-Specific Applications: Fleet management applications.
- 2. Full Custom Applications: Typically built "from scratch" using validated Open-Source code.

- 3. **IoT-as-a-Service (IoTaaS):** A collection of software components and subsystems provided primarily by AWS and Azure that companies can use to build custom IoT solutions.
- 4. **Application Enablement Platforms:** Full platform systems designed for companies to use in rapid application creation and hosting and meet Enterprise-Grade requirements.

These alternative solutions that OEMs can use as the foundation of their IIoT and Smart Product solutions are now examined further.

Vertical Market-Specific Applications:

These alternatives are only suitable for a small set of Industrial OEMs for several reasons. First, these alternatives typically are provided "as is" with minimal customization options, which minimizes any OEM opportunity for differentiations. Second, such vertical market-specific applications are targeted at an OEM's customer. Hence, the OEM becomes nothing more than a distributor with minimal value added to this relationship, minimizing any real strategic advantage. Given this minimal value-add, these alternatives are not further discussed here.

Full Custom / "From Sources" Platform Creation:

This alternative provides an Industrial OEM with complete control over the technology and total flexibility but at a considerable cost in most cases. However, this can be a viable alternative from a cost, risk, and time-to-market perspective for narrower, more straightforward, or niche applications that may not require extensive expansion, future modifications, or lifecycle management. However, as pointed out earlier, delivering a highly secure, reliable, flexible, and maintainable solution is by far the most expensive, risky, and prolonged time-to-market alternative for all but the most long-term players, and even these will require interim solutions as they deploy such an implementation.

That said, many highly competitive solutions, including our own IoT83 Application Enablement Platform, were built using this approach. But, for our Platform, it took years of development with a large staff of experienced engineers to curate multiple open-source components, to build our extensive libraries of custom platform and application code, and to extensively validate the security, reliability, scalability, and flexibility of this solution to make it truly Enterprise Grade. But with this investment and this work behind us, it is now the most advanced Application Enablement Platform.

IoT-as-a-Service (IoTaaS):

Very well-known and extensively used in the industry, the IoTaaS solutions provided by AWS and

Azure are robust, extensive, and reliable. Further, because these services are tightly coupled to the AWS and Azure Platform as a Service (PaaS) offerings, users need not worry about deploying these services. But there are Pros and Con to using IoTaaS to build OEM IoT Enterprise solutions, which we elaborate on here:

Pros for IoTaaS:

- Multiple IoTaaS components are available in constructed IoT solutions, including IoT Edge connection, database, lambda, analytics, API Gateway services, and many more.
- These services are pre-configured and ready to run on the provider's PaaS infrastructure, making deployment of these services relatively simple once understood.
- Some services operate as more integrated subsystems, such as Azure's IoT Hub and Azure Device Update Service, simplifying edge device connectivity and lifecycle management.
- Because AWS and Azure provide these services, they are well-supported and reliable.

Cons for IoTaaS:

- Since the IoTaaS offerings are a collection of services vs. a running and validated Platform, it is up to the OEM (platform developers) to invest in the skills and time to investigate, learn, and construct a complete featured platform equivalent from these services and then perform full Enterprise-Grade validation of this construction. The critical point is that while all the tools needed to build a coherent and complete IIoT Platform may be available in IoTaaS offerings, a comprehensive and cohesive IoT Platform needs to be assembled and validated by the OEM from these tools. This requires extensive engineering expertise, long development and validation cycles, and all of the costs this entails.
- Some No-Code and Low-Code tools and workflows (such as IoT Central) are provided to simplify the construction of IIoT applications. However, it is generally agreed in the industry that these tools are best for proof of concept use only and are not suited for deploying enterprise-grade applications.
- One critical financial detractor of IoTaaS offerings is a charge for every service transaction on top of the PaaS service fees. IoTaaS costs far faster as applications grow than solutions that only use underlying PaaS infrastructure (or run on Enterprise Private Servers).
- As we will see in the AEP section, an AEP provides streamlined workflows for enterprise-grade rapid application development via templates of no-code, low-code, and advanced pro-code tools and workflows suitable for building enterprise-grade solutions. IoTaaS offerings do not provide these services and leave the creation of such workflows to the OEM's development deliverables.

