Lessons Learned in Applying Modular Open Systems Approach Requirements in an Acquisition Program

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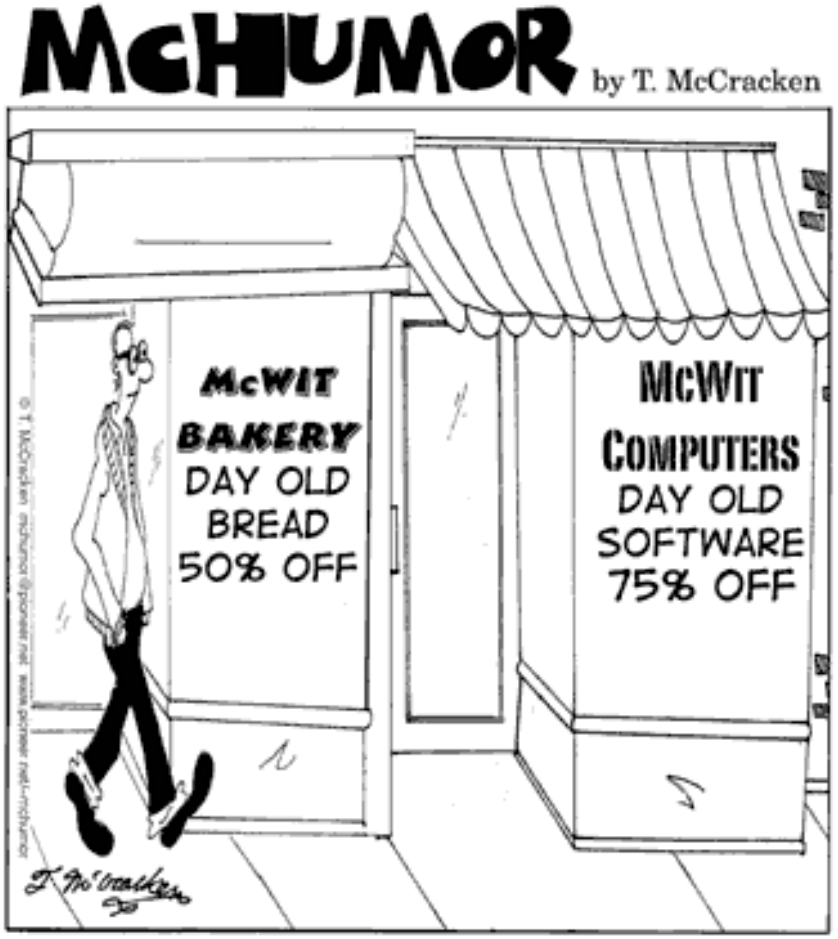
NAVAIR


McHUMOR
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McWIT
BAKERY
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TOPICS

- Technology Needs
- Acquisition process
- Execution realities
- Lessons learned

Today's Briefing Purpose –
Exchange of Information;
Inform – stimulate discussion

Program Background

- **ACAT**
  - 1C
- **Capabilities**
  - Avionics system
- **Production Phase**
  - Technology Development – 14 Months
- **Targeted platforms**
  - MV-22, AH-1Z, ..

MOTIVATION

- Current avionic systems and software implementation is not readily extensible or scalable.
- Avionics systems are stove-piped within class of platform and can not be readily reused for other programs without major re-engineering or investment
- Establish a robust and evolutionary software and system engineering architecture that permits growth, commonality and capability as the operational needs and solution space rapidly changes.

Right Cost, Right Capabilities, at the Right Time

Definition

Modular Open Systems Approach is a strategy of bounding capabilities against budget, building upon open systems architecture foundations, resulting in affordable systems with long term sustainability.

Business Case, Capabilities, and Technologies

Balancing the Force

"New Century Threats"

Conventional **&** ***Unconventional***

- **Future Peer Competitors**
- **Technology & Information Access**

- **Failed States**
- **Transnational**
- **Asymmetric**
- **Terrorists**
- **WMD**

Instability, Crisis, Chaos in the Littorals:

