Naval Combat Systems
Trends and Analysis Report
2016
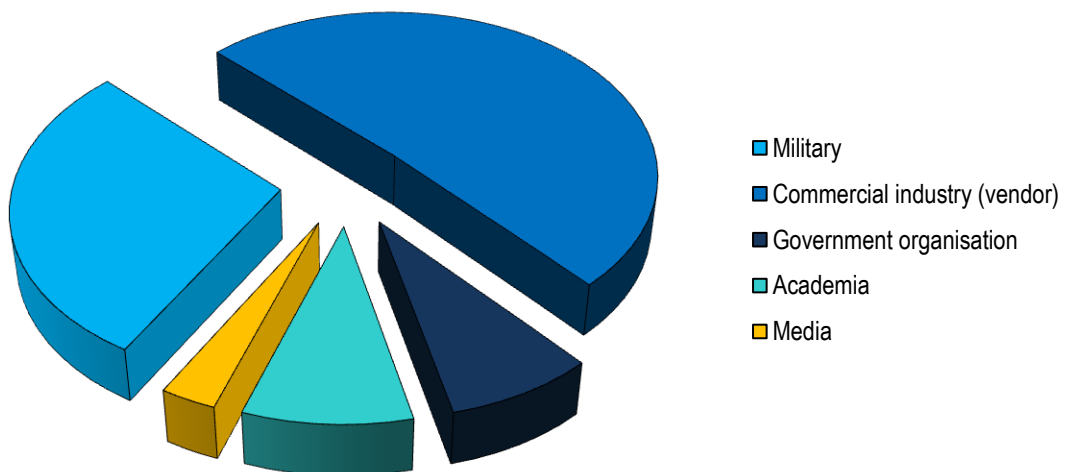
Defence iQ

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About

The market for naval combat systems (NCS) is buoyant as countries seek to modernise and upgrade systems to keep up with the pace of technology change and the evolving threat spectrum. The term NCS includes weapon, sensor, communications and EW systems and can constitute well over 50% by value of the cost of warships and submarines. To give an indication of size, the market for naval sensors alone is forecast to be worth over $20 billion in the next decade.

Ahead of the Naval Combat Systems conference (24 - 25 May, 2016 - London, UK), *Defence IQ* commissioned a survey of naval experts and industry professionals to gauge how the market is evolving and to identify the key trends in the market over the next 10 years.

Based on a survey of 307 industry experts and military stakeholders, this report looks to analyse the data and provide an insight into the NCS market. It focuses on the key challenges for modernising the systems, looks at the potentially game-changing new technologies coming to market, and explores the use of COTS as secure, long-term solutions in the naval market.

The majority of respondents (51%) represent the commercial sector while almost a third (29%) are military professionals and 8% work for government organisations or agencies. The remaining respondents are comprised of academics and media professionals.

Figure 1
Overview of respondent by type

- Military
- Commercial industry (vendor)
- Government organisation
- Academia
- Media

Budgets and bottlenecks

Despite the trend seeing global defence budgets steadily rising, securing funding for naval combat system modernisation is the most significant challenge, according to 74% of respondents.