In summary, the AWS and Azure IoTaaS tools are robust and easy to deploy and use – once you scale the learning curve. Further, for Enterprises that have adopted some of the most popular and effective IoTaaS tools, such as Azure's IoT Hub and ADU, but are facing high costs and delays in deploying new applications, these IoTaaS components are easy to securely connect to with more efficient Enterprise-Grade rapid application creation platforms such as the IoT83 AEP. As such, using a hybrid approach, IoTaaS component offerings can complement - and sometimes optimize - an OEM's Enterprise-Grade IIoT solution offerings.

Application Enablement Platform (AEP):

The value and differentiation of the AEP are multifold, as implied in the Application Enablement Platform product classification. The primary benefits of an AEP are summarized as follows:

- 1. Provide the Run-Time Environment for secure, scalable, reliable, and flexible applications.
- 2. Provide a proper Platform Environment that has already been validated from an Enterprise-Grade security, scalability, reliability, and flexibility perspective. This allows the OEM developers to focus only on new applications and value creation, customer solution needs, product differentiation, and the underlying technology. This alone is a dramatic productivity boost.
- 3. Provide Rapid Application Creation tools and workflows designed to meet the standard of Enterprise-Grade solution requirements (secure, scalable, reliable, and flexible by design).
- 4. Support multi-application / multi-role / multi-tenant deployments for highly flexible use.
- 5. Support flexible deployment alternatives such as deployment on public (AWS, Azure, Google, etc.), private clouds, or appliances. While not offered by all AEPs, this flexibility can be crucial to customers with specific needs for data privacy, economics, or strategic partnership reasons.
- 6. Provide operators with integrated DevOps tools to monitor the application health of all Platform solutions and manage redundancy and scalability.

Comparing the Alternatives:

A chart summarizing critical characteristics of each of the alternatives that OEMs have to build their foundation can use Enterprise-Grade IIoT solutions is provided below:



Comparing Alternative Industrial IoT Solution Paths

In summary, the "Home Grown" alternative is by far the most expensive on all dimensions but can nevertheless be the right choice depending on the OEM's long-term strategic focus.

However, OEMs that take this path to develop complete Enterprise-Grade solutions should understand that commercial deployment will take years of work and anywhere from \$2M to \$10M in development costs, depending on the scope. IoTaaS alternatives are less expensive and provide an OEM with a fair amount of independence. However, this alternative still requires a significant investment in skills, development, and validation costs, as well as significant delays in the time to market for commercialization.

Further, OEMs should be aware of the "cost to scale" here, as there is a charge for each IoTaaS component transaction. Finally, the AEP alternative provides OEMs with a complete Enterprise-Grade Platform and the templates, tools, and workflows to enable rapid IIoT and Smart Product application creation.

Customers Seek Solutions, Not Platforms:

All of this discussion regarding the Platform path that an OEM can select as the basis for delivering Enterprise-Grade IIoT solutions is very important as whatever approach is taken will have long-term consequences as the Platform path chosen will be the foundation for OEM solution offerings. What can be easily overlooked, however, is that this "Platform" investment is not what customers want to buy. Once the Platform is established, OEMs still need to develop and validate the customer-facing solutions. So, it is essential to take this full view to assess what it will take to deliver real value to customers from cost, risk, and time to market.

