

Open Systems: What's Old Is New Again

Tricia Oberndorf & Dr. Carol Sledge



Report Documentation Page

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▶ **Introduction**

Open Systems: Product & Approach

Succeeding with Open Systems

Reprise: Open Systems Today

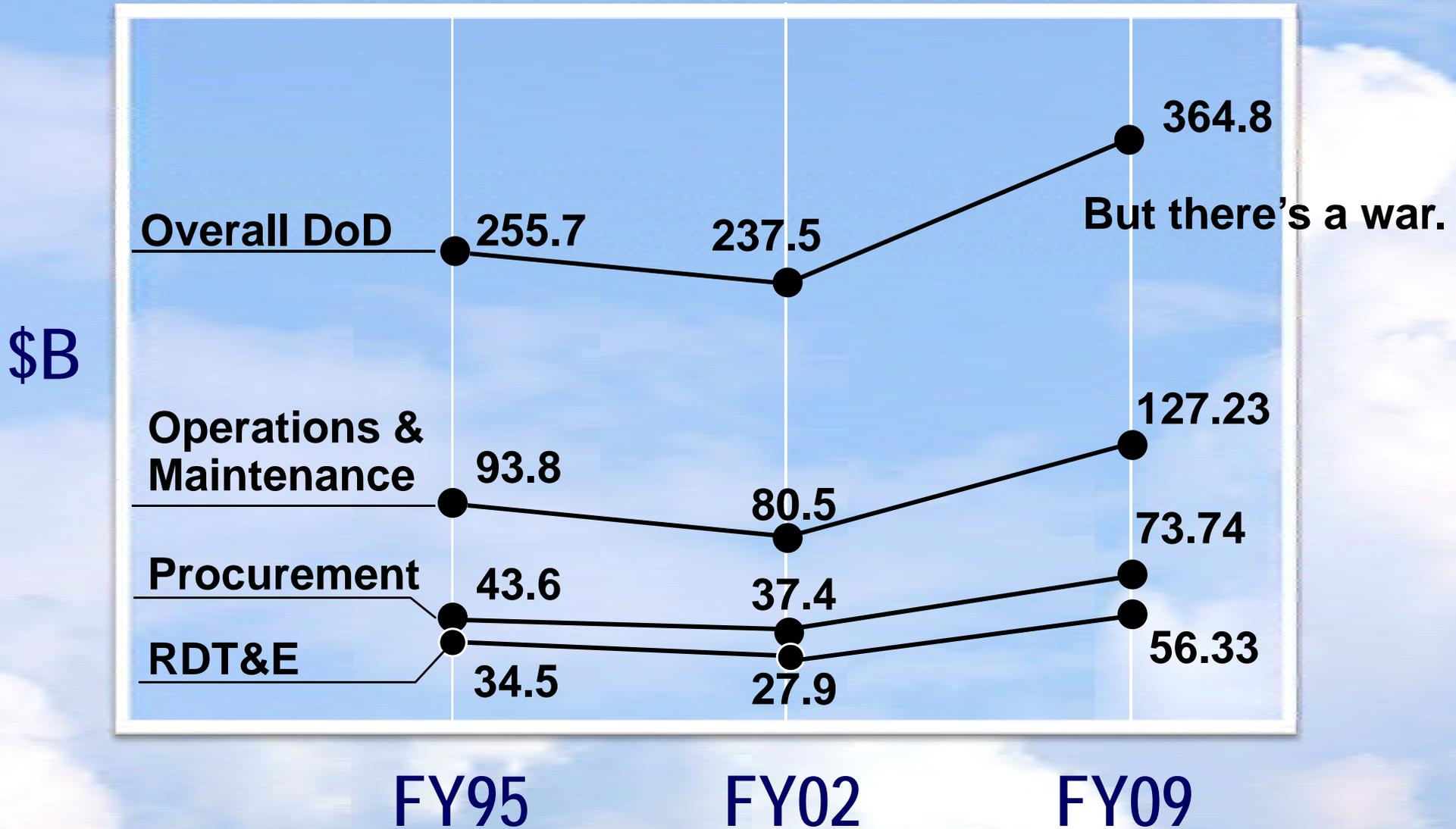
Technology is maturing faster.



