in association with INTEROPERABLE OPEN ARCHITECTURE 2016

# Interoperable Open Architecture

## Trends and Analysis Report 2016

Defence iQ

**About**

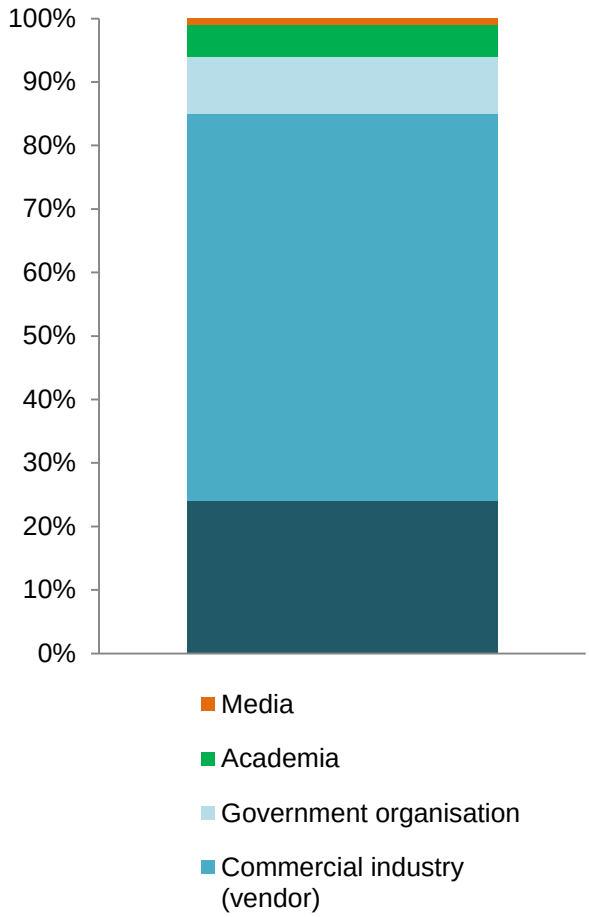
Interoperable Open Architecture (IOA) is a System-of-Systems Architecture (SoSA) based upon open standards that delivers interoperability among sub-systems and applications built and procured at different times. It is the ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces, and to use the services so exchanged to enable them to operate effectively together. Simply, interoperability enables any integrator to connect multiple components developed by different parties and it represents a key objective for defence procurement agencies in the future.

Ahead of the Interoperable Open Architecture conference in April 2016, *Defence IQ* commissioned a survey of IOA experts and industry professionals to gauge how the market is evolving and to identify the key trends as IOA moves from being a nascent technology with limited practical applications to the standard military grade system for all future equipment acquisition programmes.

Based on a survey of industry experts, this report looks to analyse the data and provide an insight into the IOA market for defence across all three domains – land, sea, and air. It explores the key benefits and challenges of the technology, underscores the likelihood of open architecture standards becoming common in each domain, and examines the delicate relationship between government and industry as interoperability becomes an ever more important requirement.

The majority of respondents (61%) represent the commercial sector while almost a quarter (24%) are military professionals and 9% work for government organisations or agencies.

**Figure 1**
**Analysis of respondents by type**



**Misaligned objectives hindering development**

According to the majority of respondents (67%) the key challenge hindering the development and implementation of interoperable open architecture standards over the next 10 years centres around communication and discord. Misaligned objectives and disagreement between governments, industry, and the military was identified as a principal hurdle in the future.

This plays into the issue of culture. The old system whereby defence procurement agencies are their suppliers' only customer is no longer viable, but changing that culture of how governments and commercial companies interact with each other is not easy. There is currently a disconnect between what is being mandated and what manufacturers feel they need to know to ensure their products are viable as and when new standards are implemented. Of course there are many aspects of this all jostling for position – those focusing on policy, those on technical issues, and others on business development. Turning the oil tanker and ensuring all these separate elements are moving together in the right direction is a significant challenge for IOA over the next ten years.