The AEP is the Logical Choice for Most OEMs

Without question, the IIoT Platform requirements of OEMs will vary depending on their market focus and the types of products and services that they provide. However, for most OEMs, there are undeniable advantages to leveraging the AEP above and beyond any choice:

- 1. **Risk / Reward and Cost Benefit:** Recognizing that the "Platform" is not the "Application," the AEP alternative is the only choice that allows an OEM to immediately focus on building revenue-generating solutions that complement the OEM portfolio. With a ready-for-market platform foundation, OEMs can leverage the templates, no-code / low-code tools, and workflows the AEP provides to focus on building new value and differentiation immediately.
- 2. **Startup Costs:** Startup costs can be measured in dollars and time to market. At the same time, an AEP will require licensing costs; such costs pale compared to custom building an application from source code or IoTaaS components. With an AEP, OEMs can immediately begin the implementation of differentiation, minimizing time-to-market delays.
- 3. **Skills and Resources:** Even if an OEM has the skills and resources to build a "from sources" or IoTaaS Platform (although many do not), these are highly skilled and expensive resources and are almost always best applied to building differentiation and new customer value for customers. By focusing internal engineering on building new value and differentiation of the OEM's target area of expertise and minimizing the stress on underlying platform technology, OEMs accelerate and optimize economic and strategic results.
- 4. **Easy Integrations for the Network Effect:** AEPs, particularly the IoT83 AEP, are built to enable and simplify integration with other systems. We view this as an essential Enterprise-Grade requirement, so multiple workflows, services, APIs, and SDKs are integrated to add diverse edge devices easily, interwork with existing OEM or Enterprise software, host containerized software, along with other capabilities to catalyze the Network Effect for cascading value.
- 5. **Complement Prior Investments:** Many OEMs have already invested in leveraging IIoT solutions but recognize that the current approach could be more optimal. With its open-systems approach and rich, secure "Connector Library," IoT83's AEP easily interworks with any existing software that provides secure APIs or other data exchange mechanisms.

Beyond these benefits, IoT83's AEP provides very targeted differentiation to benefit OEMs in creating new IIoT applications and provides very efficient long-term value creation. Some highlights of this advanced AEP include:

- 1. **Beyond No-Code and Low Code**: The IoT83 AEP provides not only No-Code and Low-Code tools and workflows, as well as multiple templates for custom application acceleration, but IoT83 is the only solution that provides Advanced Pro-Code APIs and SDKs. This Advanced Pro-Code approach offers developers access to over 35 platform services to quickly create fully customized IIoT solutions. Understanding the power of this by example, by harnessing these 35 platform services for an application that would otherwise have required 100,000 lines of new code, this application can now be written with only 15,000 lines. The savings are transformational as every new line of code comes at a cost to register, integrate, test, and debug.
- 2. Using Existing Sources for Catalyst: OEMs that adopt the IoT83 AEP have access to powerful "generic" IIoT applications that include Identity Access Services, Device Onboarding, Advanced Secure Connection tools, Data Transformation Services, Custom Business Logic tools, Threshold and Rules management, Application Containerization, Custom Analytics, Dynamic Dashboard Creation, and many more pre-built services, all harnessing the best practices for using IoT83's Advanced Pro-Code technology. OEMs can use these applications as a foundation, adapt them to the OEM's look and feel, and rapidly transform them to serve their particular needs.
- 3. **Development Services as an Extension of Your Team:** IoT83 also offers Development Services staffed by engineers and experts on the IoT83 AEP. These Development Service teams can be used as an extension of your team to accelerate solution development and train your team's experts in leveraging the full power of the IoT83 AEP. IoT83 is happy to provide testimonials on the unparalleled power of combining the AEP with these expert Development Services.

While this section emphasizes the strategic value of the AEP as a foundation for OEMs to gain strategic advantage in IIoT and Smart Products, it is critical to understand that not all AEP solutions are alike and, in some cases, are very different. Some AEP offerings provide only somewhat ridged No-Code application tools; some combine No-Code and Low-Code application creation tools, but no others combine No-Code, Low-Code, AND the Advanced Pro-Code capabilities of the IoT83 AEP.

Some AEP offerings are highly scalable with full Enterprise-Grade requirement compatibility, like IoT83's AEP, but some are not. The extensive AEP value differentiation highlighted in this section reflects the capabilities of IoT83's AEP. OEMs must carefully evaluate other AEP solutions in detail to understand their capabilities when making such a critical strategic alignment choice.