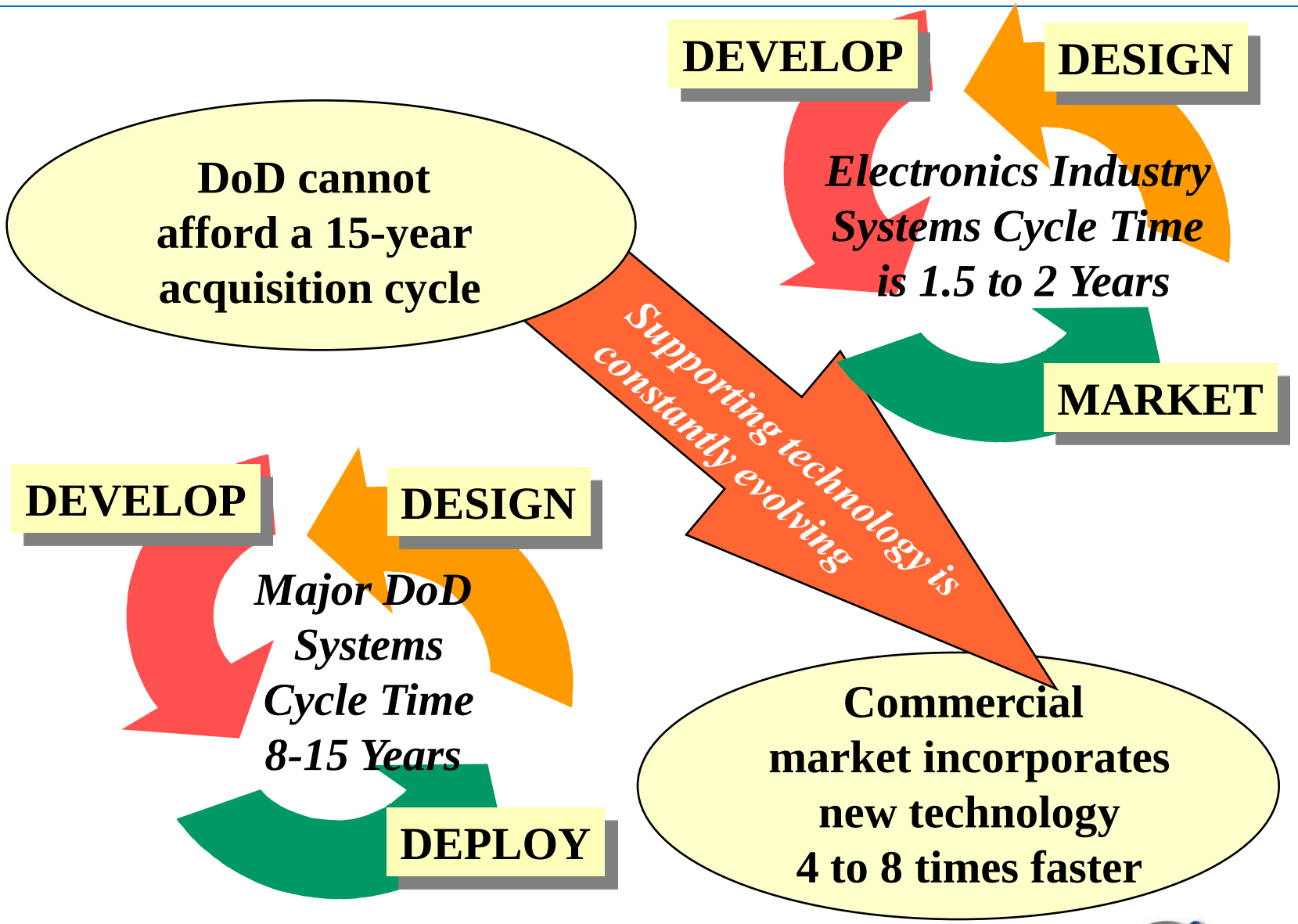
- ✓**70% of the World's Population….resides**
- ✓**80% of the World's Cities…….located**
- ✓**95% of the World's Commerce …transits**

"Future War…not the son of Desert Storm, but the stepchild of Chechnya."

Gen Krulak

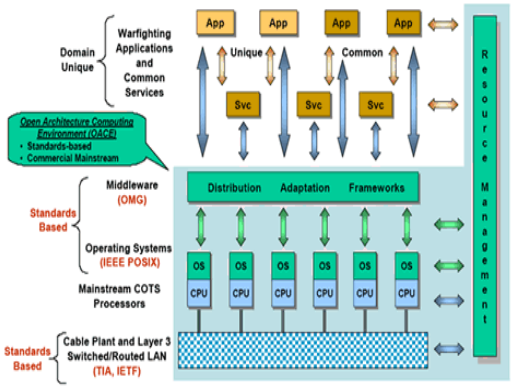
Ref : Marine Aviation Update Commander's Course, 24 Oct 07 by BGen Robert S. Walsh, Assistant Deputy Commandant for Aviation

