Commercial Off The Shelf (COTS): *Doing It Right*

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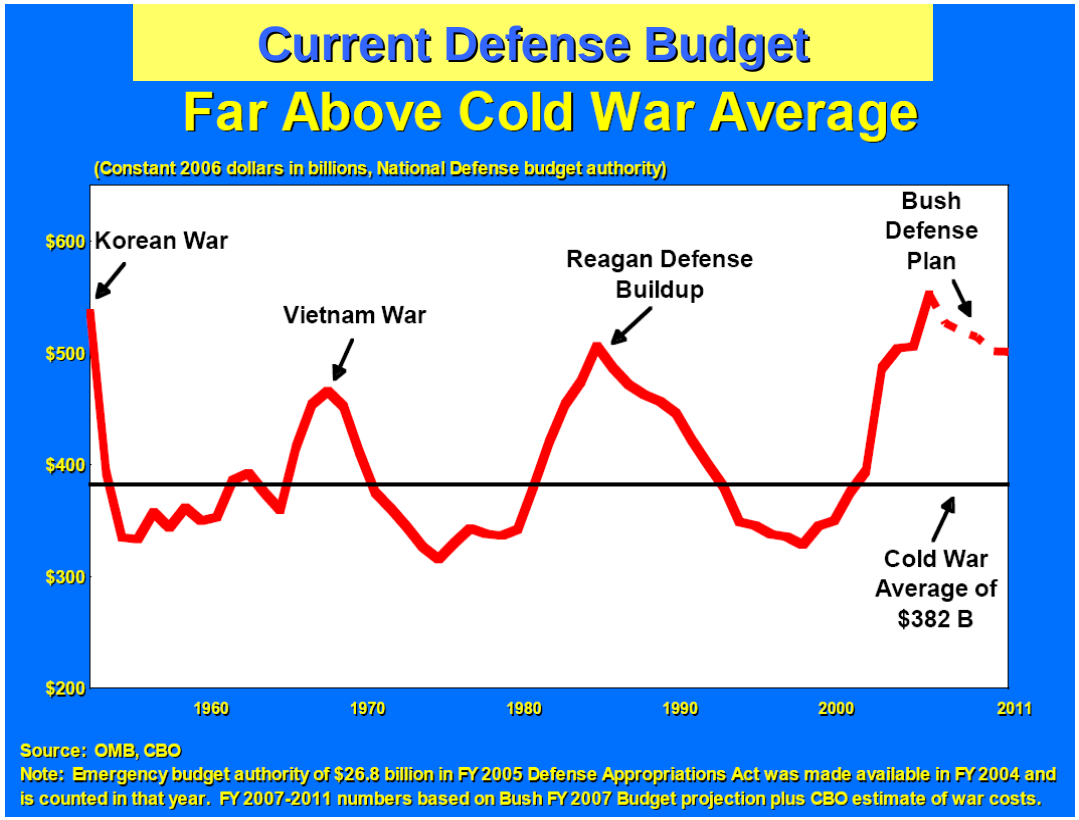
COTS Study

- Review history and policies
- Cases
  - Major Weapons Subsystem - Acoustic Rapid COTS Insertion and E-2C Hawkeye Mission Computer Upgrade
  - Major Weapons System – Light Utility Helicopter
  - Major Enterprise Software System – Defense Logistics Agency Business System Modernization (BSM)
- Preliminary Findings

COTS Policy – Past and Present include

- Former Secretary of Defense William Perry recognized the benefits of dual use processes and products in 1994. His directive, known as the "**Perry memo**," outlined the use of performance and commercial specifications over military unique requirements.
- **Federal Acquisition Streamline Act of 1994 (FASA),** removed many rigid acquisition regulations and allowed DoD to implement management best practices. FASA reform provisions pertaining to acquisitions include: commercial buying practices for COTS and preference for Commercial Off the Shelf (COTS) and Non-Development Items (NDI)
- **Clinger Cohen Act** streamline IT acquisition processes to manage risk and to get the most advantage from incremental acquisitions and COTS products.
- **Federal Acquisition Regulations, Part 12 (FAR)** …organizations should perform market research to determine whether commercial items or non-developmental items are available that could meet the agency's requirements and should purchase them when they are available
- **DoD Instruction 5000.2** requires the use of COTS Information Technology solutions to the maximum practical extent.