In parallel, the procurement cycle as a whole was identified as a bottleneck from 'the poor definition of systems requirements, to the lack of coherence in the acquisition process'. One participant stated that the procurement systems was 'broken.'
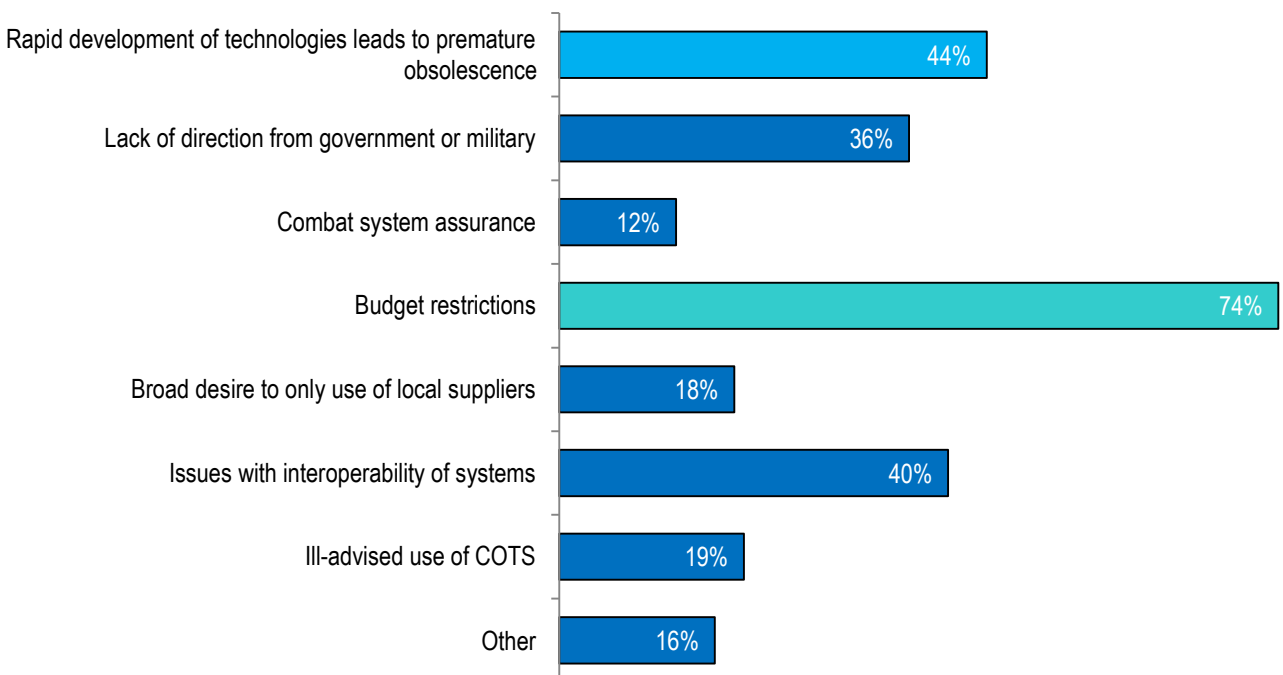
One of the key challenges for naval combat systems modernisation – identified by 40% - is the issues of interoperability. This plays into the issue of culture. And again the old system whereby defence procurement agencies are their suppliers' only customer is no longer viable, but changing that culture 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.

The rapid development of technologies was also highlighted as a key challenge. With the acquisition process being so slow, it is not uncommon for a system to be reaching obsolescence by the time it is integrated onto a naval platform. Almost half agreed this was a major problem. 'Technology development is frightening', said one.

Other than those listed, respondents also noted the poor communications – as opposed to just lack of direction – between the government and industry as a significant and enduring challenge.

Figure 2
Analysis of the most significant challenges with naval combat systems modernisation over the next 10 years

Challenge	Percentage
Rapid development of technologies leads to premature obsolescence	44%
Lack of direction from government or military	36%
Combat system assurance	12%
Budget restrictions	74%
Broad desire to only use of local suppliers	18%
Issues with interoperability of systems	40%
Ill-advised use of COTS	19%
Other	16%

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An unmanned future?