Performance requirements are increasing.



Budgets first declined, now challenged.



Adjusted for inflation



Systems often have 30-50 year service lifetimes



Your way of doing business is changing.

Clinger-Cohen Act of 1996

DoDAF

McQueary memos

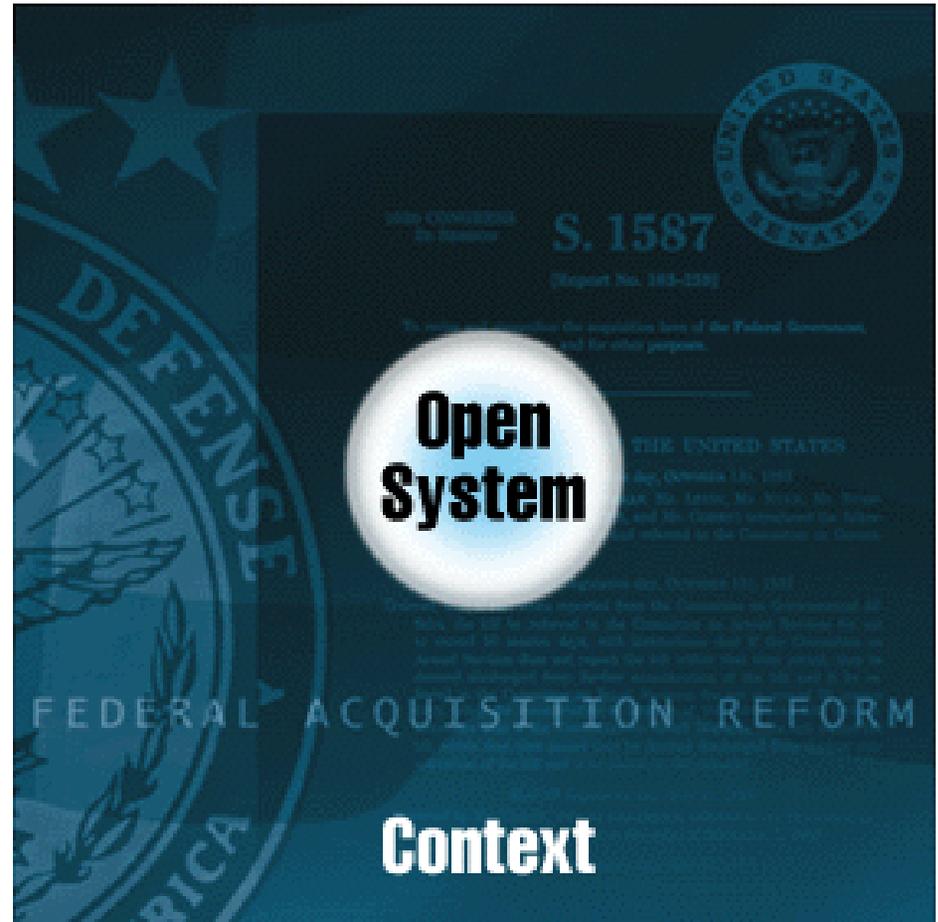
DoDI 5000.02:

8. MODULAR OPEN SYSTEMS APPROACH (MOSA). Program managers shall employ MOSA to design for affordable change, enable evolutionary acquisition, and rapidly field affordable systems that are interoperable in the joint battle space.

The latest acquisition reform

You are being asked to acquire systems more efficiently.

Open systems are part of your solution.



An open systems approach can help.

An open systems approach uses commercially available, widely accepted interface standards to bring commercial products from multiple vendors to bear in the weapons systems world.



Introduction

▶ **Open Systems: Product & Approach**

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A system is



What is an open system?