Time to Deployment



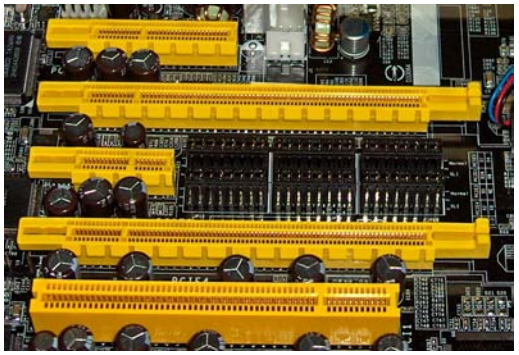
Ref: OS-JTF Open Architecture Brief

Technologies



Ref: OS-JTF Open Architecture Brief

Ref: Xilinx Virtex 7

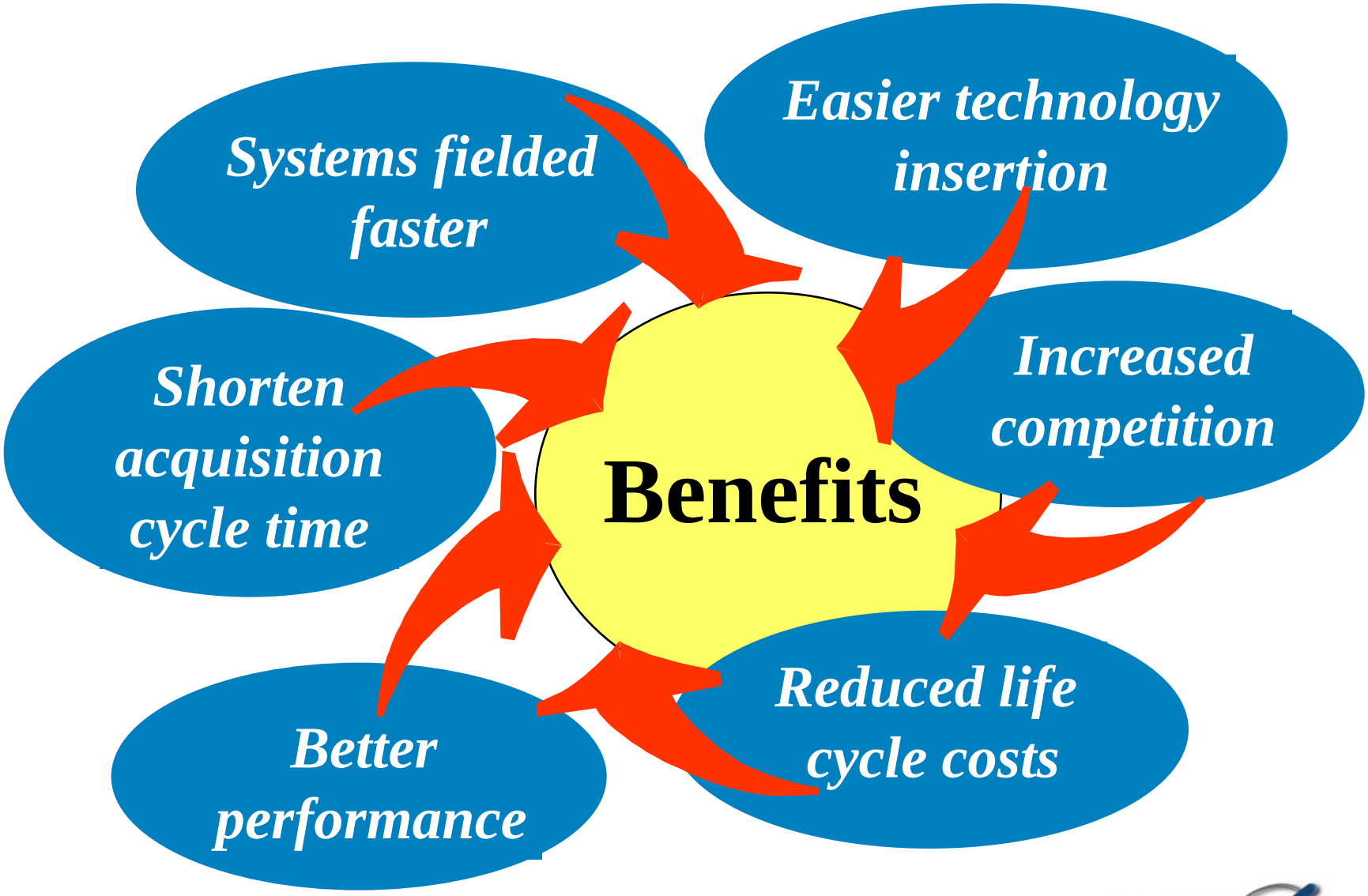


Ref: http://en.wikipedia.org/wiki/File:PCIExpress.jpg

Ref: Xembedded, Inc. XPMC-6710

- Software Architecture
- Processor Architecture
- Power Architecture
- Bus Architecture
- FPGA
- BSP

