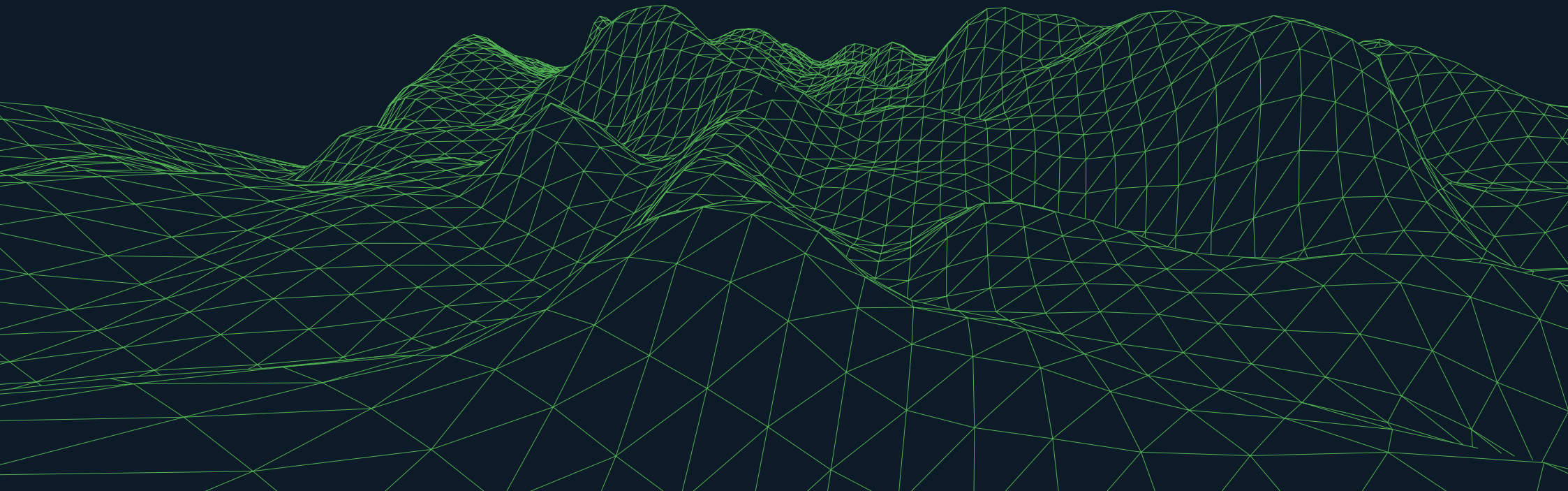


# Democratising the development of sophisticated solution centric IoT propositions



## Introduction

Industrial manufacturers of all kinds are under pressure to change and enhance established business models to take advantage of new emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI) and related concepts such as servitisation.

The benefits of a servitised business model are many and varied. They include higher quality revenue streams, reduced costs, enhanced customer relationships, and enhanced value propositions. Conversely, any competitor adopting a servitised business model will be a threat to an established industrial manufacturer's core business. As such, the effective adoption of new technologies is a critical step, not only for industrial manufacturers to thrive, but also to survive.

In recent years, Application Enablement Platforms (AEPs) have emerged as a key tool for the development of sophisticated IoT applications. These platforms seek to deliver the majority of software capabilities that are needed to deliver an IoT application, whilst also leaving room for developers to tailor their solutions so that they are differentiated in the marketplace.

Today's AEP environment is dynamic, and over time different AEPs have evolved to specialise in different markets, either vertical- or context-based, offering secure managed services to accelerate software developers. A new niche is evolving in the AEP space, which sees certain AEPs focus on supporting more complex and diverse environments that comprise multiple different IoT devices potentially provided by different OEMs (Original Equipment Manufacturers) and that might not readily integrate into seamless systems 'out of the box'.

By focusing on integrating an OEM's entire product range together with devices supplied by other OEMs in typical deployment scenarios, these ecosystem enablement platforms can help both OEMs and solution providers to accelerate the development of solutions intended to be deployed into fragmented IoT environments. In the process, these platforms can help to unlock new revenue opportunities, reduce costs, and overall democratise the development of sophisticated solution centric IoT propositions.

## New technologies results in new opportunities, but also invites new threats

Industrial manufacturers of all kinds are under pressure to change and enhance their established business models to take advantage of new and emerging technologies such as the Internet of Things (IoT), Artificial Intelligence (AI) and related concepts such as servitisation.