Fiscal Environment



Source: http://www.senate.gov/~budget/democratic/charts/2006/packet_defensehrngengland030206.pdf

DoD can anticipate significant downward budgetary pressure

Bottom Line

To gain the benefits of schedule, cost, and operational capability from COTS, program must have flexibility in requirements and specifications—especially for block #1

Acoustic Rapid COTS Insertion (Major Subsystem)

- In the 1990's USN's submarines were loosing their technological lead in detecting and tracking foreign submarines
- A new military specification system was unaffordable
  - Estimated at $1.5B for development and $90M per ship set
- The Acoustic Rapid COTS Insertion (A-RCI) sonar system was initiated to bring the benefits of modern computer technology to anti-submarine warfare.
- Objectives:
  - Improve acoustics system performance -- enable the use of high performance signal processing algorithms that allow the detection and tracking of modern quiet submarines.
  - Commonality across sub fleet
  - Reduce development costs
- First installed in the fleet in 1997

Acoustic Rapid COTS Insertion (Major Subsystem)

- A-RCI program:
  - Used modular open systems approach
  - Replaced central SONAR processors with modernized COTS personal computer technology and software.
  - Hardware and software could now progress on different paths and time lines.
  - Controlled key interfaces, standards, and protocols to insure that different modules would work together.
  - Includes interfaces to the legacy systems; signal processing enhancements; display enhancements; and incorporation of Government Furnished Information (GFI) algorithms.
- Approach enables faster, more economical, and more frequent hardware and/or software upgrades

*COTS technology enabled a **10x increase in system throughput** and an **86 percent reduction in hardware cost** per billion floating point operations per second in a six-year period.*

A-RCI Lessons

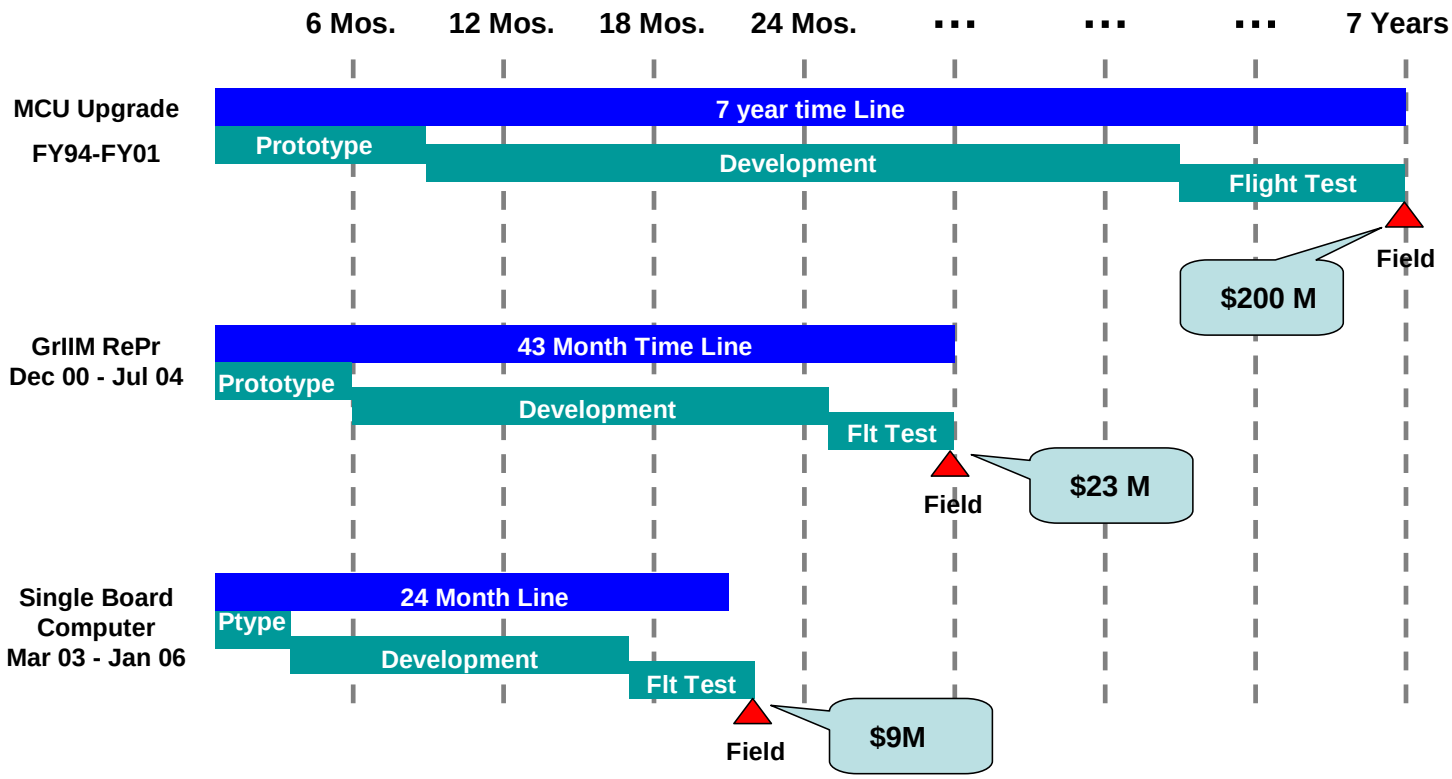
- Advanced technology at a lower cost, quicker
  - Can use COTS operating systems, device drivers, libraries
  - No need to maintain obsolete systems, they can be replaced
- Can be supported by a much broader business base, enabling increased innovation and competition
- A-RCI has enabled Maintenance Free Operating Period—reduces sailor training requirements
- Direct vendor delivery of spares, reduced need to maintain most parts in inventory
- A-RCI is now on every class of submarine—common system further reduces support costs
- Environment is significantly different – cooling the processors has been an issue
- Required a significant cultural shift
  - Urgency was driven by operational requirement and budgetary constraints

