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A Cisco Intelligent Network White Paper

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SUMMARY

The war on terrorism has presented defense agencies around the globe with a more agile, adaptive adversary. In response, all branches of the military have recognized the need for faster decision-making and more efficient and flexible operations.

Historically, defense agencies have built networks based on proprietary protocols and purchased highly specialized hardware and software as the basis for their information technology (IT) systems. Today, defense agencies are moving away from proprietary networks to standards-based, network-centric operations based on the Internet Protocol (IP) in order to securely deliver actionable information throughout the chain of command anytime, anywhere.

As a result, the momentum behind using Commercial Off the Shelf (COTS) components, rather than highly specialized military equipment, has intensified. Using COTS helps to create defense systems that are more adaptable and can take advantage of commercial technology improvements and applications. COTS procurement also enables defense agencies to build high-performance systems at a lower unit cost, while lowering their total cost of ownership (TCO).

The defense acquisition community and its prime contractors must make many adjustments to procurement practices in order to accelerate the benefits of COTS. These include changing incentives for prime contractors and identifying viable COTS vendors for long-term partnership.

CHALLENGE

Historically, military systems have been built on highly specialized hardware and software. This model presents serious obstacles to the critical transformation of military operations from a slow, deliberate, monolithic force to one that is smaller, lighter, and more agile.

According to the *2004 U.S. Air Force Transformation Flight Plan*, "Developing and fielding weapon systems in today's dynamic threat environment with rapidly evolving technologies demand changes to the process the Air Force uses to acquire those systems. Agile Acquisition is changing the way the Air Force delivers capability to the warfighter with two basic goals: to decrease acquisition cycle time and increase credibility in executing programs. The bottom line is to achieve effects on the battlefield with today's technology today rather than with yesterday's technology tomorrow."

The dependence on specialized hardware and software hampers the military's ability to be more efficient, agile, and adaptive. For example:

- The use of non-standard hardware and software makes interoperability more difficult.
- The long cycle time for design and development of specialized military equipment means that systems and technology are often out of date by the time the equipment goes into service.
- Highly specialized equipment drives up development and procurement costs because the military shoulders 100% of development costs.
- Higher support and training costs increase the total cost of ownership over the life of the equipment.
- Defense agencies are unable to take advantage of technology improvements, new applications developed for commercial implementations, and the rapid decline in the cost of standardized components and systems.

- Dependence on specialized equipment drives up the cost of establishing centralized depots for spares.
- The requirement to base architectural plans and frameworks on custom-built equipment makes it difficult to anticipate and implement future enhancements and extensions.

In an article published in SIGNAL Magazine entitled, "*Navy Embarks on Operational Sea Change*, " Monica R. Shephard, director of Task Force Web, Office of the Chief of Naval Operations, commented, "Speed matters from a warfare perspective, from a perspective of providing information and delivering information. A seven-year acquisition cycle doesn't cut it anymore."[1]

SOLUTION

The term "COTS" was coined about 15 years ago within the U.S. Department of Defense. According to the COTS Journal[2], "COTS is generally defined for technology, goods and services as: a) using commercial business practices and specifications, b) not developed under government funding, c) offered for sale to the general market, d) still must meet the program ORD.

In an interview with *Sea Power Magazine*, Rear Adm. Jay M. Cohen, Chief of Naval Research, said, "We have had a 30-year service life mentality for ships and a 20-year mentality for aircraft for far too long. I am convinced that we have a three-year window for the emergence of new technologies. As chief of naval research, I have a responsibility to ensure that we have those latest technologies available for direct insertion in our aircraft, ships, land and combat vehicles, and other systems without having to tear the platform apart at an unreasonable cost….In the civilian sector, the companies that have been most effective and profitable in building aircraft, cars, and consumer products are the ones that have designed-in the ability to update and refresh technology on a regular basis so they don't lose market share. For the Navy and Marine Corps, market share is dominance at sea."[3]

Some of the more recent, successful examples of acquisitions leveraging COTS in support of military operations include:

In 2004, the USS Pinckney became the first Aegis class destroyer to be completely outfitted with COTS-based technology, replacing all military-specific computers used previously.

The Royal Netherlands Army replaced its European Command (EUROCOM)1-based mobile communication network with the Theatre Independent Tactical Army and Air Force Network (TITAAN), based on an IP infrastructure as support for integrated voice, data, and video services. TITAAN is the first tactical military networks almost completely based on commercial off-the-shelf software and hardware components.

There are numerous reasons that governments around the globe, and all branches of the military, are choosing COTS over military specification equipment, including:

- The reliability of commercial grade components and subsystems has improved, eliminating the justification for expensive military specification equipment.
- Military agencies can implement more flexible, high performance systems at a lower unit cost.
- Agencies can take advantage of current commercial approaches and practices; this commonality simplifies the development and deployment of applications, which enables a more rapid incorporation of new capabilities.
- Economies of scale make it feasible to use centralized depots in balance with critical on-site spares.
- The higher the proportion of COTS equipment in a system, the easier and less expensive it becomes to modify or enhance the system, supporting more rapid technology refresh and greater adaptability to change.
- COTS purchases dramatically reduce operations and support costs for military systems because suppliers are able to spread development costs over a number of market sectors.

