

The Guide to IoT Orchestration

Setting your IoT data free



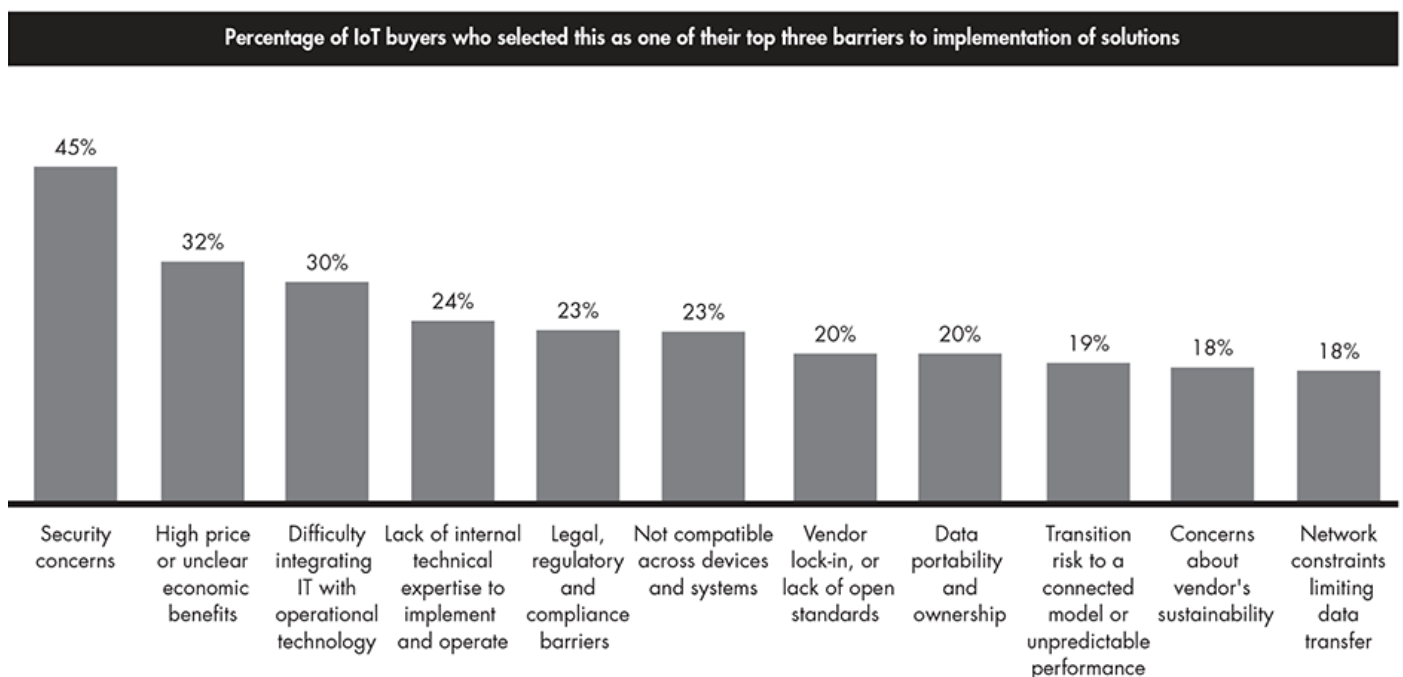
Introduction

IoT, by definition, is a network of "things", that can connect, interact and exchange data. Once an organization starts implementing IoT, they quickly realize that while connecting sensors is possible, exchanging data is complex. In the sea of sensors, systems, protocols and data structures (structure codifies data types, relationships and more), each vendor is an island. Exposing data? Not a problem. Connecting to other sensors and systems from different vendors? Much more challenging.

Imagine having an app for your HVAC. Another for your lighting. And yet another from your energy provider. That's a learning curve with three separate apps, different protocols, hardware and 3 separate dashboards to keep track of. An even bigger problem is that there is no way to get insights, automate or define rules using data that resides in different applications.