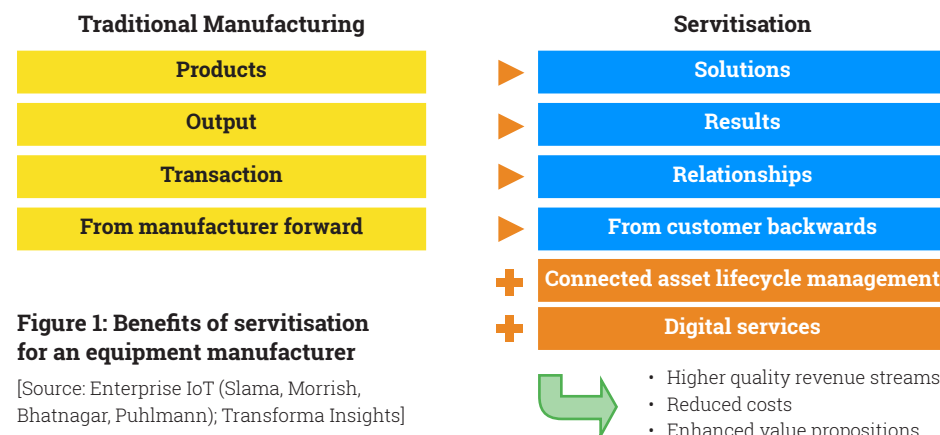
The opportunities that new technologies unlock are many and varied. Servitisation, or the offering of capabilities 'as a service' instead of a more traditional approach which may have been underpinned by sales of equivalent hardware, is just the tip of an iceberg. Servitised business models enable vendors to have closer customer relationships and to become partners with their clients, hence unlocking further opportunities to generate new revenues by cross-selling and up-selling.

Meanwhile, vendors that receive regular information from hardware assets deployed at client sites are well positioned to add new value through services such as predictive and preventive maintenance and are better positioned to optimise any field force operations to deliver these services efficiently. In addition, any information received from assets in the field can be incorporated into future product designs, so that future products are generated as closely as possible to match the user requirements without the risk of over-specifications (and so unnecessary costs).

Clearly, any users of servitised assets can also benefit from this kind of arrangement. From the perspective of a customer, a servitised proposition can reduce risk by converting a one-off hardware purchase to a regular payment for the provision of a service, potentially with additional flexibility to upgrade (or downgrade) service levels and capacity as their business grows or refocuses. For a customer, the enhanced efficiency that a manufacturer can achieve with servitisation and predictive maintenance manifests as improved service levels, increased up-time of assets, reduced requirements for 'spare' capacity and parts, and more efficient operations overall.

Any industrial manufacturer that can successfully migrate from one-off hardware sales to ongoing revenue streams associated with servitised propositions will benefit from regular revenue streams from an established customer base which has the potential to enhance enterprise value.

The benefits of servitisation for an equipment manufacturer are highlighted in **Figure 1**, below.



Although, the adoption of new technologies such as IoT and AI to enable servitisation act as only an opportunity, it can also attract challenges. As multiple industries adopt new technologies, so each participant within the industry must keep pace or else get outcompeted by others offering enhanced products and services.

In short, the advent of new technologies such as IoT and AI is an opportunity for any given industrial manufacturer to enhance revenue streams by securing new market share, addressing new opportunities, offering value added services, and transitioning away from one-off hardware sales to ongoing revenue streams. But the adoption of such new technologies is not an option, since more effective and aggressive competitors will make inroads to established core businesses if an industrial manufacturer does not effectively adopt new technologies.

The evolution from hardware-centric to software-centric business models will clearly be a significant challenge, but it is also a critical step for any industrial manufacturer not only to thrive, but also to survive.

## Why the world needs Application Enablement Platforms (AEPs)

Application Enablement Platforms have been a key concept in IoT for a little over a decade. Until this time platforms existed that could help with the development of IoT applications (then mostly referred to as just plain old M2M rather than IoT), but the user experience offered by leading IoT enablement platforms took a significant step forward in around 2012 with the advent of more user-friendly 'drag and drop' programming interfaces.

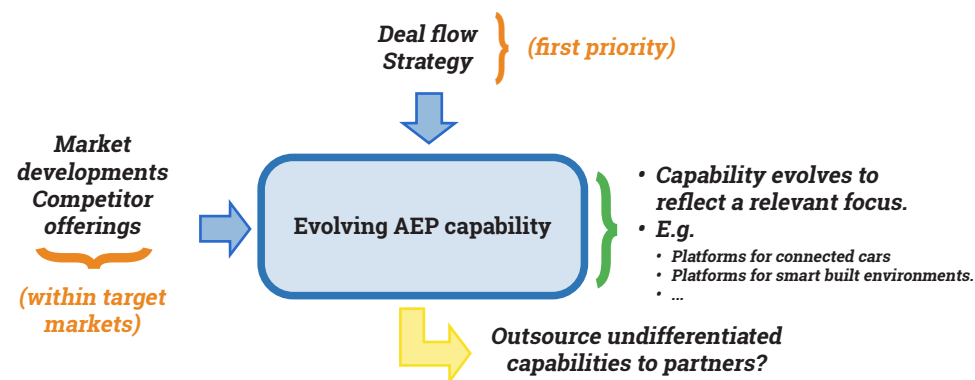
The idea was that an AEP, as they came to be known, would offer a simple abstracted environment with key software components of typical IoT applications already written and simply requiring connection with other components and then configurations to support basic IoT applications. More sophisticated and customised applications could then be developed building on the baseline capabilities provided by the AEP.