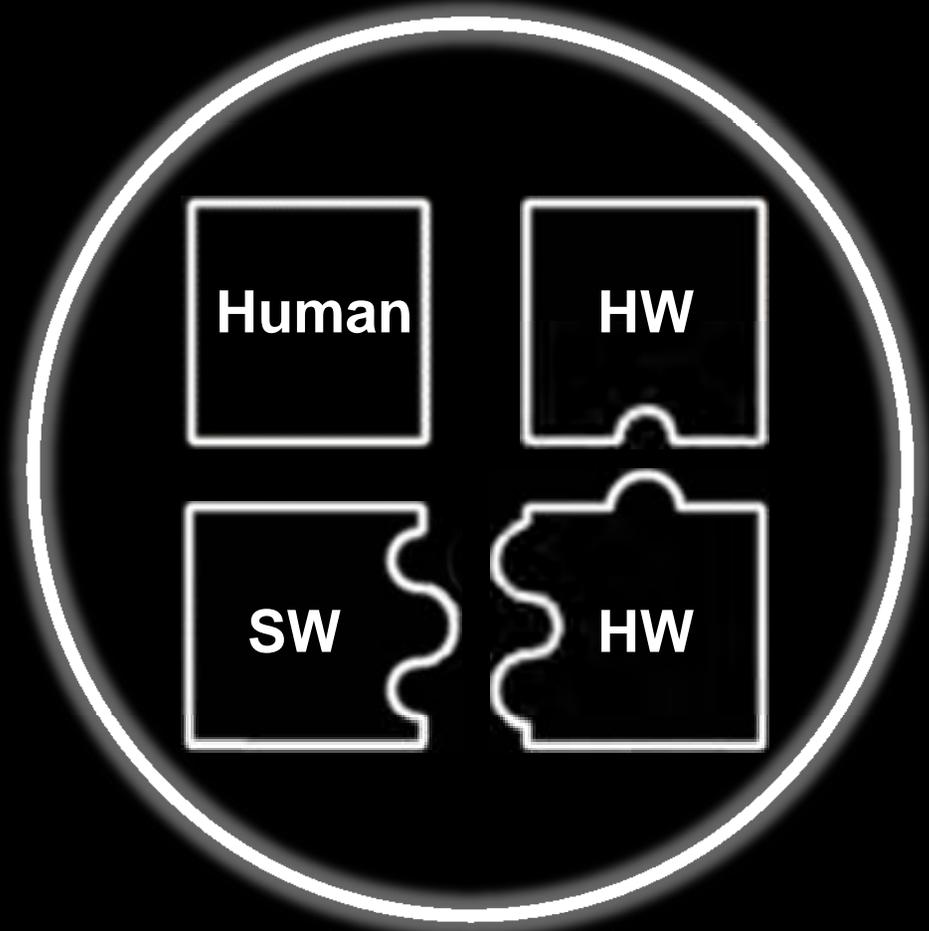
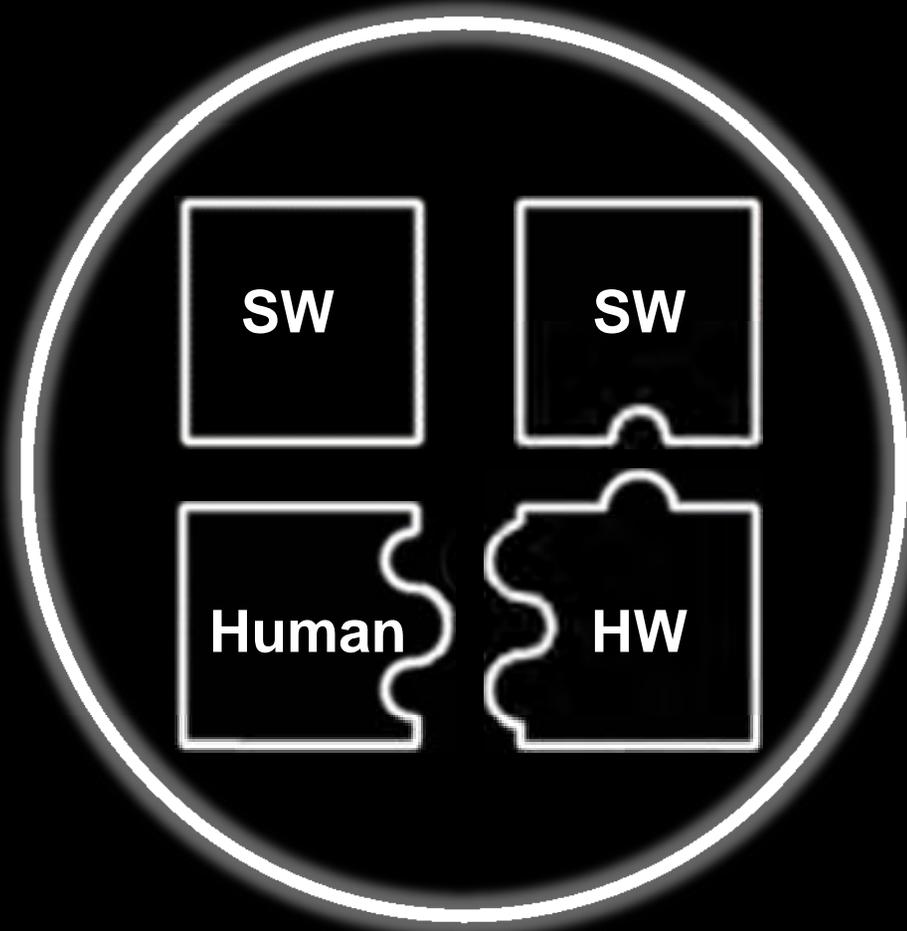
open system