Meanwhile, some of the data you want to use resides in IT systems, like Building Management Systems, Warehouse Management Systems, Hotel Management, Employees Work Plans and countless others. How do you connect these existing systems, used effectively in your current operations, to the new data generated by IoT? Imagine the insights, workflow efficiencies and improved monitoring you could gain if everything operated in sync.

In a recent Bain customer survey of the top IoT barriers, the #2 most cited barrier to IoT adoption (right after security), was difficulty integrating IoT with operational technology. Rounding out the top 5 barriers are unclear ROI, lack of expertise in implementation and concerns about interoperability.



Source: Bain IoT customer survey 2016 (n=533)

Done right, IoT orchestration can remove these barriers.

An orchestration platform integrates separate IT systems, software and sensors into a single management platform. You can then view, manage and set automated rules on every piece of data that currently exists in the platform, resulting in powerful and previously unavailable applications.

Breaking the Silos – "Connected Products"

Back in the old days, before we had IoT, we still had connected devices – and systems. Really!

- ▶ A warehouse had a warehouse management system – in a silo
- ▶ A building had a building management system – in a silo
- ▶ A fleet had a fleet management system, maybe. But if it did, it was in a silo

Then IoT started getting more traction, and things got even more siloed.

- ▶ Connected HVAC? Sure, but with its own management app – in a silo.
- ▶ Energy management? Yes, but in a silo.

Let's zoom out and look at say, a chain of supermarkets. They have buildings, warehouses, carts, refrigeration, HVAC.... They're running quite a few connected applications like cashier line management, recycling bin management (empty/full), store ambience (CO2, temperature, humidity, sound), shopping cart tracking, energy efficiency, and more. Every single one of those is generating valuable data – but that data is in silos.

Let's characterize these silos:

- ▶ They could be legacy IT systems or new ones
- ▶ They're specialized and have limited use cases. ie. the elevator doesn't know how to manage the HVAC
- ▶ They each use different protocols and standards that are ideal for their own individual use cases
- ▶ They have different data structures and collect and send data out at different intervals – optimized for their own use cases
- ▶ They're being used! Profoundly tied to operations

Should we break down the silos?

The business gains from the unified management of connected devices and systems, point to a clear yes. When we break down the silos, we can:

- ▶ Integrate IoT with IT and existing business workflows and systems
- ▶ Gain a single management platform for all currently connected devices, systems and apps
- ▶ Create a single pane of glass monitoring – won't your team be happy about that?
- ▶ Gain the ability to analyze and act on multiple data pieces – previously in silos – in order to increase efficiency or generate new revenue streams.

Start with the Right Ingredients

What does it take to break down the silos and orchestrate data from different IoT devices and IT systems? Let's dive into the key ingredients.

Any Sensor / Device / Protocols / Data Structure

The building blocks of an orchestrated IoT application is the ability to ingest data and manage any sensor, regardless of protocol and data structure. You should be able to integrate your existing sensors, add sensors on top of existing infrastructure, and also expand to any new sensor off the shelf when needed. Orchestration does not require access to the device code in order to place an SDK/agent for integration, and offers far more flexibility.

The orchestration platform also has to be able to act on all data in concert, which requires normalization of all protocols and data structures into a single standard.

Any IT System

As far as the IoT orchestration platform is concerned, connecting to an IT system is quite similar to connecting to an IoT sensor. The system is a repository of data to be collected and normalized, same as with sensors. The only differences are in the complexity and breadth of data, and the fact that it is typically integrated via APIs.

Any Business Logic & Analytics

The orchestration platform cannot be limited to a specific set of rules, business logic or analytics. Since the goal is to act on all types of data from different business units, the rules, alerts, and dashboards have to be completely flexible, so they can be customized for any business need.

Where an orchestration platform really shines is when you need to provide cross-application or cross-sensor analytics like correlations, telemetries, and comparisons of various locations.