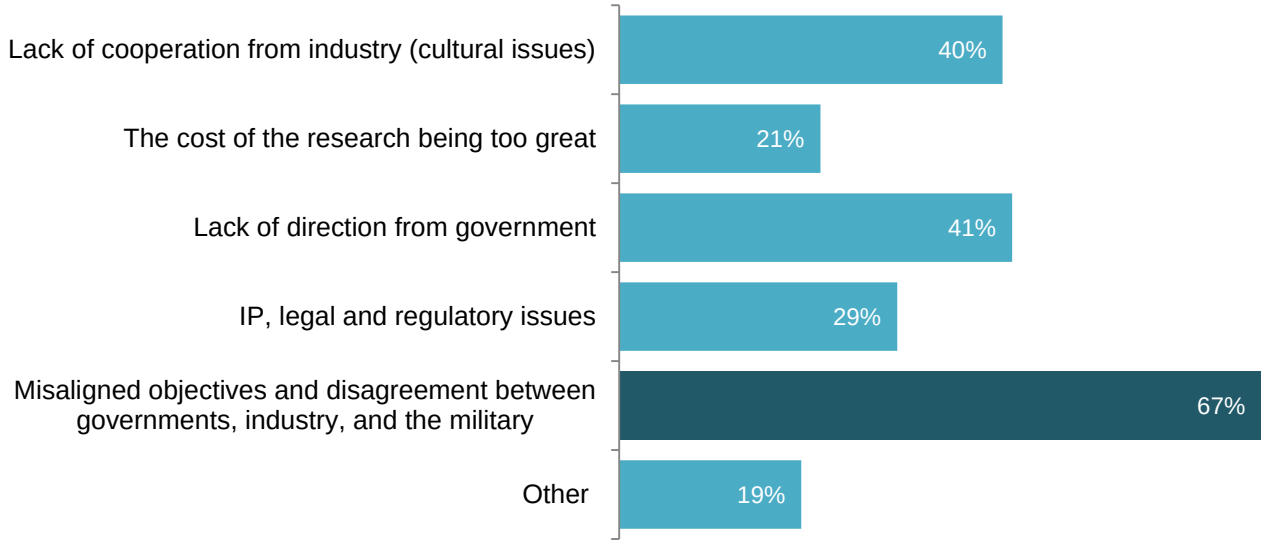
The process of change is slow, particularly in defence where the lives of troops are at stake. Decisions must not be taken lightly and any new standard that is brought in must be for the ultimate benefit of the military end-user to improve capability and efficiency. The progression of IOA has inevitably been sluggish and it is likely to continue to develop at a steady rate over the next decade. However, with rapidly evolving hybrid threats and an increasingly opaque operating environment the need for a flexible IOA-based procurement strategy is more important than ever. Changing the defence acquisition culture is a major hurdle for IOA, but it is one that must be addressed head-on.

One respondent said that there is a disconnect between industry objectives and how contracts are evaluated, specifically noting the relationships between prime contractors and SMEs. "The danger is that SME innovation is stifled by the primes as their priority is to maximise profits, [and sometimes this means] squeezing suppliers, which tends to dilute SME innovation."

Another participant indicated that decisions need to be made higher up the chain of command where requirements for allied nations are agreed between national Defence departments and a solution is a procured at a NATO level. This would potentially reduce the costs associated with the acquisition process – and not to mention through life costs – due to the economies of scale and the enhanced interoperability between allied nations.

The integration with legacy systems, lack of focus on standardisation, and a perceived lack of will between stakeholders to agree to these new standards were also identified as significant challenges in the future. While the high cost of research and any potential IP, legal or regulatory issues associated with IOA were identified as a threat by some respondents (21% and 29% respectively), they are clearly not as pressing as the misalignment of objective and the wider relationship between government and industry and the cultural issues surrounding it.

**Figure 2**
**Analysis of key challenges hindering development and implementation of IOA over 10 years**




> Misaligned objectives and disagreement between governments, industry, and the military was identified as a principal hurdle in the future.