E-2C Hawkeye (Major Subsystem)

- The U.S. Navy's E-2C Hawkeye is a carrier-based airborne early warning platform
  - The Navy equivalent to the Air Force's Airborne Warning and Control System (AWACS)
- The most robust Hawkeye, the E-2C, was first delivered to the Navy in 1973.
- COTS was initially selected for the Mission Computer Upgrade (MCU) program in 1992
  - Goal to replace the existing mission computer with a state-of-the-art, open architecture COTS system.
- The **Gr**oup **II** **M**ission Computer **Re**placement **Pr**ogram (**GrIIM RePr**, pronounced "grim reaper") was initiated in 2001.
  - Used available COTS technology upgrade the mission computer and improve the E-2Cs mission readiness and growth potential.

Program office estimates "40 to 60 times more performance" at comparable costs

E-2C MCU Cycle Times



Cycle Time reduced from 7 years to less than 2 years

Cost reduced significantly

E-2C Hawkeye Lessons

- COTS = Change
  - Decreases time, and development and production costs
  - Required a technology insertion budget bogey for commercial system unanticipated changes
  - On occasion, contractor would change vendors for components, which may impact performance and configuration control
  - Vendors may end production in reaction to commercial demand
  - Vendors may change suppliers of components with little or no notice
  - Requires detailed support planning, e.g. spare for a short period (e.g. 18-24 mos.) than plan on update

E-2C Hawkeye Lessons (cont)

- COTS implementation spans several development phases, and creates “color of money” issues
- Quality of commercial products has improved significantly, and now in most cases meets military requirements
- Some requirements could not be met e.g. fault isolation
- Configuration differences requires detailed and accurate configuration management

UH-72A Lakota Light Utility Helicopter (weapon system)

- The U.S. Army awarded contract for the production and contractor logistics support of the Light Utility Helicopter (LUH) to EADS North American Defense on June 30, 2006.
- The UH-72A is a Commercial/Non-Developmental Item aircraft
  - Mission is to fly general support in permissive, non-combat operational environments.
- The UH-72A program is part of an ongoing Army effort to transform its aviation capability
  - Funded by the canceled Comanche program funds.

- The Army intends to procure and field a total of 322 Light Utility Helicopters.
  - The Army National Guard will receive the majority of the 322 UH-72As.
- This commercial/NDI aircraft was solicited on a full and open competition basis.
  - There were 5 initial offers received.
  - The contract base year plus options will cover 10 program years.
  - Total estimated value of the contract, including options, is $2.3B
  - Bought under FAR Part 15

UH-72A

- UH-72A is a commercial off-the-shelf procurement —the Eurocopter-145— is a Federal Aviation Administration (FAA) certified aircraft and currently in use commercially
- Contract for the system was awarded on June 30, 2006.
  - Currently in low-rate production and 16 aircraft were delivered as of November 2007, full rate production was approved in August 2007.
  - Limited operational test and evaluation was conducted in March 2007.
- Program office considers the system's five critical technologies as mature
  - network-ready communications,
  - cabin size sufficient for 2 crew and 6 passenger seats,
  - force protection—defined as the capability of the crew to operate all flight controls while wearing standard protection suits,
  - survivability—defined as meeting FAA standards for crashworthy seats and fuel tanks, and
  - performance—defined as the ability to carry 2 patients on litters with a medical attendant and equipment.
- Four modifications were approved:
  - a secure military radio
  - a cabin temperature ventilation system to mitigate a temperature elevation observed during limited operation test and evaluation
  - an engine inlet barrier filter
  - modification to the medical evacuation mission support kit