A collection of interacting components designed to satisfy stated needs with the interface specification of components

- fully defined
- available to the public
- maintained according to group consensus

in which the implementations of components are conformant to the specification.

Open systems emphasize interface specification



Open systems are based on standards

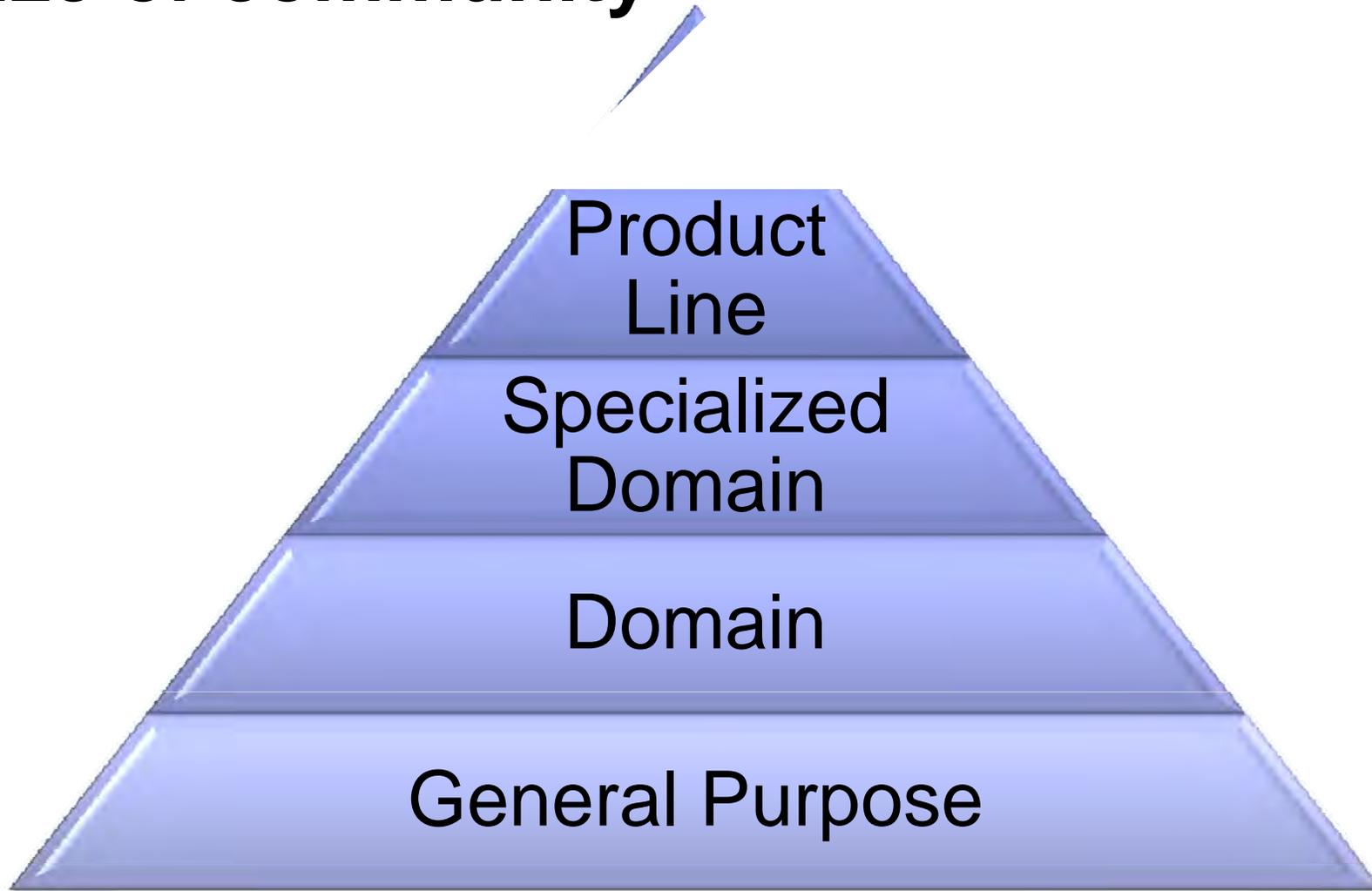
standard

A publicly available document defining specifications for interfaces, services, protocols, or data formats, established and maintained by consensus.

Where do standards come from?

Standards are developed by industry, government, professional associations, consortia, and academia.