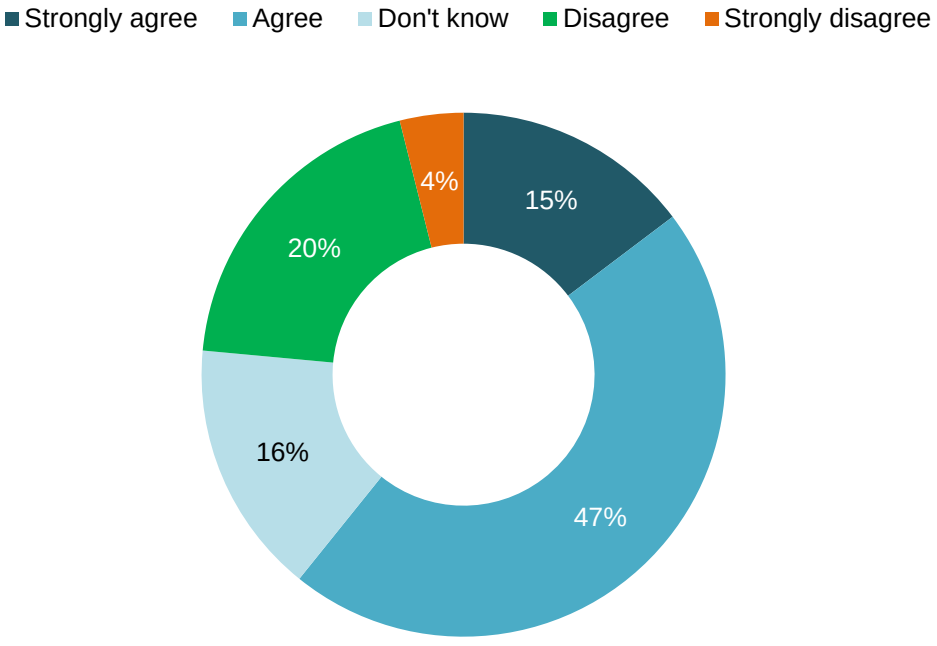
**Industry vs. government**

Well over half of respondents either strongly agree (15%) or agree (47%) that industry is not fully embracing open architecture. Respondents agreed that defence culture was one of the greatest obstacles to its development and implementation in the future according to the data in Figure 3. Given that 61% of survey respondents identified themselves as industry, this robust response is even more remarkable than that seen in Figure 4, which is perhaps more understandable based on the configuration of the data. It indicates that a significant portion of industry is aware of the drawbacks IOA presents – at least in terms of its own interests – and is not fully committed to investing in it.

Almost a quarter either disagreed (20%) or strongly disagreed (4%) with the statement, indicating that there is a not inconsiderable and vocal number who believe that IOA is being embraced by the commercial sector, regardless of any perceived disadvantages or lack of buy-in from other organisations. One respondent said that defence culture is not necessarily the problem but rather being able to demonstrate the safety of the IOA-based systems and ensuring that the benefits are realised.

A respondent from the commercial sector said that true challenge here is one of application. “Although I partially agree with the statement I

**Figure 3**
**To what extent do you agree with the following statement: "Industry is not fully embracing open architecture with Defence culture being one of the greatest obstacles to its development and implementation."**



think that where obvious and useful standards exist both industry and defence are taking the standard seriously. A significant challenge in the adoption of standards is that they don't necessarily exist across the interoperability domain. There are strong standards for networked simulation for GIS and web based visualisation but in other areas standards are at best emergent or non-existent."

While this survey data is comprised of predominantly industry respondents, it is difficult to avoid the obvious conclusion from Figure 4: Industry is not getting enough support and does not know where best to invest in this area. Three-quarters of participants either strongly agreed (34%) or agreed (41%) that industry is not getting enough support or direction from governments and militaries in order to confidently invest in interoperable open architecture.

Although most agree that more support is required, it is still apparent that responsibility ultimately lies with industry to drive the technology despite the need for culture change. One respondent said that government needs to be better at developing a new business model to deal with industry but commercial solutions can only be driven by commercial interests.

