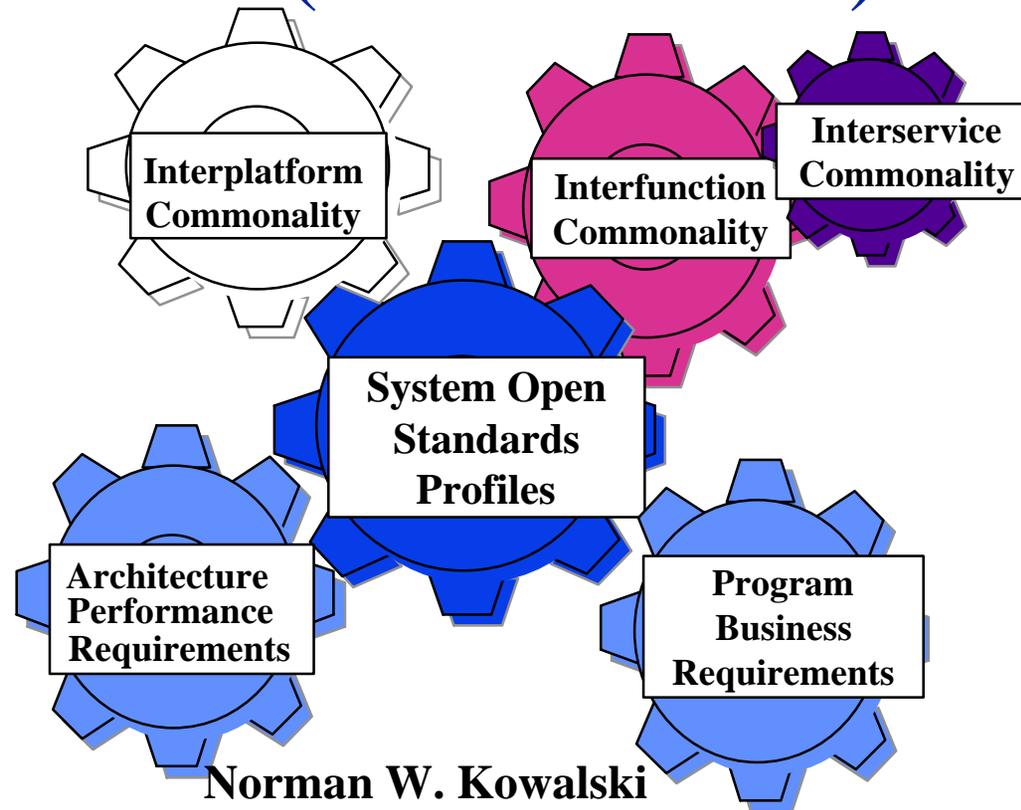


Open Systems (Architecture) Engineering



Norman W. Kowalski

Code 2252, Building 1171-2

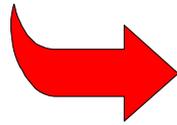
Naval Undersea Warfare Center (NUWC) Division, Newport