Unmanned underwater systems (UUVs) are the most exciting and potentially game-changing technology that respondents believe will impact the naval market, as well as influencing the nature of future warfare a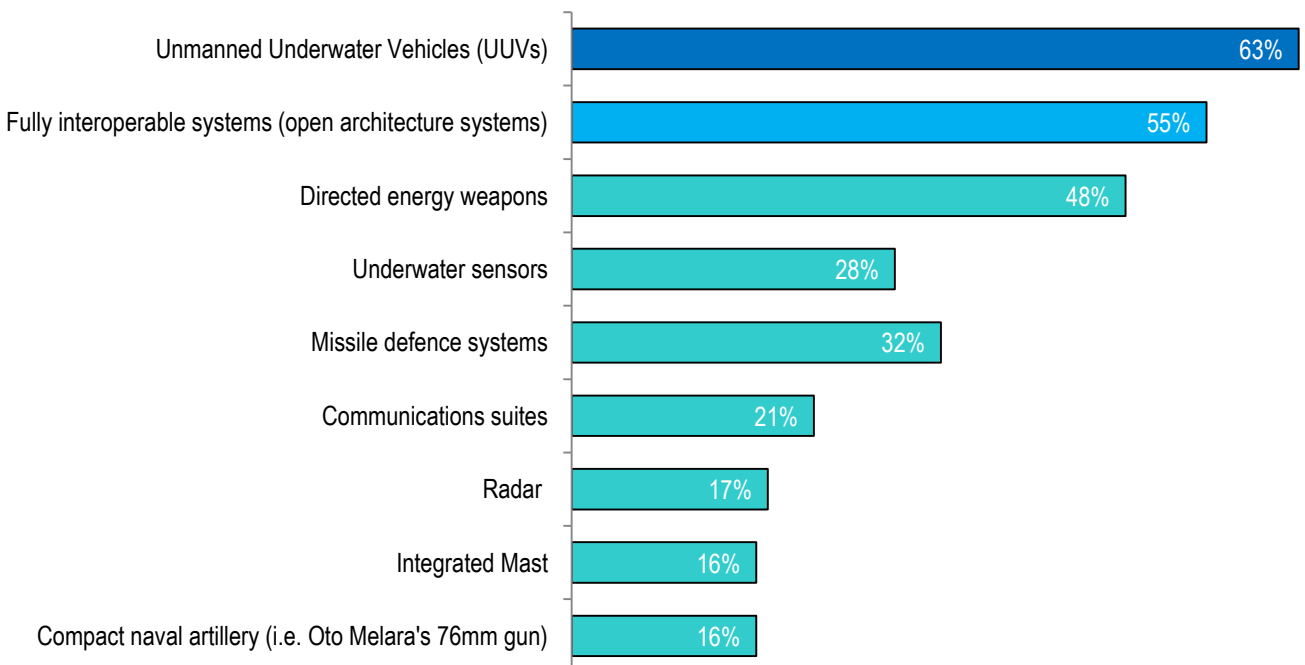nd other naval force operations. Furthermore, many respondents highlighted the role UAVs – and, in fact, all unmanned technologies in general – will play in naval operations. With 63%, unmanned systems were clearly identified as the technology with the most potential to make an impact on the naval combat systems market.