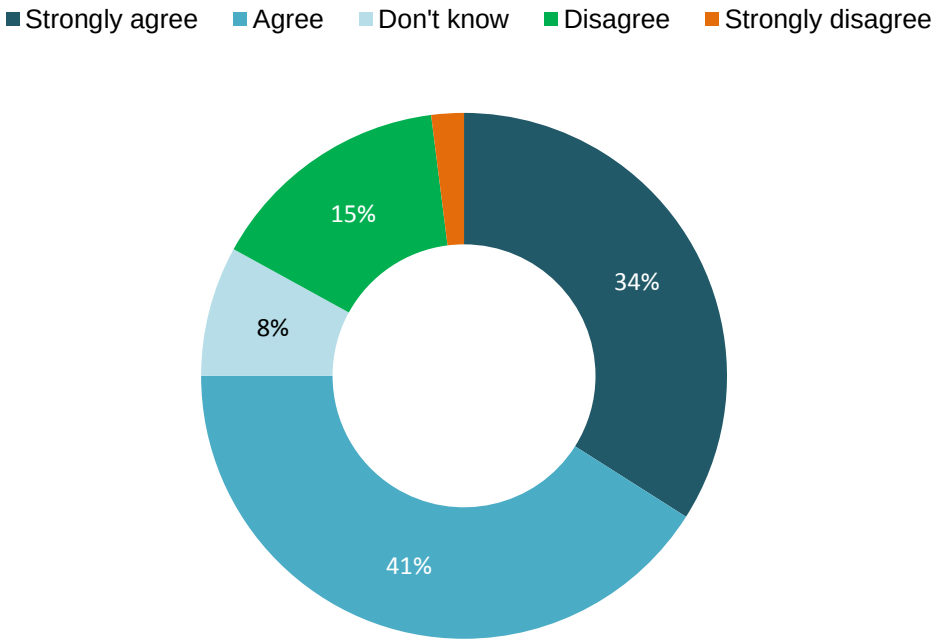
In a previous study, a respondent said to Defence IQ: "The problem is that dialogue between governmental administrators and the industry is sorely lacking, which I suspect is a handy excuse for the primes to not engage as quickly as they should. More urgency should be placed on this, not only for the sake of good business practice but to properly ensure that the operators are getting the best possible equipment."

But of course it is not just government organisations that must find ways to work better with industry or vice-versa, there is also the military to consider too. Is there enough awareness and agreement between all parties in this field? Are all their objectives aligned to ensure the smooth transition of IOA systems? Clearly it is impossible for all parties to work together seamlessly but one respondent said it was vital that each kept the goals and needs of the others in mind. The system must work for everyone, otherwise it works for no one.

Some indicated that military institutions and government bodies are a little "closed" while another was blunter, saying that "MoD procurement is driven by short term thinking and lack of technical competence". A new standard would also require a "fundamental re-think in the business model of defence system procurement and only the USA has fully committed to open architecture."

However, a respondent representing a UK-based engineering consulting firm said that specific programmes help communication and integration between these parties because it makes it easier to track progress and align goals. "The Land Open Systems Architecture (LOSA) programme with its maturing DEFSTANs and Field Experimentation show that Industry, DE&S and Army Command can work together to drive innovation and change," the respondent stated. LOSA is an open architecture for systems integration and interoperability and is being developed with the aim of delivering a "coherent and agile" force structure for future operations.

**Figure 4**
**To what extent do you agree with the following statement: "Industry is not getting enough support or direction from governments and militaries in order to confidently invest in open architecture."**




> The problem is that dialogue between governmental administrators and the industry is sorely lacking