Newport, RI 02841-1708

(401) 841-4581, FAX 2130

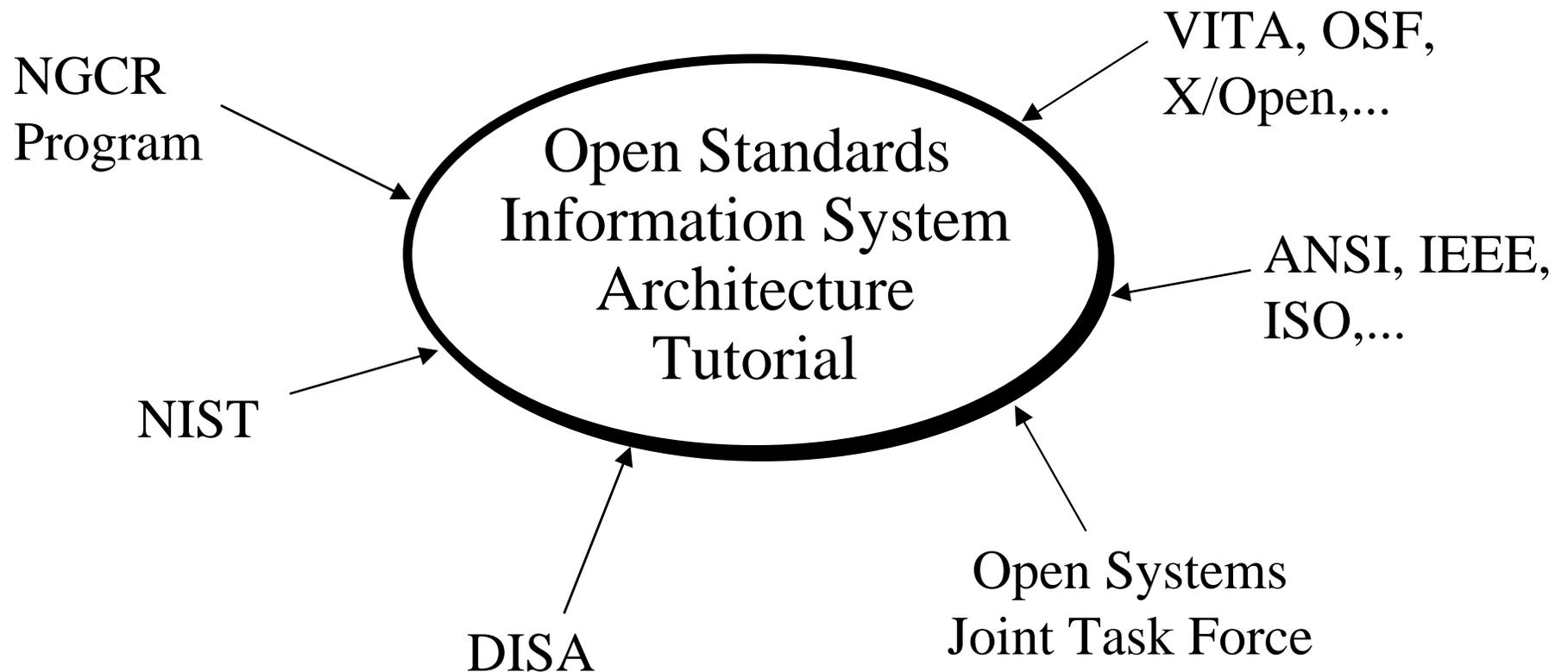
kowalski@code22.npt.nuwc.navy.mil

Syllabus



- **Overview**
 - Key Open System Concepts and Definitions
 - Conformance & Compatibility Management
 - Open System Engineering Approach
 - Open System Policy
 - Today's Transition Environment
 - Open System Transition Process
 - Summary

Genesis of the Presentation Material



Key Open System Concepts and Definitions

- Provides a foundation for understanding open system concepts and premises
- This section provides engineering and programmatic concept definitions on which much of the remainder of the discussions are based.

Conformance & Compatibility Management

- Conformance Management is discussed with programmatic and technical requirements explained
 - Conformance to open commercial standards is key to achieving an open system
 - Unless products can be verified to be conformant, open benefits may not be achieved
- Commercial products, despite being conformant, may not necessarily interoperate together. The engineering and programmatic ramifications of this are discussed.

Open System Engineering Approach

- This section of the training materials describes an overall approach to achieving open system benefits, in a non-prescriptive manner.
- The section ties together many of the definitions and concepts into logical grouping and activities.

Open System Policy

- A key element of a successful open systems engineering approach is to establish a policy for guiding management decisions and direction.
- While COTS volatility precludes prescriptive policy, guidance on decision making activities within programs is provided

Today's Transition Environment

- What is the current state of practice of open systems engineering in the DoD and commercial environments?
- What does this environment mean to decision makers?

Open System Transition Process

- What is a reasonable approach to transition to an open systems environment?
- Is the approach different if legacy systems are involved, rather than the system development being a new start?

Summary

- A summary of the major premises of the training material is presented.