Interoperable open architecture systems, which allow for more competitive and cost-effective upgrade contracts for the military in the future, was also identified as a key technology that will significantly improve naval platforms. Over half (55%) agreed it
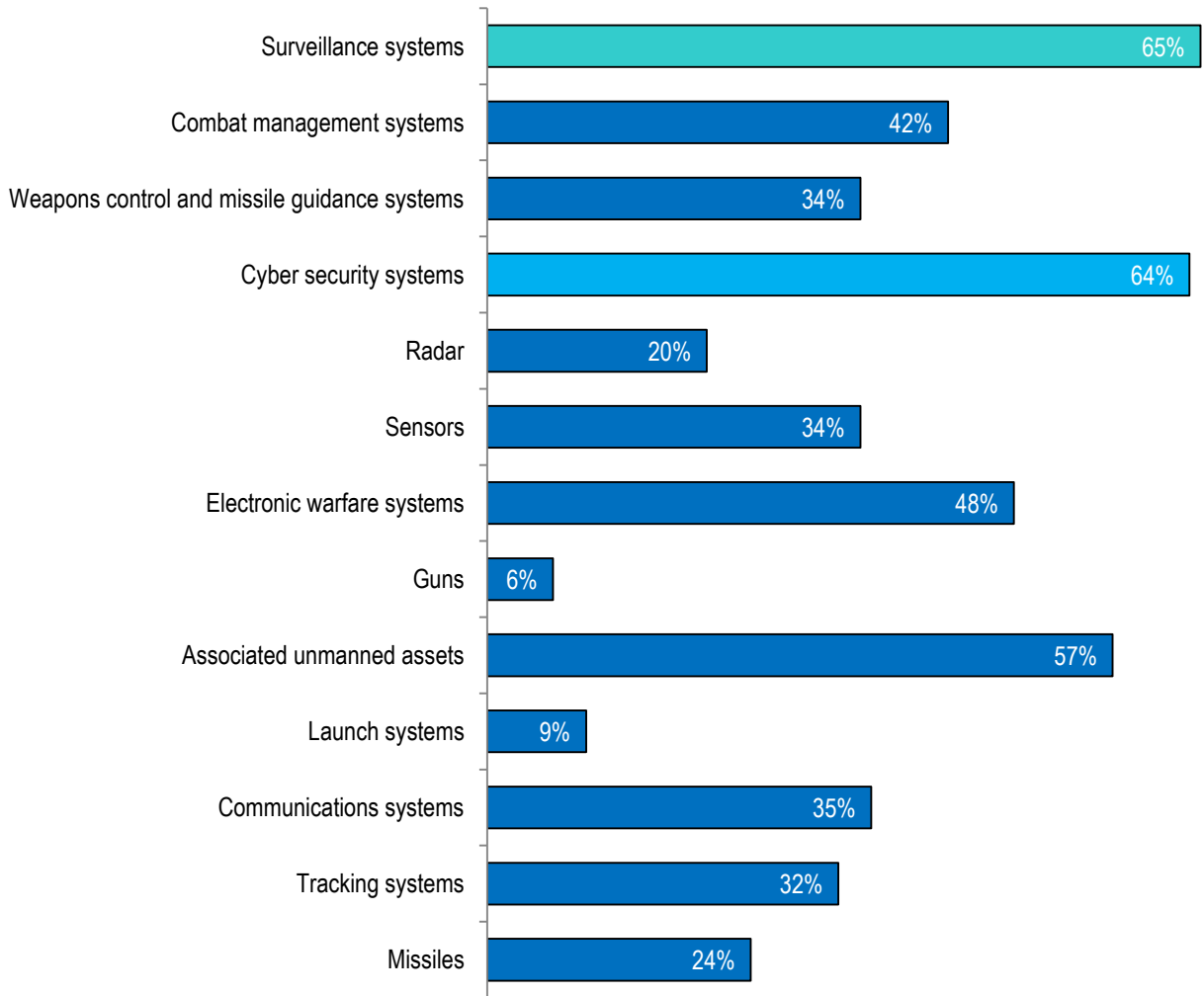
could be a game-changer. However, this hurdle here is the previously mentioned antiquated acquisition process. For industry specifically, one of the most important commercial market benefits of open systems is that it prevents contractor lock-in and opens up competition for sub-system supply.

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.

Figure3
Overview of potentially game-changing technologies in the future

Technology	%
Unmanned Underwater Vehicles (UUVs)	63%
Fully interoperable systems (open architecture systems)	55%
Directed energy weapons	48%
Underwater sensors	28%
Missile defence systems	32%
Communications suites	21%
Radar	17%
Integrated Mast	16%
Compact naval artillery (i.e. Oto Melara's 76mm gun)	16%

Figure 4
Analysis of which naval combat systems will likely be prioritised by militaries and government procurement agencies in the next decade

System	Percentage
Surveillance systems	65%
Combat management systems	42%
Weapons control and missile guidance systems	34%
Cyber security systems	64%
Radar	20%
Sensors	34%
Electronic warfare systems	48%
Guns	6%
Associated unmanned assets	57%
Launch systems	9%
Communications systems	35%
Tracking systems	32%
Missiles	24%

Keeping an eye out for NCS priorities

Surveillance systems were identified as a clear priority for the military over the next decade. Almost two thirds of respondents (65%) underscored the need to augment surveillance capabilities as a key requirement. There are a number of interesting developments in surveillance technology for naval platforms that promise to significantly improve maritime ISR.