Benefits of Open Systems



Ref: OS-JTF Open Architecture Brief

MOSA is Not

- Processor Card
- Interface Control Document
- Published proprietary interfaces

Acquisition Process

- DoD 5000.1
- DoDi 5000.2
- Naval Open Architecture Contract Guidebook
  - Contracting language as recommended were place in section C with modification from Legal
  - Associated contract data requirements lists
  - Sections L and M of solicitations
- Can not force the contractor to sell their intellectual properties

Acquisition Process

- Two key contractor deliverables
  - Open Architecture System Engineering Management Plan
    - Management plan describing the process to attain modular open systems framework
  - Modular Open System Approach Analysis Report
    - Market survey
    - Business case studies
    - Technologies trend/obsolescence

Execution Realities

- Established open architecture working group
  - Met on a monthly basis
  - Spent time defining terms such as
    - Modular architecture
    - Widely accepted/supported standards
    - Use of commodity COTS
    - Published Interfaces
    - Isolated proprietary components
  - More interested in meeting contractual requirements to be competitive in EMD

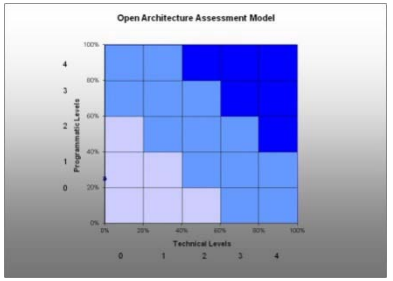
Execution Realities

- Open Architecture System Engineering Management Plan
  - Company's IRAD engineering management strategy
- Modular Open System Approach Analysis Report
  - Previous market survey that was performed in support of IRAD

Execution Realities

- Contractors were not skilled in the desired approach
  - Not proficient practitioner of latest software design approach
  - Still doing functional decomposition with 2010 refresh (new tools but same approach)

- Utilized three sets of tools to evaluate the goodness of contractor's Modular Open Systems Approach
  - Open Architecture Assessment Tool (OAAT)
  - Modular Open Systems Approach Program Assessment Rating Tool (PART)
  - Key Open Sub System Tool (KOSS)



Execution Realities

- KOSS provides a mechanism for:
  - Identifying and providing transparency into components that will have volatility over a long period of time (e.g. System Life Cycle)
  - Identifying factors of component volatility
  - Corporate competitive technologies – market share drivers
  - Changes: obsolescence, Gov't. mandates, component costs
  - Designating the interfaces on either side of that volatile component or sub- system as a KEY INTERFACE

		Capability Roadmap Rev. ___ & Date ___								
	Period	2008-2010	2010-2015	2015-2018	2018-2020	2020-2023				
Category	Component Decomposition	Capability 1	Capability 2	Capability 3	Capability 4	Capability 5	Obsolescence	Relative Rate of Change	Relative Cost of Change	Relative Weapon
Hardware	Component 1	N	N	N	N	N	L	0	L	H
Software	Component 1	N	N	Y	Y	N	L	2	L	H
Middleware	Component 8	N	Y	Y	Y	N	L	3	L	L
OS	Component 9	N	N	N	Y	N	M	2	L	L

Ref: Key Open Sub Systems (KOSS) Tool: KOSS Description and Application

Lessons Learned

- The MOSA was heavily dependent on contractor's internal research and development
  - No insight into their intellectual property except the interface
- Heavy dependence on modular open system approach analysis report to evaluate the design that did not materialized with the desire intent
- Tools were too ambiguous to be used as a benchmark.
  - Needs to have a method to certified the approach

Lessons Learned

- Acquisition duration
  - Not enough time and funding to make course correction and impact implementation
- Government needs to invest in internal research and development effort to set the definition and requirements of the technology baseline desired.
  - If we leave this important task to the contractor, we will have what the contractor wants verses what the warfighter needs
  - Community of practice
- The cost of buying data rights was overly optimistic

SUMMARY

- Naval Open Architecture Contract Guidebook is a good starting point but needs rework
- Government needs to perform business\technology analysis before contract negotiation
- Pre-defined desired data rights to be acquired as part of contract negotiation
- Recognizing certain proprietary data is good for the industry
- The modular open systems that was designed is what the contractor developed years prior

Thank you !