As an example of what this might mean in practice, if an enterprise user wants to collect and store (for example) pipeline pressure readings from industrial equipment around the world then developers would probably find the relevant capability in an AEP. If the company wanted to analyse the same pipeline pressures in different units (kPa, BAR, PSI, etc.) taking into account ambient atmospheric pressure and the altitude of any given installation, then developers would probably need to build that capability using a few AEP components and maybe some bespoke code.

Accordingly, AEPs generally deliver a baseline scope of data ingestion, transformation, the application of business rules, historian functions, and support for user-configurable dashboards. More sophisticated AEPs would target specific industry verticals or contexts with an additional range of pre-packaged software options to support things like servitisation for industrial OEMs (Original Equipment Manufacturers) or smart buildings management for facilities managers.

Today's AEPs are also constantly enhancing their services to offer more and more of the functionality that their target users need. In turn, AEPs naturally evolve into specialists in their chosen markets which, to date, have generally been industry verticals, specific types of applications, or niche ecosystems (such as might be found in smart buildings).

The development path of any AEP will often take into account the customer deal flow that they need to support and also the evolving capabilities of competitors. Of these two elements, priority is given to supporting their own deal flow and developing capabilities that will help to differentiate offerings for key customer groups and deliver their needs most efficiently. Potentially, over time, an AEP would also be able to outsource relatively undifferentiated capabilities to third parties, or partners. This evolutionary dynamic is illustrated in **figure 2**, below.



**Figure 2: Evolution and specialisation of an AEP proposition**

[Source: Enterprise IoT (Slama, Morrish, Bhatnagar, Puhmann); Transforma Insights]

In this way, AEPs seek to offer perhaps 80% of the software needed by clients in their chosen target markets as configurable 'off the shelf' components, leaving the balance (perhaps 20%) to be developed by specific clients. This approach allows AEPs to help accelerate the development and deployment of IoT applications for all clients, but still allows individual clients to differentiate their propositions.

Importantly, AEP capabilities are generally offered as a managed service, so that security, resilience and robustness is assured.

## Embracing interconnected ecosystems

An emerging concept in the AEP space is a focus on the enablement of smart environments, rather than specific applications. IoT83, for example, positions itself as an OEM Enterprise Domain Cloud (OEDC), allowing OEMs to integrate a wide range of already connected devices into enhanced propositions.

This emerging focus area has come about due to a realisation that today many IoT-connected devices are deployed into environments that already feature many other types of connected equipment, each potentially associated with its own IoT application. Clearly there are significant benefits to be derived from connecting those devices and applications into a more cohesive system so that they can be managed together. Ingesting data into a shared environment also enables new applications to be built that draw inputs from a diversity of IoT connected devices, and potentially other data sources (for example, such as weather information in the case of smart building optimisation).

Today's connected environments are themselves diverse in nature, ranging from factory floors and warehouses in industrial environments, to the plethora of monitoring and management systems that might be found in an oil refinery. Often, applications associated with the different devices found in such environments would not have been developed with a view to interworking to become a seamless whole. In some cases,

devices will be associated with legacy and low functionality IoT applications. In many cases, applications associated with IoT devices sourced from different OEMs simply will never have been designed with a view to seamless integration.

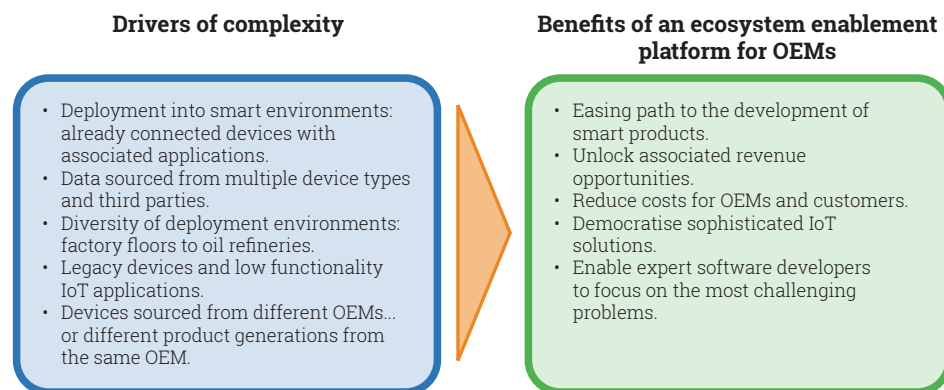
OEMs can also benefit from this emerging category of ecosystem enablement platforms, either to enable the seamless operation of different connected solutions that they themselves provide, or to enable the deployment of sophisticated solutions that manage, or at least integrate efficiently with, other device types that are present in a typical deployment location. Such platforms can also be used to support the development and deployment of sophisticated oversight applications either for specific equipment types or for combinations of equipment types that are typically deployed alongside each other.