Relatively few navies have so far embraced the infra-red search and track (IRST) as a part of their above-water sensor mix. However, two factors – one technological, one operational – are now rebalancing the equation. First, technology is witnessing a step change with the emergence of a new generation of staring-array IRSTs using distributed sensor apertures to overcome ship-fitting constraints and provide uninterrupted omnidirectional surveillance, wide elevation coverage and rapid data refresh.

Secondly, the current pattern of maritime operations puts greater emphasis on improved situational awareness against surface threats. So whereas the IRST was originally conceived to perform a horizon search function against low-elevation ASCMs, there is now a recognition that the technology has an important contribution to make to surface surveillance in littoral environments, particularly in the face of the growing fast inshore attack craft threat.

Cyber security is, or at least should be, a priority too. Just 1% behind surveillance systems, it is no exaggeration to say that the need to improve cyber capabilities for navies is of the highest importance.

Almost half (48%) indicated that electronic warfare systems would be a priority in the future. Indeed, navies are continuing to invest in new electronic attack technologies to counter advanced radar threats. Novel ECM techniques are being explored to counter monopulse seekers and inverse synthetic aperture radars as onboard jammers continue to be developed for many navies around the globe. At the same time, to counter the whole spectrum of threats to naval surface vessels, multi-layered ship defence systems are crucial, including soft-kill systems such as naval decoys. The market for naval EW systems alone is forecast to exceed $10 billion over the next decade.

The world's navies are also relying more and more heavily on secure communications. As more nations join maritime coalitions to fight shared issues such as piracy and human trafficking , there is a requirement to improve communications between coalition vessels. Over a third of respondents (35%) identified communications systems as apriority for the military over the next decade, although there are operational issues hindering further modenisation of these. The preferred method of naval communications has been to adopt a navalised form of internet, which permits free-form messaging, but questions remain about how secure it is.

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Figure 5
**How likely is it that we will see true interoperability across a suite
of naval combat systems over the next decade?**

- Highly likely
- Likely
- Not sure
- Unlikely
- Highly unlikely
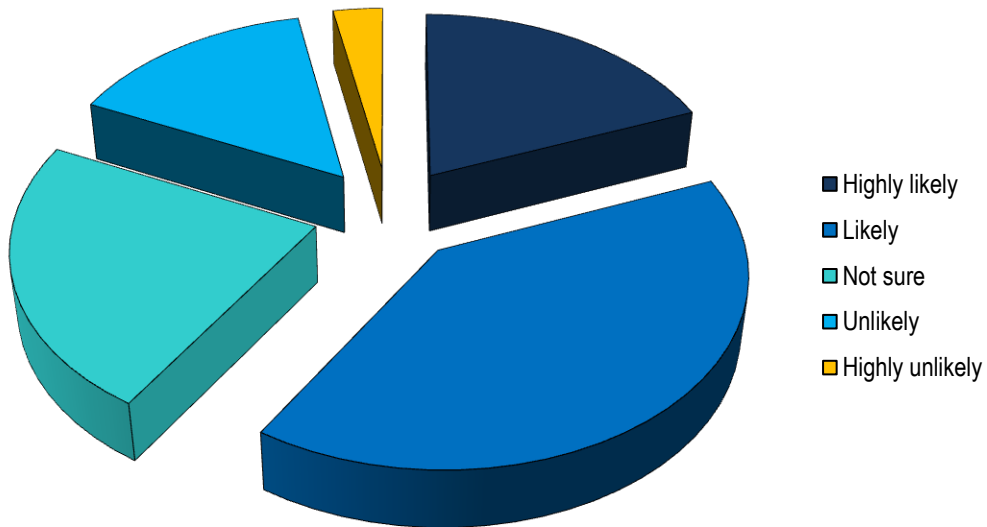
Truly, madly, interoperability?

I have little doubt that true interoperability will be achieved in this area within the next ten years', said one respondent. 'However I do have some doubt as to the ability to maintain this interoperability in the face of rapidly changing threats. As demonstrated in Figure 2, technological advancement is a significant challenge, not just for naval combat systems but across the military spectrum.

