2iC Q&A PAPER **LSA (LEAN SERVICES ARCHITECTURE) TECHNOLOGY**

LEAN SERVICES ARCHITECTURE: WHAT IS IT, AND WHY DOES IT MATTER?

GRAHAM BOOTH
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IN CONVERSATION WITH

BUSINESS AND TECHNOLOGY JOURNALIST
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A brief introduction to 2iC

2iC is a small company that has gained a significant reputation amongst some of the world's bigger defence organisations and companies. The reason? 2iC's unique software and its proven Lean Services Architecture (LSA), which enables enhanced digital interoperability in the battlespace and other critical operations.

I was able to catch up with 2iC's CEO Graham Booth and asked him to explain what LSA is exactly and what the benefits are, particularly in complex multi-system defence equipment projects.

Q:

WHAT IS IT THAT HAS ATTRACTED THESE DEFENCE ORGANISATIONS AND INDUSTRIES TO USING LSA?

Many defence projects significantly over-run on timescale and budget. Generally, that isn't down to core technologies, but the challenge of integrating them into a coherent whole.

A:

As we know from the UK National Audit Office, many defence projects have significantly over-run in terms of timescale and budget. Generally, that isn't down to the core technologies that are involved, but the challenge of integrating them into a coherent whole, particularly as many systems now have a significant software component: radios, sensors, weapons, battlefield command systems and so on.

In other words, the problem of overruns is rarely due to the platform itself—be that an aircraft, a vehicle, a missile, or a soldier's harness—but instead it's to do with the challenges of integrating everything on the platform and being able to share with other platforms to do more than the initial intent. Doing this piecemeal can be complicated, costly and time-consuming—and may even compromise the core mission of the platform in question.

A typical example of this is a military vehicle needing to interoperate with all the other devices, platforms and systems in the same battlespace. All of these things typically come from different suppliers and then all the systems required on that vehicle—GPS, sensors, radios and more—have to be integrated. This is time-consuming because it might involve installing extensive point-to-point wiring, multiple antennae, a beefed-up alternator, and any number of other ad hoc customisations. This means more weight, complexity and cost, and additional power consumption, too. And then you still have the even more complex problem of getting each of the systems to communicate with each other in an assured, secure and flexible manner.

Q:

SO HOW CAN SUCH PROBLEMS BE AVOIDED?

In today's fast-moving world, new technologies can deliver valuable new capabilities, which then somehow need adding to existing platforms.

A:

Very simply. Think of Lego. Lego pieces come in all shapes and sizes, but ultimately they all fit together to build a house, a car or a spaceship. That's because the pieces are designed to do that from the outset so it works, literally, "out of the box". That is precisely what is needed in the modern battlespace. The systems need to be designed to interoperate together, to communicate over a common digital information 'bus', rather than through silos of expensive point-to-point connections. So we need systems to become "Plug and Play" like the add-ons for the computers we use in our homes and at work, and that we all take for granted.

The gains from applying much the same principle in the defence world are enormous: there are significant savings to be made in project delivery time, cost and performance. This is because the 'how' it is done can become common knowledge amongst suppliers. And this in turn will lead to greater reliability, less risk and, ultimately, a much safer system.

There's another advantage, too. In today's fast-moving world, new technologies can deliver valuable new capabilities, which then somehow need adding to existing platforms—think of adding a new sensor to an existing platform such as a vehicle or aircraft, for instance. 'Designed-in' interoperability makes doing so very straightforward.

Q:

SO WHAT DOES THIS ‘DESIGNED-IN’ INTEROPERABILITY LOOK LIKE IN PRACTICE?

A:

Think of the Lego piece with its carefully defined common interface; that’s what we do here, define a common standard to which all the devices and systems in question must conform. In the jargon, it’s called an ‘architecture’ that basically says “if you want to join in, then these are the joining rules”. If the devices and systems do conform, then integration and interoperability will be assured. Not only that, of course, but it will be straightforward, so that—at least in terms of integration and interoperability—budget and timescale overruns won’t occur.

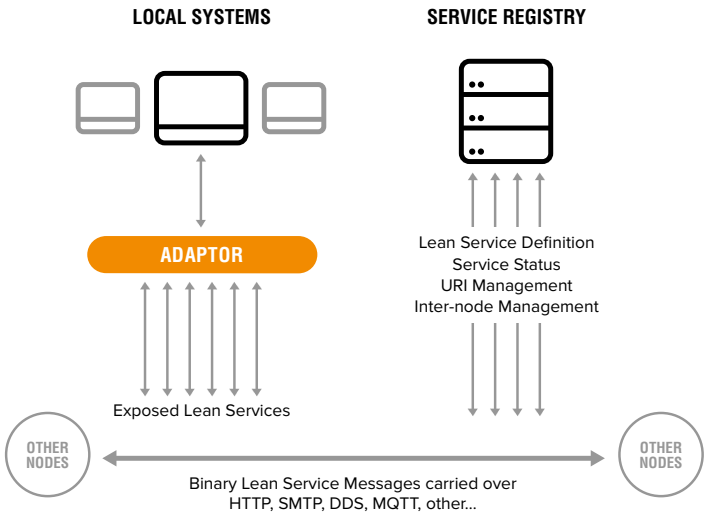
Now, put like that, it sounds simple. In reality, things are bit more complicated. Obviously, for example, the ‘standard’ needs to be openly published and readily available. You can’t have proprietary interests ‘owning’ it. It also needs to be complete, and all-encompassing of the physical and data aspects; connectors as well as data protocols. In other words, it shouldn’t be open to interpretation or require anything adding in order for it to work. And of course, it needs to be secure and resilient.