Size of community

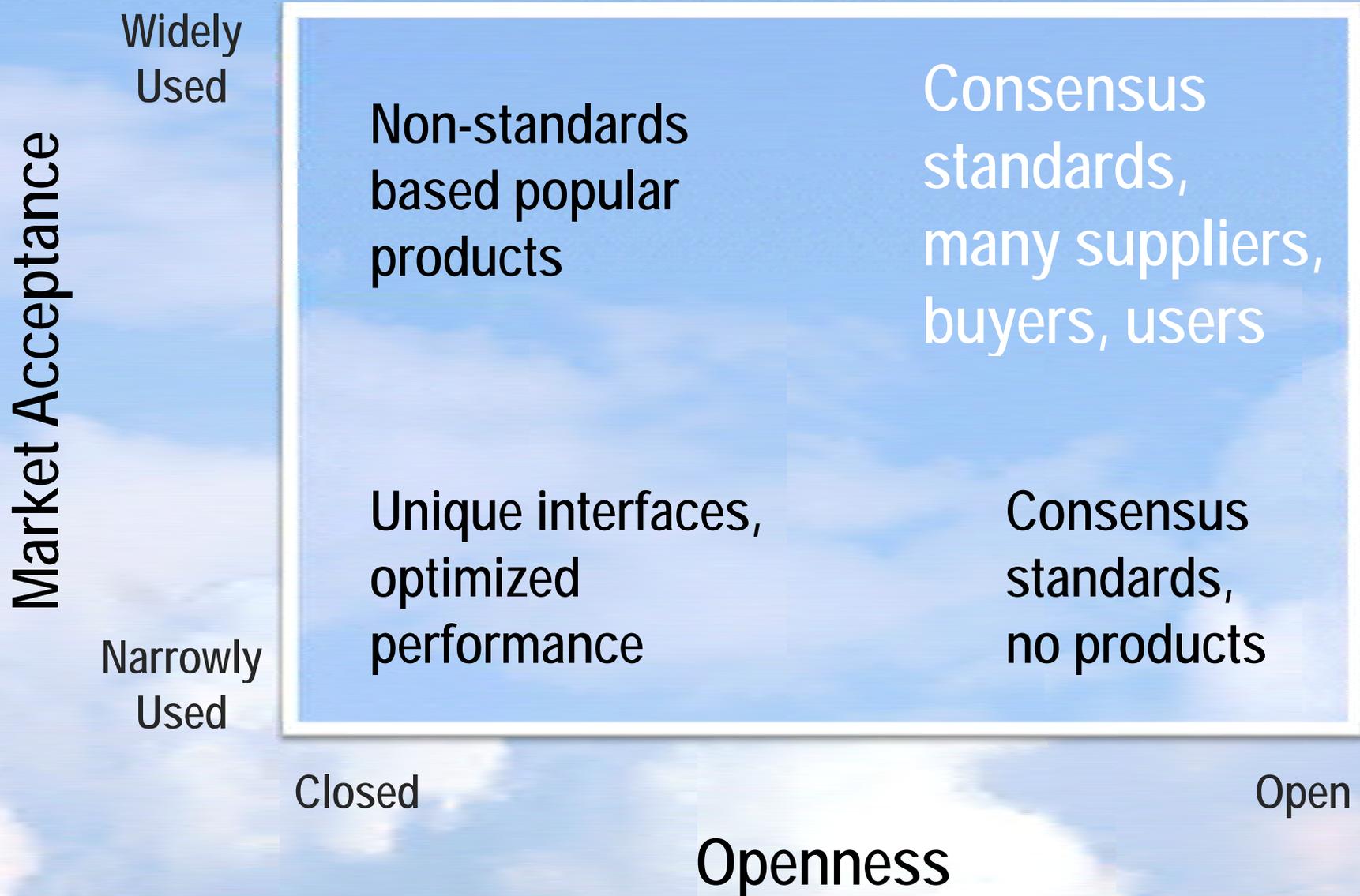




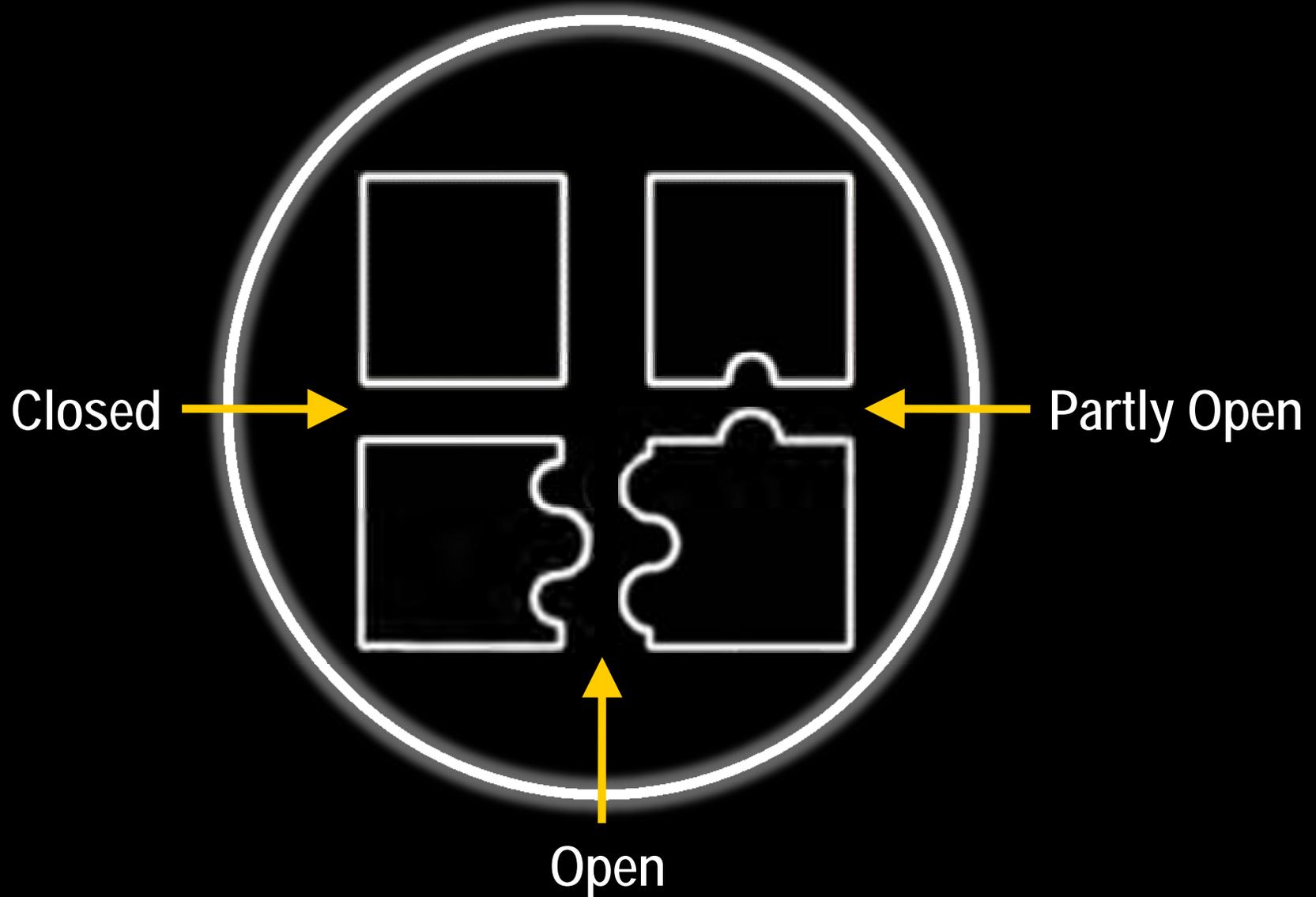
Sources of components



Openness vs. market acceptance



Not all components have to be “open”



NDI ≠ open

commercial ≠ open

open source ≠ open system

open ≠ interoperable

Open systems is a new way of thinking about acquisition

Traditional Approach

Open Systems Approach