Configurability

As a corollary to supporting flexible business logic & analytics, they must be configurable and extensible. By configurability, I am referring to a simple drag and drop, or point and click interface that anyone can use to create the IoT application. Extensibility supports the addition of custom code to the application, to add proprietary algorithms & knowledge. These ensure that every business logic change or new dashboard doesn't require hours of engineering development, so the user is self-sufficient. This is the best way to develop IoT projects in a timely and profitable way.

Multi-Tenancy

Since you're integrating data from several business units, locations, or hundreds of customers, you don't want to grant everyone access to all the data. In fact, you want to deliver the right alerts to the right people at the right time. You will want to create specific dashboards and rules for specific units. That's where multi-tenancy comes in. Configure granular access permissions to groups of people by geography, title, department or any parameter you define.

Application Hierarchy

Planning a full-blown orchestration application from the outset is nearly impossible. For one thing, many pieces already exist in your organization. For another, this kind of complex planning is extremely difficult and arduous, and can't respond to changing business conditions quickly enough. A good orchestration platform will support agile development through application hierarchies. This allows you to build smaller applications and connect them to larger and larger applications gradually. An example would be data center temperature monitoring, connected to the HVAC application, and then to the Energy Management System.

Let's Go Platform Shopping

Now that we've defined some basic requirements, let's see what kind of capabilities the different types of IoT platforms supply for orchestration.

Connectivity & device management platforms

These usually have narrow capabilities, designed to optimize their specific functions of connectivity and device/edge management. While a select few are sensor/protocol agnostic, the majority were developed by device vendors to extend their own capabilities, so that they have limited interoperability with other devices and systems. The business logic and analytics offered by these platforms are optimized for their specific use case, and not very configurable.

Bottom line: Optimized for a specific use case, lacking capabilities beyond this, and not extensible or configurable

IaaS/Cloud platforms

AWS, Azure, Google, and others offer robust infrastructure for enterprise IoT. However, the actual applications have to be developed from start to finish, and nothing is configurable. This doesn't lend itself to the agility and configurability needed for orchestration.

Bottom line: Heavy development requirement is not suitable for IoT orchestration demands

Application Enablement Platforms (AEPs)

Offer the full stack of services need to develop and manage IoT applications. However, they rely heavily on custom development per customer, and are not flexible and configurable. A typical IoT application takes 6-18 months to launch, and extending to additional systems and applications will take even longer.

Bottom line: Time to develop additional capabilities not supported out of the box is very long. When factoring in low extensibility, IoT orchestration will be too expensive and long.

Capability	Connectivity Platform	Device Platform	IaaS/Cloud Backend	Application Enablement Platforms	Orchestration Platform
Sensor Variety	Limited May require an SDK	Limited May require an SDK	Limited May require an SDK	Good, but some custom development may be necessary	Any No sensor/gateway SDK required
Protocol Variety	Limited	Limited	Limited	Good, but some custom development may be necessary	Any
Data Structure Variety	Limited	Limited	Limited	Good, but some custom development may be necessary	Any
Normalize Data / Protocols	No	No	No	Limited	Yes
IT System Integration	No	No	No	No, or very expensive and lengthy to develop	Yes
Business Logic Flexibility	Limited	Limited	None out of the box	Expensive and lengthy development to customize	Any
Analytics Flexibility	Limited	Limited	None out of the box	Expensive and lengthy development to customize	Any
Configurability	Very limited	Very limited	None	Expensive and lengthy development to customize	Full
Extensibility	None	None	Limited	Some	Full, Also support multi-tenancy hierarchies
Multi-Tenancy	None	None	Limited	Limited	Full
Application Hierarchy	No	No	No	No	Yes

Checking Out: Orchestration Platforms

IoT orchestration platforms are designed for fast and flexible IoT application development, but also for application growth. Their key features are:

- ▶ Fast connectivity and integration of any device, platform, IT system or application in use
- ▶ Flexible configuration of business logic, rules, alerts and dashboards without the need for professional services or engineering
- ▶ Full extensibility to drop in custom algorithms and code
- ▶ Multi-tenant hierarchies allow for distribution of the aggregated data back to the right teams at the right time
- ▶ Application hierarchies that allow gradual addition and enhancement of IoT applications while maintaining full ability to expose and use data from several applications in concert

Show me the Business Benefits

These capabilities can generate a competitive advantage for industries implementing IoT, but require a shift in perspective about IoT challenges.