UH-72A – Lessons

- Cultural resistance to COTS e.g.
  - Airworthiness certified by FAA
  - Army Airworthiness Directorate bypassed
  - Military mechanics must be FAA certified
  - Must obtain Supplemental Type Certificate (STC) from FAA for modifications
  - Training stays within commercial realm
- Did not fit neatly into the JCIDS process
- Requires a prioritization and some flexibility in requirements to include as many potential platforms as possible—must minimize changes
- Eliminating development saved significant time and budget
- Leverages commercial parts/logistics capabilities

Business Systems Modernization (BSM)

- BSM is DLA's program to replace the agency's 1960 vintage legacy systems with COTS software and state of the art technologies linking the entire supply chain from customer to supplier.
- It is an implementation of an Agency-wide Enterprise Resource Planning (ERP) system replacing core business.
  - Links the entire supply chain from warfighter order through delivery
- Goal of BSN was to enable DLA to:
  - Replace legacy systems with commercial-off-the-shelf (COTS) software
  - Reengineer by fielding best practices
  - Improve customer service by collaborating with customers
  - Provide best value solutions
  - Provide the training, experience, and opportunity to succeed

BSM Primary COTS Components

- Manugistics
  - Forecasting, requirements planning, customer collaboration
- SAP
  - Core data repository, transactional processing of requirements, funding
- COTS Procurement solution was found to be "inadequate," replaced with GOTS suite
- Integrated by Accenture

SAP

- **Order Fulfillment**
- **Procurement**
- **Financial Management**
- **Tech Quality**

DPACS* Suite

- **Solicit**
- **Award**
- **Report**

manugistics
Leveraged Intelligence

- **Demand Planning**
- **Supply Planning**
- **Collaborate**

* DLA Pre-Award Contracting System (DPACS)

Business Systems Modernization (BSM)

- With BSM, DLA has re-engineered its business processes to adopt best business practices
  - Crosses all agency commodities (e.g. subsistence, construction, medical, etc.) to provide end-to-end materiel, financial and procurement management.
  - Material Release Order (MRO) processing time improvement—Receipt of requisition to release of MRO: **about 4 ½ hours in BSM vice 12 hours in legacy system**
  - Required a robust change management program to prepare employees and assess organizational change readiness at various stages of BSM implementation
- Program investment of approximately $750M
- The BSM program achieved FOC in July 2007

BSM serves as the ERP platform for supply chain management of DLA's 5.2 million hardware and troop support items

Business Systems Modernization – Lessons

- Never enough change management
- Its not just about replacing the system, but transforming business processes and the way the organization operates.
- BSM was rolled out in small manageable increments, not in large blocks of capability or users
  - This enabled an operational assessment
- The PMO used the results of operational tests to provide course corrections and drive system changes
- Senior leadership involvement was critical

COTS Findings to Date – Cons

- Commercial market and vendors drive development of COTS, not the Program Office. As a result, change is a constant
  - May require a funding line for technology insertion
  - Requires increased attention to configuration management
- The downside to using COTS software is the lack of insight into the code details
  - Programmers have less understanding of the code than they would have with internally developed software.
  - Also results in security concerns
- "Color of money" conflicts can create problem (e.g. the inability to use procurement dollars to do T&E)
- COTS software products often have embedded processes—may require process reengineering
- COTS hardware may not be designed to meet all military environmental requirements
  - Parts may still have to be "militarized" to function properly
  - Vendors may substitute parts
- May lock the user into a proprietary technology

COTS Findings to Date – Pros

- COTS provides improved performance on an accelerated schedule
  - Leverages the commercial market to get upgrades
  - Development and manufacturing costs are amortized over a larger customer base
- Integrating COTS components is within the capability of smaller firms, creating a much broader business base
  - Can permit the purchase of system equipment from several vendors, ensuring continuous price competition.
- Using COTS hardware components brings the benefit of using COTS operating systems, device drivers, and libraries.
  - This enables the system developers to focus on the applications vs. the support software.
- The high volume and market competition of COTS offers not only, fast response, and friendly user interfaces, but **lower costs**.

Conclusion

- There is a broad range of possibilities for using COTS
- Using COTS can:
  - leverage the massive technology investments of the private sector
  - reap the benefits of reduced cycle times, faster insertion of new technologies, lower life cycle costs, greater reliability and availability, and support from a robust industrial base.
- Using COTS creates some new challenges, and to gain the greatest advantage requires flexibility in requirements and specifications (especially for block #1)
- In spite of the challenges, the benefits can far outweigh the risks