The majority of respondents believe that interoperable open systems will be in place within the next ten years (where 19% said it was highly likely and 40% said it was likely). However, difficulties with the integration with legacy systems, the lack of focus on standardisation for open architecture, and a perceived lack of will between stakeholders to agree to these new standards are all significant challenges holding interoperability back.

While it is already happening in some militaries to some extent, interoperability certainly does not have widespread buy-in – especially from industry – nor does it have enough political or economic incentive to push it through as a standard acquisition requirement in this timeframe Some respondent indicated that the move towards truly interoperable systems is inevitable but that it may take longer – 20 years – to achieve this.

Figure 6
To what extent do you agree with the following statement:
"COTS solutions are temporary fixes and do not offer efficient capabilities or value for money over the long-term"
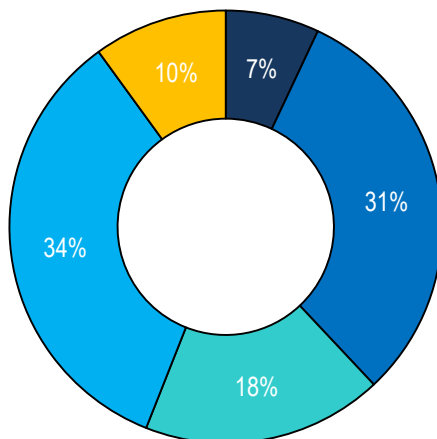
Figure 7
To what extent do you agree with the following statement:
"The security risk associated with using COTS solutions is too great and brings into question their usage on naval platforms."
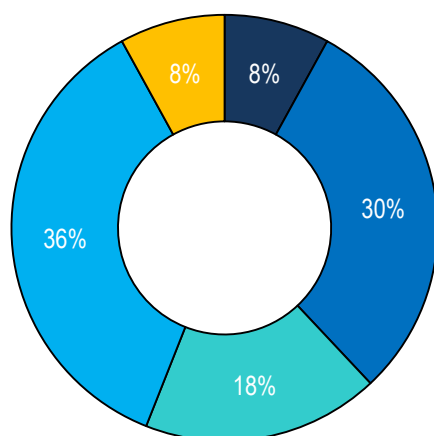
- Strongly agree
- Agree
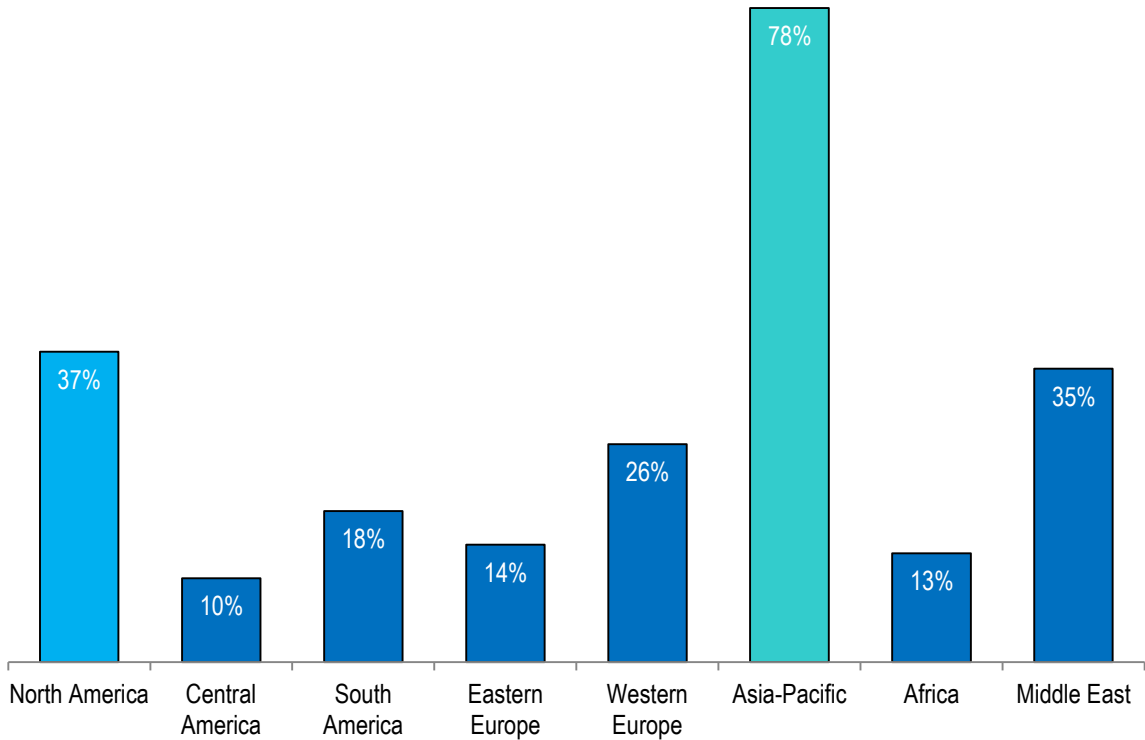- Don't know
- Disagree
- Strongly disagree