**Key benefits of IOA**

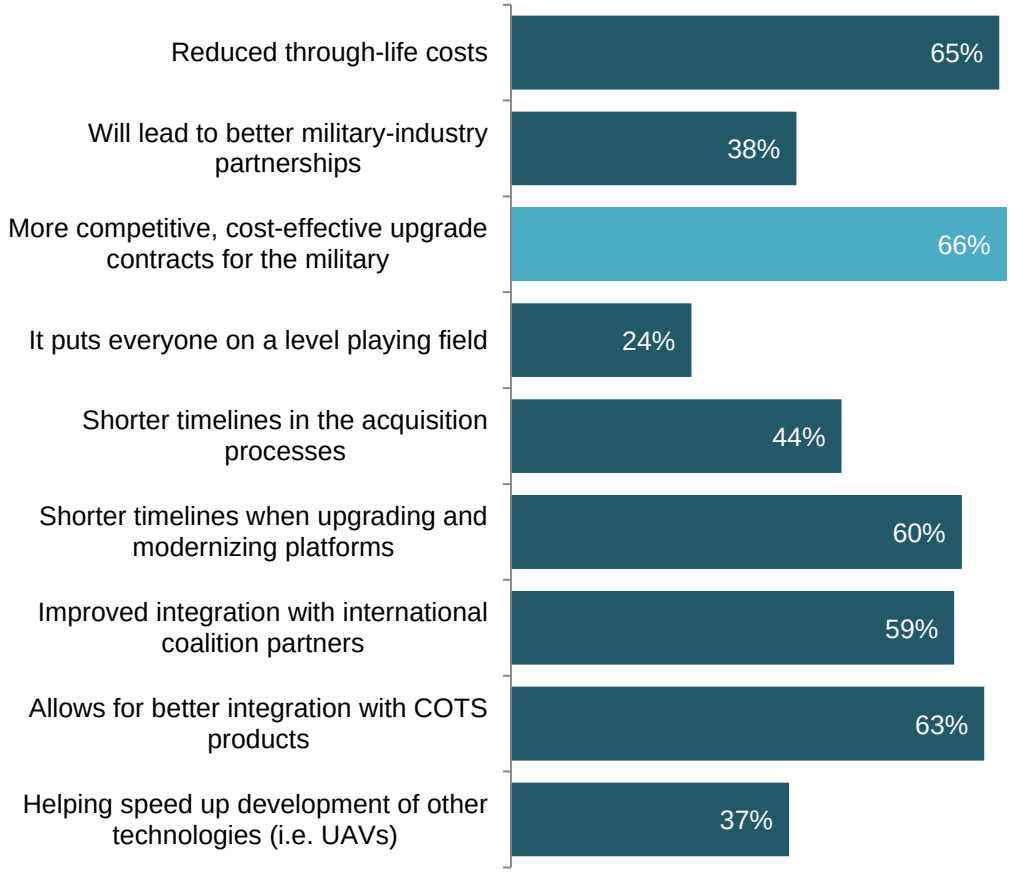
The main benefit of interoperable open architecture is that it allows for more competitive and cost-effective upgrade contracts for the military in the future according to 66% of respondents. The reduction in through life costs (65%), allowing for better integration with COTS products (63%) and the shorter timeframes for modernisation (60%) were also identified as key enablers for IOA.

Through-life maintenance and upgrades will be open to competition as the original supplier won't have the monopoly on future integration, meaning a better deal for government and the military. The technology can also be redesigned and upgraded that keeps up with commercial and technical advances, meaning flexibility is built-in from the start.

For industry specifically, one of the most important commercial market benefits is the new open market competition for sub-system supply.
Economic imperative and technological advancement are the key drivers for change. Commercial-off-the-shelf (COTS) technologies are more capable than ever – a smartphone today could do the job of 10 military-grade systems just a decade ago. A new acquisition process must be implemented to allow defence equipment to develop at the same rate of change as the commercial world – capabilities are now being driven by the commercial market, not by the defence industry itself. An armoured vehicle with five screens only needs one but because the systems are not interoperable there is little choice. Development of IOA is not only beneficial for all of the above reasons and more, it goes further than that: it is a fundamental requirement for future defence capability and operations.

While all options were generally perceived to be benefits, the very low number of respondents – less than a quarter – indicating that IOA puts companies on a level playing field suggests something else: That is doesn't put everyone on a level playing field. As one respondent noted: "We may all be equal, but some organisations are more equal than others."