The Old Way Connected Product	With IoT Orchestration Connected Enterprise
When you select a sensor/platform ecosystem, you'll always be locked in to it	Full flexibility to use the most suitable component for any application
IoT and IT are too expensive to integrate & will consume many engineering resources	Fully integrate IT and IoT systems in weeks
Management and operations will be using two separate systems in parallel	Single pane of glass management for your entire business
The business gains efficiency by optimizing one device/system at a time	Combine data sources to improve efficiency, reduce costs & improve predictive maintenance
Plan and budget for a large-scale IoT project (measured in years)	Start small and scale. Develop mini-IoT applications fast & interconnecting them later
Difficult to measure ROI for a project that may take years	Maintain a positive ROI at every phase of development
Hard to approve budget and resources	Easy to get started with small and smart applications
Uncertainty regarding future development, and expandability	Future-proof IoT, can expand applications in any direction

Orchestration of Orchestration: Management Capabilities for IoT Providers

IoT projects are quite complex. As mentioned in the intro, enterprises often lack the resources to pull all these components together effectively.

Fortunately, system integrators and service providers are stepping into the gap. They have experience assembling networking, IT or security projects using equipment from different vendors and making them all interoperate, and then training the users or maintaining the application themselves.

In a valuable Machina Research report titled 'System Integrators are most trusted to deliver the IoT', we see that 70% of companies are already working with system integrators, and 44% of all IoT projects are executed by system integrators.

Building and managing IoT applications as a service comes with its own set of requirements, which can also be addressed with orchestration capabilities.

Support Any Customer in Any Industry

At any given time, IoT service providers will be developing applications for customers across many industries, departments, and applications. When using an application platform, they can handle all of their customer's requirements on a single platform. They'll have an unlimited choice of devices, will be able to seamlessly integrate any IT system and configure any business logic.

Fast Development Times

Another feature of the orchestration platform valued by system integrators and service providers is 'speed of development'. When offering IoT development services to many customers, being able to deliver fast and with minimal resource consumption is essential to scaling the business. Faster development time is also a strong competitive advantage and enables IoT providers to capture significantly more business.

Flexible Response to Customer Requirements

Configuration, rather than custom development, allows IoT providers to easily respond to changing customer requirements. This results in a smoother development process, as well as improved maintenance and support.

Management of Customer Applications

Orchestration platforms also allow system integrators and service providers to create a management layer for all of their customer's applications. Taking advantage of application hierarchy capabilities, they can simply create a management application layer. This will give them complete cross-application visibility and analytics. They can track any useful piece of data they wish across their large customer base in order to optimize device or business logic selections. For managed services, they can create dashboards and configure alerts.

Unique Service Provider & System Integrator Features

Since service providers and system integrators make up a large piece of the IoT market, some IoT orchestration platforms offer them unique capabilities, aimed at making development and management much faster and simpler:

- ▶ Get customers to market faster by easily re-using device set-up, business logic, and analytics between customers and projects
- ▶ Create a cross-application asset library
- ▶ Create tenant, application, product and group level rules
- ▶ Single pane of glass
- ▶ Cross-customer visibility (dashboards and reports)

About Axonize

Axonize is an IoT orchestration platform, purpose-built to provide speed and scale for service providers, developing and managing IoT applications. Based on a unique multi-application architecture that requires configuration rather than development, launching a full-fledged IoT project on Axonize requires mere days, rather than months, and yields a high ROI. Axonize is used by leading IoT service providers, including Deutsche Telekom, Bezeq, MHP and others.

Some of our customers



Contact us to schedule a walk-through at any time: hello@axonize.com