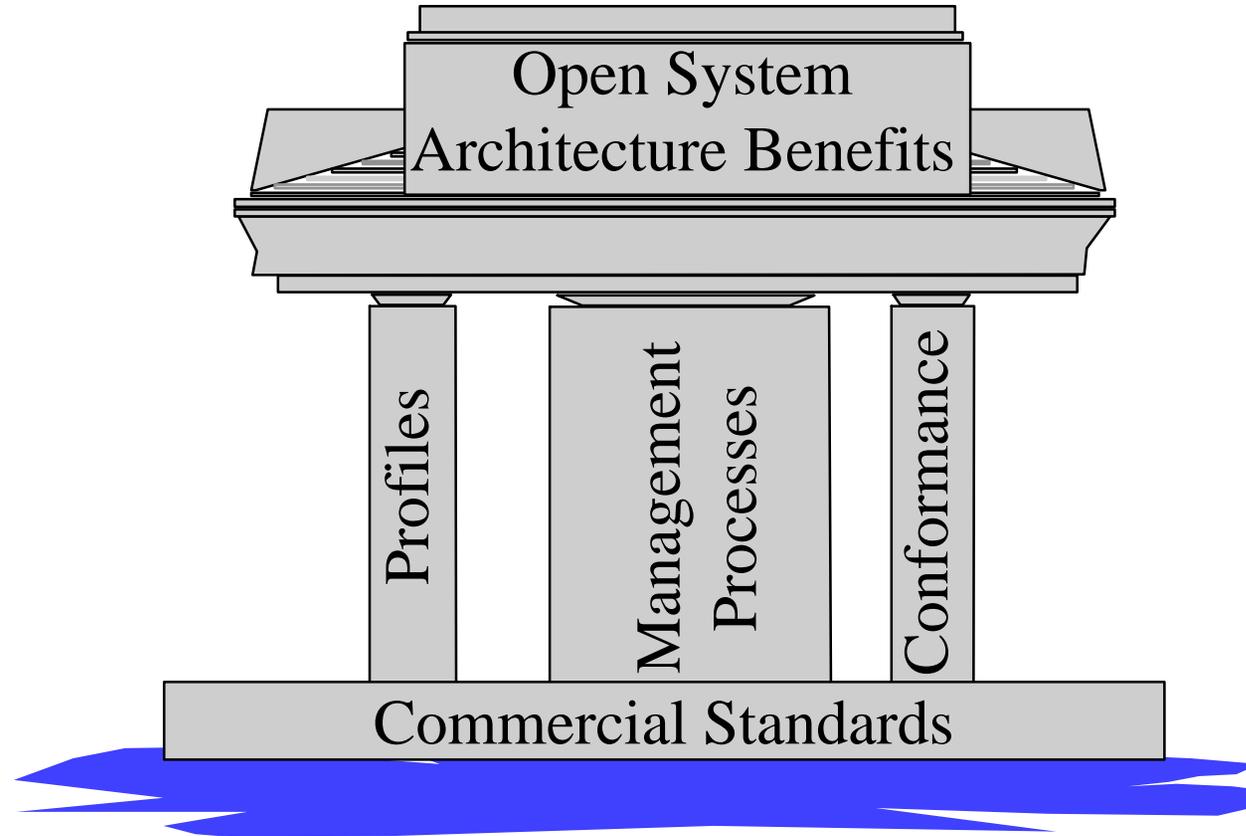
DoD Regulation 5000.2-R

- 4.3.4 Open Systems Design
 - An open systems approach shall be followed for all system elements (mechanical, electrical, software, etc..) in developing systems. This approach is a business and engineering strategy to choose specifications and standards adopted by industry standards bodies or de facto standards (set by the market place) for selected system interfaces (functional and physical), products, practices and tools. Selected specifications shall be based on performance, cost, industry acceptance, long term availability and supportability, and upgrade potential.

VISION

- To establish in DoD an open systems approach as the foundation for all weapon systems acquisitions in order to lower life cycle costs and improve weapons systems performance.

Key Elements of an Open Systems (Architecture) Engineering Approach



Open Systems Approach

- An open systems approach is a business approach for developing affordable (life cycle) systems (weapon, C3I,...)
 - It relies on open commercial standards as a technical baseline for a system
 - It requires and employs disciplined management and systems engineering processes to develop and maintain a system's architecture
 - Disciplined processes employed throughout a systems life cycle are the key to achieving open system benefits

Payoffs

- Lower life cycle cost for weapon systems
- Better performing systems with greater intraoperability
- Technology transparency for rapid upgrades
- Improved interoperability for joint warfighting
- Closer cooperation between commercial and military electronics industries
- Improved international competitiveness of U.S. electronics industry

Open System Architecture Benefits

- Interoperability - the ability of two or more (similar or dissimilar) computer systems and their software to exchange and use information that has been exchanged
- Compatibility - the general ability of two applications to coordinate with one another in their operation, even if not originally designed to do so
- Portability - the ease with which an application or hardware component can be transferred from one hardware or software environment to another
- Reusability - the ability to reuse portions of one application's software/hardware in the generation of another application
- Maintainability - the qualities that improve the ability to maintain the application such as by eliminating interface uniqueness for parts of application code

Open System Architecture Benefits

- Vendor independence - allowing different vendors to compete with hardware and software offerings
- Improved user productivity - achieved through having established consistency and predictability in services regardless of the application platform
- Reduced life cycle cost - achieved through reduced duplication of functionality to meet the requirements of different computer vendors' configuration requirements
- Improved Technology Insertion - achieved through providing stable vendor target paths for technology, and modular insertion
- Scalability - the ability of applications to be configured to allow operation on platforms ranging from micros to mainframes



What Does an Open System Yield?

- An Open System provides open benefits.
 - An open system does **not** guarantee a specific performance level. Poorly performing implementations do not perform better if they are performing on open implementations.
 - Poor systems development practices will not be overcome by an open system implementation.
- Open systems provide economic benefits, technology insertion opportunities, and vendor independence through providing portability, scalability, interoperability,...

Overview Summary

- The goals of an open systems approach are economic
- Faced with dwindling budgets and rapid technology advances, the DoD has mandated the use of commercial products and an open systems approach in building, upgrading and maintaining systems.
- An open systems approach involves specific systems engineering disciplines applied to open commercial interface standards
- There are several key management processes that also must be present to ensure that open goals are met