The importance of IoT standardisation

Founded in 2012, oneM2M is a global partnership project comprising eight of the world’s leading ICT standards development organisations. oneM2M has developed and continues to evolve a body of technical specifications for a set of common service functions to support scalable and interoperable IoT applications across different industry sectors. Developers can embed oneM2M capabilities within various hardware and software components to connect the many devices in the field with IoT gateways and application servers worldwide. Ken Figueredo, one of oneM2M’s contributing members and a Market Development Consultant for Chordant Inc., outlines the importance of IoT standardisation and oneM2M’s actions towards that goal.

Question: What are the drivers for digital transformation, and why is data management a fundamental capability for digitally enabled businesses?

Ken Figueredo: A large part of digital transformation is to use data more quickly to make business decisions. Data is fundamental because we’re moving into an era where we have access to so much more data, not just data about people, but data from connected devices, smartphones, and sensors. Many organisations are learning how to adapt their operations now that so much more data is available. The scope is broader than static or snapshot data, because IoT devices are sources of time series data feeds.

We can break the digital transformation challenge down into several steps. The first involves managing the devices that supply the data. That is why we hear a lot of organisations talking about device management. Over time, many more IoT devices will be deployed and a significant proportion will be low-cost constrained devices. These devices don’t run continuously, but gather data, wake up from a sleep state, and pass the data on before going back to a sleep state in order to conserve energy. In data management terms, the entity that collects the data needs to recognise when devices are awake and ready to transmit their data, collect that data efficiently and quickly let that device go back to sleep.

Once you are handling a pool of devices, the next step is to figure out how to manage the data they generate. What is the data source, and what is its integrity? How do I pass data on to
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users and exercise security and privacy policies over downstream users? Within a large organisation, how do I share data across different departments? The whole idea of sourcing and supplying data between different parties becomes very important.

These examples illustrate the layers of complexity and define the foundations on which digital transformation depends. They are the kinds of issues that oneM2M is addressing by creating an open standard for the IoT ecosystem.

Question: Operational boundaries are often reported to be one of the major factors in hindering data sharing and management; what is the solution to this challenge?

Ken Figueredo: We need to consider several different boundaries in practice. In the industrial sector, there is a boundary between operational technologies (OT) – all the devices, sensors and controllers that manage the processing environment in a manufacturing facility, for example – and information technologies (IT) – for enterprise resource planning and accounting, for example. Many organisational structures operate with that distinction, and that's one of the boundaries to span in making data driven decisions.

A public sector example is where transportation and welfare-service departments can collaborate to improve citizen services. Take the case of shuttling house-bound patients for appointments at clinics or doctors’ surgeries. By using capacity planning and live data to coordinate scheduling between a regulated taxi fleet and welfare services schedulers, both departments can embrace digital transformation to improve resource utilisation and deliver a better experience for patients, care workers and taxi drivers.

Chordant’s experience falls more in the area of data sharing, often across public and private sector boundaries. A case in point might be an organisation whose data is valuable to another company, and they want to find a dependable way of sharing that data. One example we are working on in the UK involves testing of connected and autonomous vehicles (CAV). Vehicles providers recognise that they can improve the quality of testing by combining CAV data with data about activity on the transport network and local weather data. A use case might be a road test that is run in February when it's dark and raining. With data sharing, can a tester evaluate performance under simulated conditions for the month of June when traffic levels and the weather conditions are completely different? For that kind of testing to work and for each organisation to get value from their data, there is a need to share data. This scenario involves multiple data sources, many different technologies, and requirements to apply privacy controls for selective data sharing. It is ideally suited to using an IoT platform built on the oneM2M standard. The open standard approach means that Chordant’s platform operates as a neutral data exchange that different public and private sector organisations can rely on. It also demonstrates the value of reusability as the same set-up is being used by Transport for West Midlands (TfWM) and other organisations to create a market for connected and autonomous mobility data services.

Question: The IoT is expected to revolutionise the world, spanning government, commercial and consumer sectors alike. What route do you expect this revolution to follow?

Ken Figueredo: IoT is an attention grabbing label in marketing terms, but I think that we can expect to talk less about it over the coming years because it will just blend into the background. IoT will become a part of everyday life and everyday operations. The focus will be on services and benefits rather than the technology.

Look at this in the case of students in the pre-Internet era. They would have to go to libraries, find a librarian and navigate through a catalogue of publications. That process has largely changed. Through digital transformation, we take it for granted that you can access much more information and far more easily from our computers and phones. The emphasis now is on how we use that information.