For both OEMs and service providers, or even end-users seeking to deploy solutions that draw on multiple IoT data sources, the advent of such ecosystem enablement platforms will also provide a potential route to avoid the FUD (fear, uncertainty, and doubt) associated with an alternative approach which might see IoT applications re-written into new environments with new supporting software infrastructures. Ecosystem enablement platforms can potentially also ease the integration of a new technology vendor into a connected system, or the integration of a new software capability associated with specific devices and with a specific software environment. In short, an ecosystem enablement platform can allow far greater latitude in the way that an evolving smart environment is managed and can also de-risk the evolution of smart environments.



## Benefits of ecosystem enablement for OEMs and solution providers

The benefits of ecosystem enablement platforms for OEMs and solution providers are manifold, encompassing the enablement of those environments, increased revenues, reduced costs, and the overall democratisation of smart environments. These are summarised in **figure 3** and are explored in more detail below.



**Figure 3: The benefits of an ecosystem enablement platform**

[Source: Enterprise IoT (Slama, Morrish, Bhatnagar, Puhlmann); Transforma Insights]

Ecosystem enablement platforms can **ease the path to developing smart products**, particularly those to be deployed into connected environments, and to developing propositions that combine inputs from multiple device types and that can also control those devices. By bringing incremental capabilities that are essentially an overlay to existing IoT solution capabilities, an ecosystem enablement platform allows new capabilities to be deployed whilst leveraging investments that have already been made in isolated IoT devices and associated applications. Such an approach also de-risks the development of these new capabilities.

Clearly the potential to easily develop and deploy new sophisticated services at low cost and with relatively low risk can **unlock associated revenue opportunities**. New revenues could be associated simply with enhancements of any application already associated with an IoT device, or they could derive from the ability to offer new services based on the IoT solutions that are already in place in a given location. Alternatively, new revenues could be associated with the potential to deploy new IoT solutions into constellations of devices that can be integrated using an ecosystem enablement platform. Ultimately, the deployment of an ecosystem enablement platform might allow a disparate estate of devices to be offered 'as-a-service', unlocking multiple potential associated revenue and other opportunities.

Ecosystem enablement platforms can help to **reduce costs** for both OEMs and their customers. Simply by enabling new monitoring and control applications an ecosystem enablement platform can unlock new associated efficiencies that would not be possible to secure without tight integration across multiple IoT solution types. These could be realised in the form of reduced operational costs for end-users due to the availability of better management data and more sophisticated control systems. For an OEM, meanwhile, ecosystem enablement platforms can minimise the costs associated with the development of new capabilities and new solution propositions. For both OEMs and their customers, ecosystem enablement platforms can also play a role in de-risking the evolution of smart environments, which can be expected to unlock additional costs savings. And the fact that much of the required software development can be supported by a productised platform environment can also reduce the cost of core software development.

Ecosystem enablement platforms can also help to **democratise the development of sophisticated solution centric IoT propositions** based on multiple disparate IoT applications, in much the same way that the advent of the AEP has already democratised the development of IoT applications. By seeking to productise most of the software capabilities required to support these kinds of solution-centric propositions, ecosystem enablement platforms allow such solutions to be developed quickly by less specialised software developers, freeing up the time of expert software developers to focus on the key aspects of a sophisticated solution that are expected to be competitive differentiators in the market.

## Conclusions

Industrial OEMs find themselves at a critical juncture. While the adoption of new technologies is an opportunity to enhance their products and services, and capture new and higher quality revenues, it is also a significant threat. Meanwhile, any individual OEM may need to confront a legacy of connected devices in the field which are associated with legacy technology applications and fragmented deployment contexts including devices sourced from multiple OEMs.

AEPs have performed a key role in IoT markets for many years, and most AEPs have evolved to specialise in different markets, either vertical- or context-based. The next challenge to be addressed is the management of diverse environments that are characterised by the presence of multiple disparate IoT solutions, potentially provided by different OEMs or even the same OEM over the course of multiple years and several products and product generations.

As such, today's IoT environments highlight a need for an evolved AEP capability that focuses on the orchestration of complex and fragmented states of devices. The emerging need is for the enablement of smart environments, rather than specific applications, and opens the door for a new type of platform focused on specifically this.

The benefits of such platforms for OEMs and solution providers are manifold, encompassing the enablement of those environments, increased revenues, reduced costs, and the overall democratisation of smart environments.