Taking this analysis into account - for many, if not most, OEMs - the AEP approach discussed here is far superior to the "homegrown" or an IoTaaS approach. Specifically, regarding the IoT83 AEP, multiple OEMs have validated this solution in large Enterprise-Grade applications across different vertical markets. From a cost, risk, and time-to-market perspective, the IoT83 is the most competitive alternative for OEMs that want to benefit from the economic mega-trend of IIoT and Smart Product solutions across their portfolios.

To emphasize the benefits of IoT83's AEP further, examine the streamlined workflows in the diagram below. With this industry-leading AEP, diverse devices and data flows are easily connected to an advanced IIoT rapid application creation pipeline that allows the OEM to deliver multiple robust Enterprise-Grade solutions that solve real-world customer needs. This highly repeatable and extensible value-creation engine is transformational. It enables the OEM to leverage their industry know-how and strategically focus on what matters to their market and customers versus shouldering the burden of the underlying technology.



What it Takes to Make it Happen with IoT83

Engaging with IoT83 is an open and pain-free experience. From a company culture perspective, we are engineers at heart. We are customer-driven to understand your real needs and strategic objectives and how to deliver best what you need with our AEP and services.

We fully understand that building the confidence needed for an OEM to select our AEP as a foundational element of their IIoT strategy puts the burden of proof on us. To create this confidence,

our team will invest in enabling you to make a fully informed decision. Some of the components of this will include:

- 1. **Seeing is Believing:** We provide real-world examples of Enterprise-Grade deployments built on IoT83's AEP. While our ability to showcase all deployments is limited due to customer confidentiality, our available showcase validates our customer's success.
- 2. **Shoulder to Shoulder PoC:** We will work with your team to build a compelling Proof of Concept that leverages our existing templates, no-code applications, or low-code solutions or a combination of all of these, that integrates your products with the AEP in the context of your vertical market.
- 3. **Engineer to Engineer Validation:** Engineer discussions to understand "what's under the hood," AEP architecture, the practical aspects of using the AEP, how the Advanced Pro-Code solution works, and many other elements are essential to an OEM's decision-making. We will fully support this.
- 4. **Validation of Cyber Security:** As security is a critical aspect of IIoT Enterprise-Grade solutions, our Chief Security Officer will engage with your team to provide the security validation needed.
- 5. **Transparent Pricing Model:** IoT83 is fully transparent regarding the license cost, any incremental costs at scale, costs of incremental deployments, and Services costs, and we will fully disclose this with your leadership team.

In summary, we aim to make engagements with Industrial OEMs as streamlined and open as possible. The burden of proof is on us, and we embrace that, but we are proud of our product and confident in the value it will deliver, so we are always eager to showcase its full capabilities.

Summary and Conclusions

In conclusion, Industrial OEMs have tremendous strategic growth opportunities by providing their customers with innovative IIoT and Smart Product solutions. Customer demand for these solutions is well-established and is growing exponentially. Based on market research on customer expectations and demand, participation in this market must be a strategic imperative for Industrial OEMs. And, for OEMs that achieve real differentiation, this will catalyze transformative competitive advantage and growth.

This White Paper examined the foundational technology IIoT Platform alternatives available to Industrial OEMs to deliver Enterprise-Grade solutions. We established many reasons why the AEP alternative is the best choice from a cost, risk, and time-to-market perspective. We concluded that the AEP is the best strategic choice for OEMs to accelerate delivery of Enterprise-Grade IIoT, rapidly build differentiation in the IIoT and Smart Product domain, and to achieve strategic differentiation now and over the long term. Finally, we established IoT83's AEP as the best choice across multiple dimensions.

At IoT83, we look forward to one-on-one engagements with you and your teams to understand your strategic objectives and to demonstrate how IoT83 can become your strategic partner in this exciting and industry-transformational time.

References:

IIoT-World Report on State of IIoT Adoption and Maturity in Three Industries Mckinsey Report: IoT value set to accelerate through 2030: Where and how to capture it