The bigger picture is to think more about how we’re gathering and sharing
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Making Missions Possible
For the last five or so years we’ve seen a lot of market forecasts from analysts talking about the numbers of connected devices; it’s relatively straightforward to count and to forecast numbers of devices. It’s also easy to project the amount of data that these devices will generate. The change we need to see happen is to think about different metrics for the value of data – it’s not just in the volume; there can be small quantities of quite valuable data and large quantities of invaluable data. A shift away from forecasting device and data quantities will drive different behaviours in the way companies share and use data.

**Question:** Let’s talk about standardisation. How important is it in IoT applications?

**Ken Figueredo:** Some companies want to launch products quickly, and they’ll build something independently using proprietary technology to go to market in as little time as possible. There’s an implicit trade-off about long term viability. As organisations deploy new solutions it becomes a challenge to maintain them if only one company provides that solution. Once there’s a standard other vendors can be a backup.

Another consideration is that the IoT is helping organisations do new things through digital transformation so there is scope to add new standards to existing ones. For example, there are several standards such as Bluetooth, NB-IoT and Wi-Fi for connectivity as well MQTT or COAP for data transfer. They solve different parts of the IoT problem. The bigger IoT challenge is to connect any device, to collect data from that device, to supply data to an application that makes some sort of decision, and for that application to interrogate or remotely control that device. The more devices, applications, vendors and technologies that are added to the workflow, the more complex and interwoven this arrangement becomes. Also, each time a developer adds a new device or new application there is a cost of integration. This is a new paradigm – the ability to simplify the process of connecting any device to any application – and what oneM2M set out to solve when it launched in 2012. oneM2M standards define a middleware layer, between connected devices and applications, that masks technology complexities for application developers. You can think of oneM2M as a standard that solves a new problem but leveraging existing standards. oneM2M can use cellular connectivity with COAP or MQTT protocols; it does not displace existing or established standards. Instead, oneM2M provides a better way of using those standards to connect applications and devices with the added benefits of interoperability and scalability.

**Question:** The IoT famously requires secure, reliable and always-on connectivity. What roles do you expect 5G, satellite and terrestrial networks to play?

**Ken Figueredo:** I’d qualify the first assertion because there will be scenarios where connected devices won’t always be on. This will be the case for large numbers of low-power, power-constrained devices that are only on momentarily to transmit the data. This calls for some kind of intelligent middleware between these data producing devices and the applications that depend on their data.

Different applications will rely on different connectivity solutions. If you consider forestry management or agriculture, satellites might provide connectivity for remote and mission-critical areas in conjunction with cellular

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connectivity for more accessible areas and building locations. There are drawbacks in building a data gathering application twice, once for cellular and once for satellite. It is better to be connectivity agnostic. This approach allows organisations to use different connectivity options – 5G, satellite and terrestrial - without having to invest in multiple silos.

Beyond connectivity, there is value in having a common framework for devices and applications to interact. The oneM2M standard defines these additional capabilities that add value to connectivity standards, all within a common framework.

**Question: What role does oneM2M have to play in the IoT agenda going forwards?**

**Ken Figueredo:** There is a very important role in the sense that the IoT opens the field for organisations to do new things through digital transformation. That calls for a new way of doing things, with open standardisation delivering economies of scale.

oneM2M stands out for its standardisation track record. Its members began early and invested a significant effort to analyse the requirements for IoT solutions in multiple industry verticals and to identify a set of common requirements. To put this in perspective, each of the previous cellular standards – 2G, 3G, 4G etc. – required around one million man-hours of effort via the 3G Partnership Project (3GPP). The corresponding level of effort for oneM2M is about 500,000 man-hours. There isn’t that level of investment elsewhere.

oneM2M saves organisations the time of having to reinvent the wheel. Having established the foundations for interoperable and scalable IoT solutions, the issue now is to spread knowledge more widely beyond the early set of users; anyone can access them and contribute to them. oneM2M published a joint white paper with the Industrial internet Consortium to help industrial organisations.

There is a liaison framework in place with the Internet Connectivity Alliance, an IoT developer community that Alibaba launched for the Chinese market and oneM2M is a candidate for India’s smart cities initiative.

A final observation is the concern that small and medium sized enterprises (SME) find it difficult or lack the resources to participate in standardisation activities. I heard an interesting story recently from Europe where a group of lift manufacturers collaborated on a proposal to standardise how data is collected on lifts to transform maintenance procedures.

The idea is to standardise data gathering from any kind of connected lift, regardless of the manufacturer. These businesses see IoT technologies as a means of digitally transforming their monitoring, predictive analysis and maintenance operations. The group presented a technical requirement to add to the oneM2M standard. Once approved, this will become a part of oneM2M’s Release 4 standards. It’s a great example of reusing the basic functionality in the oneM2M standard and adding new capabilities within a common framework. It proves that oneM2M is an active and evolving standard and that all organisations, small and large, can contribute to progress!