Define unique interfaces

Develop components

Integrate components

Use & support the system

Adopt standard interfaces

Acquire components

Integrate components

Use & support the system

How are you going to make the shift from producer to consumer?

Traditional
Approach

Open Systems
Approach

Define unique interfaces

Develop components

Integrate components

Use & support the system

Adopt standard interfaces

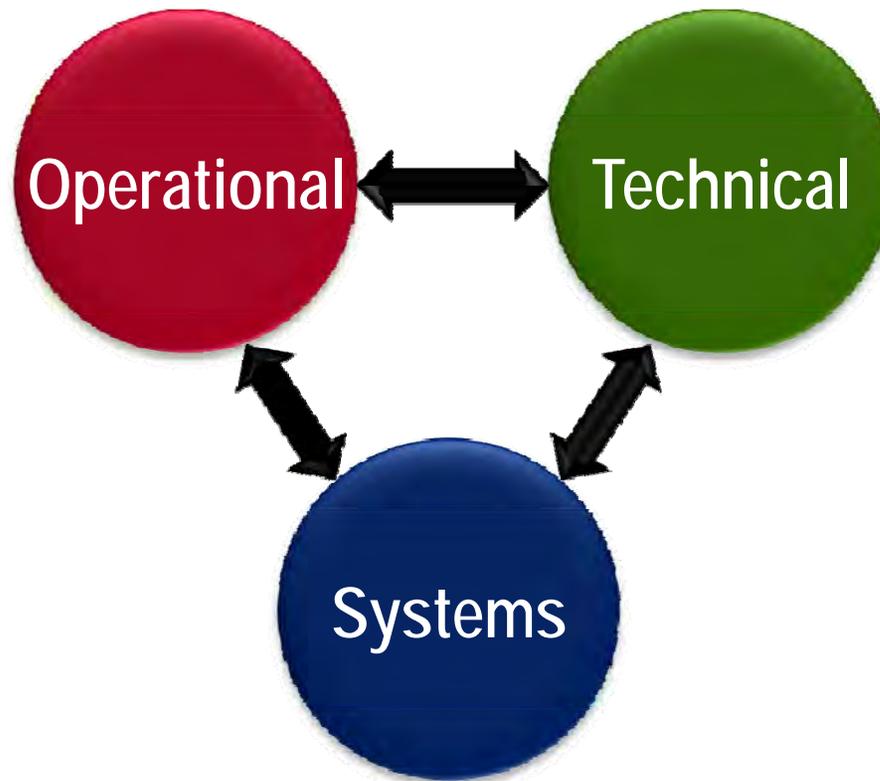
Acquire components

Integrate components

Use & support the system

Open system architecture

An open system architecture is an architecture in which the interrelationships of the components are defined by interface standards, and the architectural principles and guidelines are consistent with an open systems approach.