**Figure 5**
**Analysis of the main advantages of IOA**

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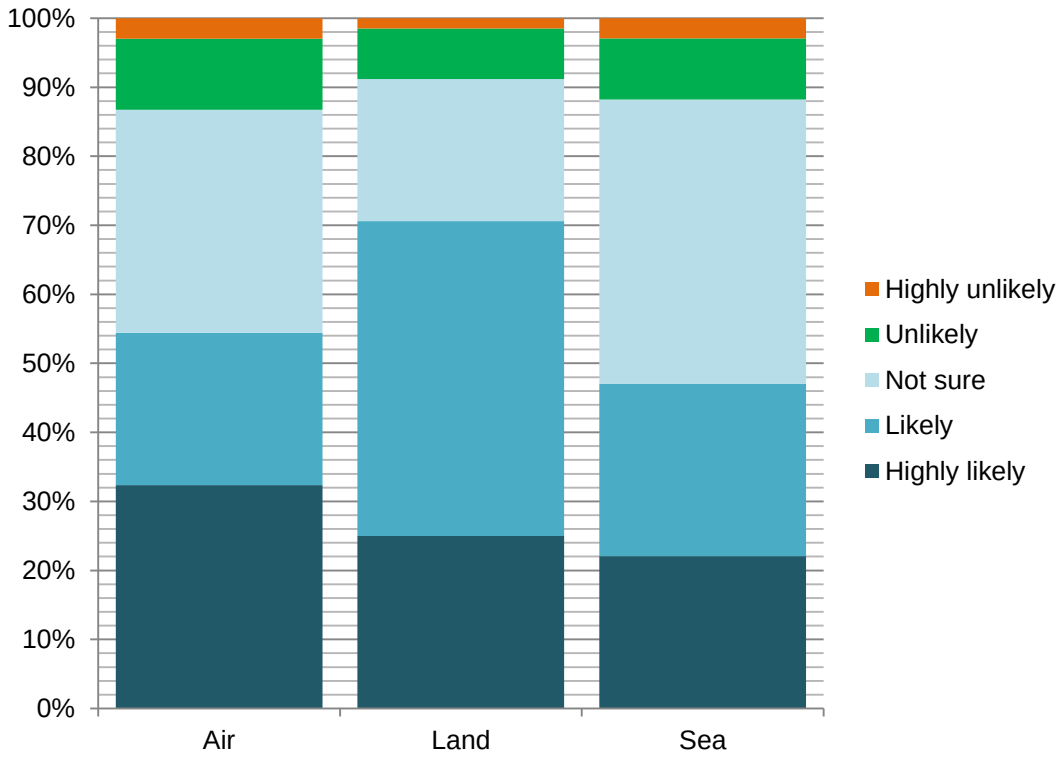
**Air, land, and sea**

The land domain is most likely to implement IOA as a common standard according to 71% of respondents (25% said it was highly likely while 46% indicated it was likely). Given the significant progress and current programmes underway in this domain it is no surprise that it has been identified as the leading sector. It is notable that while not as many respondents in total thought IOA would become as common in the air domain as the land, there were more that specified it as being highly likely (32% and 25% respectively).

The majority of respondents concurred that IOA would became common in all domains other than sea, which only had a combined 47% saying it was highly likely or likely.

At the Interoperable Open Architecture event in April 2016 in London, representatives from all three domains will convene to share best practice and discuss current and future programmes looking at the implementation of open architecture systems.

**Figure 6**
**Analysis of likelihood of open architecture standards becoming common in each domain**



# INTEROPERABLE OPEN ARCHITECTURE 2016

26 - 28 April, 2016 – London, UK

## The only forum supporting tri-service Interoperable Open Architecture initiatives

Armies, Navies, and Air Forces in every modern military have adopted the principles of Interoperable Open Architecture (IOA), which speed up the acquisition and upgrading of platforms, augment the procurement of customized systems, and ultimately reduce through-life costs. NATO's coalition offices, the European Space Agency and other procurement offices have all embraced this cost-effective strategy to keep up with the pace of technological change in an increasingly challenging economic environment.

Interoperable Open Architecture 2016 will bring together subject matter experts, procurement agents and other invested parties from the international community to discuss ongoing projects, offering solutions and guidelines as the open architecture approach continues to gain momentum.

The forum will also further the technical discussion on state-of-the-art programmes including LAVOSARII, SoSA languages, CDS, and SBSA amongst others.


Download the agenda here!

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