COTS: Cost-effective and secure?

The use of COTS can be a heated subject. Some believe them to be an accessible and inexpensive solution that the military should generally make more use of. Others see them as short-term fixes that are more costly over the long run that pose a real security risk to connected systems and the wider network. As is apparent from Figures 6 and 7, there is little agreement about which argument is correct. When asking respondents to agree or disagree with a statement about COTS solutions offering value for money and if they present a security risk, the results indicated that there was no consensus with either issue. There was an even spread – indeed both questions invoked remarkably similar responses -

between answers. Although only slight, there was more support for those disagreeing with the statement in both instances, however neither resulted in a majority verdict. 44% either strongly disagreed or disagreed with the statement that COTS solutions are temporary fixes and do not offer efficient capabilities or value for money over the long-term, compared with 38% on the other side of the fence. When asked to consider whether the security risk associated with using COTS solutions is too great and brings into question their usage on naval platforms, again those disagreeing just scraped it with 44% compared to 38%. In both cases, almost 1 in 5 said they did not know.

Figure 8
Analysis of most attractive global market for naval combat system procurement over the next 10 years

Region	Value
North America	37%
Central America	10%
South America	18%
Eastern Europe	14%
Western Europe	26%
Asia-Pacific	78%
Africa	13%
Middle East	35%

APAC leads global demand

China's efforts to massively expand its naval capabilities and maritime interests will drive investment in the Asia-Pacific region as other nations seeks to protect their sovereignty. This is the major conclusion drawn from responses, where 78% believe that the region will have the greatest demand for naval combat systems over the next 10years. This is supported by the report Defence IQ recently published about global requirements and programmes in this field; 14 Asia-Pacific countries had active requirements for NCS, compared with 10 in Western Europe, 8 in the Middle East and Africa, 8 in the Americas, and 4 in Eastern Europe.

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24 - 25 May, 2016 - London, UK

DOWNLOAD THE AGENDA

The **Naval Combat Systems** 2016 conference has been designed to enable end-users and industry to further the discussion around modernisation, modularity, interoperability, and the acquisition and integration of new combat systems.

For instance, is it possible to achieve effective modularity for systems integration without compromising on ship design and security standards? Is open architecture the key to reducing cost and accelerating implementation? Are COTS systems a real option to reduce costs or are they short term solutions that become more costly over the years? Is it better to focus on generic ship design and to integrate systems later or to design your ship with specific systems in mind?

Naval Combat Systems 16 will address the answers to these questions and more, through the perspectives of operators and platform/systems programme managers from international navies. Industry leaders will also showcase their experiences and capability development achievements, through detailed presentations focusing on the delivery of systems and modernisation programmes for Frigates, Corvettes and OPV's.

The conference will therefore examine the innovative technologies and solutions that are designed to meet operational requirements by generating high-level debate amongst these delegates, around the key issues in the sector.

Interested in finding out more?

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