So developing such a standard isn’t something to be undertaken lightly. But when it is undertaken, the payback is considerable. Let’s go back to the customisation of that example military vehicle I mentioned earlier. It is precisely experiences like that which prompted the development in the UK of a standard called the Generic Vehicle Architecture (Def Stan 23 009), which is generally considered to be very successful and is being developed by others such as NATO and Australia.

It’s notable that the fitting out of the next generation of vehicles, led by the now in-service Foxhound vehicle, went very smoothly. And the difference between the two generations is of course the existence of the Generic Vehicle Architecture.

The Lean Services Architecture (LSA) is software-only, with low implementation overhead, making it suitable for lean (low powered) computing devices and lean (low bandwidth) communications.

Designed and proven for the tactical military domain but also usable in any other environment, it is operating system, programming language and transport protocol neutral.



Q:

SO WHAT YOU'RE SAYING IS THAT THE LEAN SERVICES ARCHITECTURE IS ONE OF THESE INTEGRATION AND INTEROPERABILITY STANDARDS, RIGHT?

LSA is designed for mobile platforms in low-powered environments characterised by an absence of central servers, poor quality communications and large numbers of frequently-changing participating systems and platforms, operating systems and communications devices. In other words, for the typical battlespace

A:

Correct! It's also "open" which is really important here—it's the key to avoiding being locked in to any one vendor.

Specifically, LSA is designed for mobile platforms in low-powered environments characterised by an absence of central servers, poor quality communications—in other words, low bandwidth, high latency, and with frequent interruptions—and large numbers of frequently-changing participating systems and platforms, operating systems and communications devices.

And if that sounds to you like a typical battlespace, then you're absolutely correct again.

Q:

OK, SO I THINK I UNDERSTAND THE ‘LEAN’ PART OF THE NAME: THAT’S A REFERENCE TO LOW-POWERED DEVICES AND LOW-BANDWIDTH COMMUNICATIONS. BUT WHERE DOES ‘SERVICES’ COME FROM?

A:

That’s a bit more technical, but again, it’s not complicated. Let’s go back to that vehicle example for a moment. In a vehicle, if a device is switched on—a radio, or a GPS system, say—then the communication with other devices is likely to be a continuous stream of data which may or may not be relevant to that particular system and is costly in overheads. However, if devices or systems can ask for and get what they need to do their job, it all becomes much easier. This “asking” and “getting” bit is called service orientation. It’s at the heart of LSA as it enables devices in a battlespace to make ‘requests’ and receive ‘responses’ so they get the data they actually need and in a much more economical way!

Q:

SO FINALLY, WHERE DOES 2IC FIT IN? YOU SAID EARLIER THAT SUCH STANDARDS HAVE TO BE OPENLY PUBLISHED, AND NOT OWNED BY PROPRIETARY INTERESTS.

A:

Exactly. And that’s precisely the situation with the Lean Services Architecture. We invented and authored it—and so are obviously experts in it—and we also update and maintain it. But it is openly published under an Open Government Licence by the UK Ministry of Defence, to whom we assigned the copyright. This means that anyone can use it and build systems that meet the specification for creating a full ecosystem.

And today, it’s now been successfully used by a large number of organisations—ourselves at 2iC, of course, but also by the UK Ministry of Defence, the United States Department of Defense, the Australian Department of Defence and the New Zealand Defence Force.

Technically, the Lean Services Architecture (LSA) is an open schema-based request/response and event message protocol and supporting architecture that provides a Services Orientated Architecture (SOA) in the operational and tactical military domain, or other similar environments such as front line emergency services and the Industrial Internet of Things (IoT).

ABOUT 2iC: GLOBAL LEADERS IN DIGITAL INTEROPERABILITY IN THE BATTLESPACE

2iC's unique software layer liberates human capability in the battlespace by digitally automating the exchange of mission-critical and actionable information between commanders, operators and equipment across land, sea and air.

Designed for the very leanest of digital conditions in the modern battlespace, 2iC's solution delivers two-way communications in environments with low-power computing, low-bandwidth connections, physical landscape challenges or interrupted communications. It effectively delivers the benefits of IoT (the Internet of Things) when there is no viable internet.

Find out more at **www.2iCworld.com**

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