[1] SIGNAL Magazine, May 2003

[2] www.cotsjournalonline.com

[3] Sea Power Magazine, April 2001

Transforming Procurement Practices

Transitioning to a COTS-based acquisition process, while growing in acceptance, still faces some resistance from within the defense acquisition community—as well as prime contractors. Issues to look at in building acceptance of COTS include the following:

- Factoring in both initial procurement costs and lower TCO
- Changing incentives for prime contractors
- Identifying viable COTS vendors for long-term partnership

Factoring in Short- and Long-term Savings

Defense agencies have been focused on saving money on military procurement for the last two decades. A recent article in Fortune Magazine[4] reports, "The Pentagon has come a long way from its '80s splurges on $435 hammers, but it still has a long way to go, according to a recent report by the General Accountability Office. For the 26 programs the GAO zeroed in on, R&D costs were 42% (or $42 billion) above initial projections. And those projects needed an average 20% more time than originally budgeted to be combat-ready."

The use of COTS-based design in the commercial world has demonstrated that COTS can reduce development costs because vendors spread their costs across multiple market segments or customers. Beyond this, COTS can also have an impact on reducing TCO.

Normally, when military agencies specify an initial system acquisition, the specification does not cover all future enhancements and extensions. Modifications, when they become necessary, can be extremely difficult and costly to implement for a system based on custom-built components. This, in turn, means that the TCO of the system is extremely high.

Having well-defined interfaces using extensible standards makes it easier and less expensive to add new capabilities. This, in turn, translates to greater flexibility and adaptability in response to rapidly changing defense requirements. It also makes it easier to interconnect systems, which facilitates information-sharing and collaboration.

Prime Contractors See New Value in COTS

In the past, prime contractors have developed system-specific solutions for the military, often incorporating custom or proprietary components. These components require a lifecycle support infrastructure that provides an annuity to the prime, creating a powerful incentive for perpetuating highly specialized solutions for the military.

Another reason that prime contractors may express reluctance to select COTS is because they are unaware of the breadth of COTS solutions available at a fraction of internal development costs. As COTS products continue to grow in breadth and depth, their use across the defense establishment infrastructure should also grow into previously non-traditional COTS areas.

In order to realize the benefits of COTS in defense systems, agencies are beginning to change their acquisition processes to incent prime contractors to use COTS components to the greatest extent possible.

What to Look for In Commercial Providers

There are several things to look for in evaluating a COTS vendor. Two of the most important are product continuity and participation in industry and government security organizations.

[4] Fortune, May 2, 2005

Support for some defense contracts must be provided for up to 25 years, far longer than that normally available in commercial markets. A viable COTS vendor must demonstrate:

- The ability to supply spares for as long as necessary.
- Compatibility with previous generations of equipment.
- The ability to adapt COTS products to offer special features tailored to the customer's specific requirements.

Another important consideration when evaluating the use of COTS is the commercial company's participation in industry and government security organizations. Some of these organizations include:

- **CERT Coordination Center:** The CERT/CC is the major reporting center for Internet security problems. Staff members provide technical advice and coordinate responses to security compromises, identify trends in intruder activity, work with other security experts to identify solutions to security problems, and disseminate information to the broad community. The CERT/CC also analyzes product vulnerabilities, publishes technical documents, and presents training courses. The CERT/CC is funded primarily by the U.S. Department of Defense and the Department of Homeland Security, along with a number of other federal civil agencies. A COTS vendor should have an internal security incident response organization charted with distributing information about security vulnerabilities in its products through a field notice process, to include notification of the CERT/CC.
- **The National Infrastructure Advisory Council (NIAC):** The NIAC is charged with enhancing the partnership of the public and private sectors in protecting information systems for critical infrastructures and providing reports to the Secretary of Homeland Security, as appropriate. The NIAC also proposes and develops ways to encourage private industry to perform periodic risk assessments of critical information and telecommunications systems, and monitors the development of private sector Information Sharing and Analysis Centers (ISACs), providing recommendations to the President, through the Secretary of Homeland Security, on how these organizations can best foster improved cooperation among the ISACs, DHS, and other Federal Government entities.
- **Information Sharing and Analysis Centers:** The mission of the Information Sharing and Analysis Centers Council (ISAC) is to advance the physical and cyber security of the critical infrastructures of North America by establishing and maintaining a framework for valuable interaction between and among the ISACs and government.

CONCLUSION

Military agencies around the globe recognize that it is critical to be able to adapt and respond. Products must be interoperable and integrate with a breadth of solutions from partners and competitors. Embracing open standards enables agencies to take advantage of technology advances and improvements across other market segments, reducing initial investment costs and longer term TCO.

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: 31 0 20 357 1000
Fax: 31 0 20 357 1100

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

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Printed in the USA