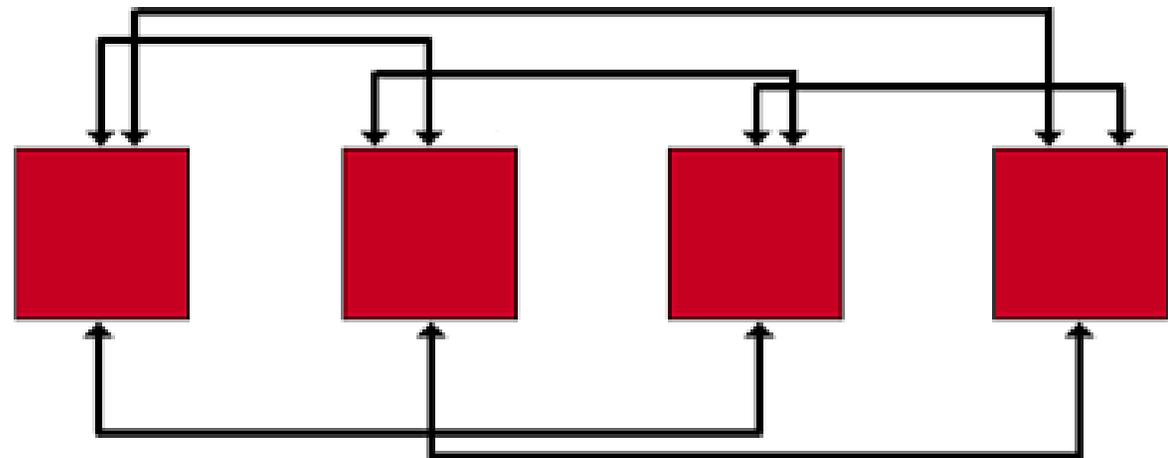
Leverage points for integration

You can gain leverage at different levels.

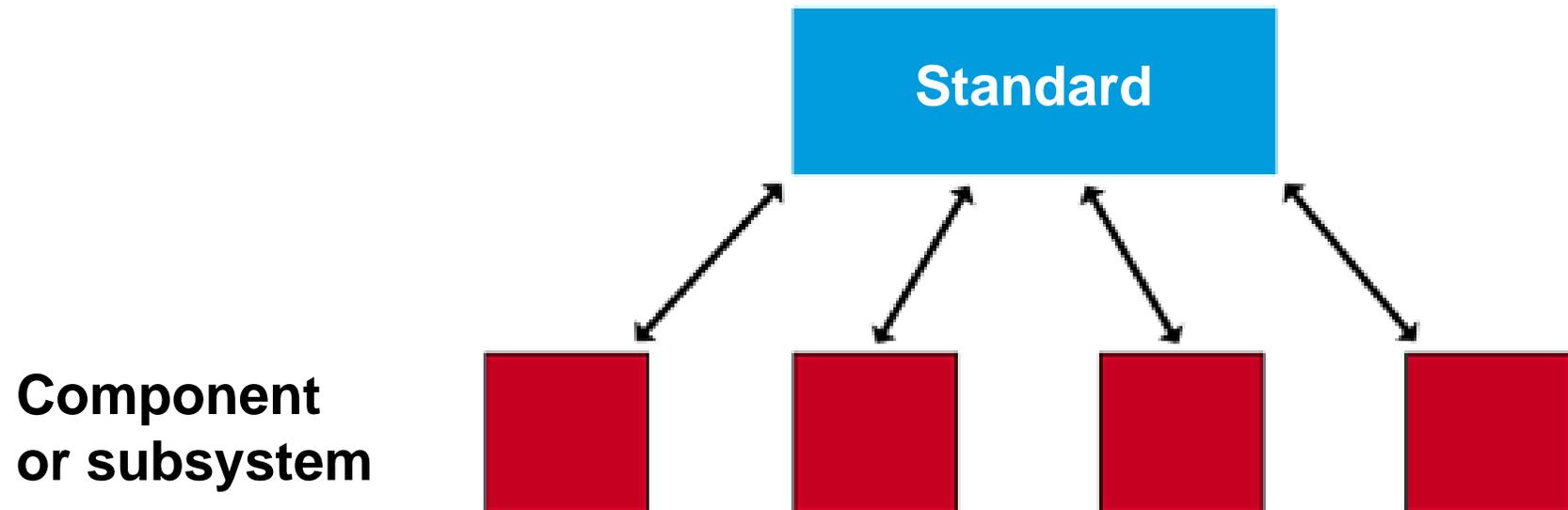
- component
- interface standards
- architecture

Point to point integration

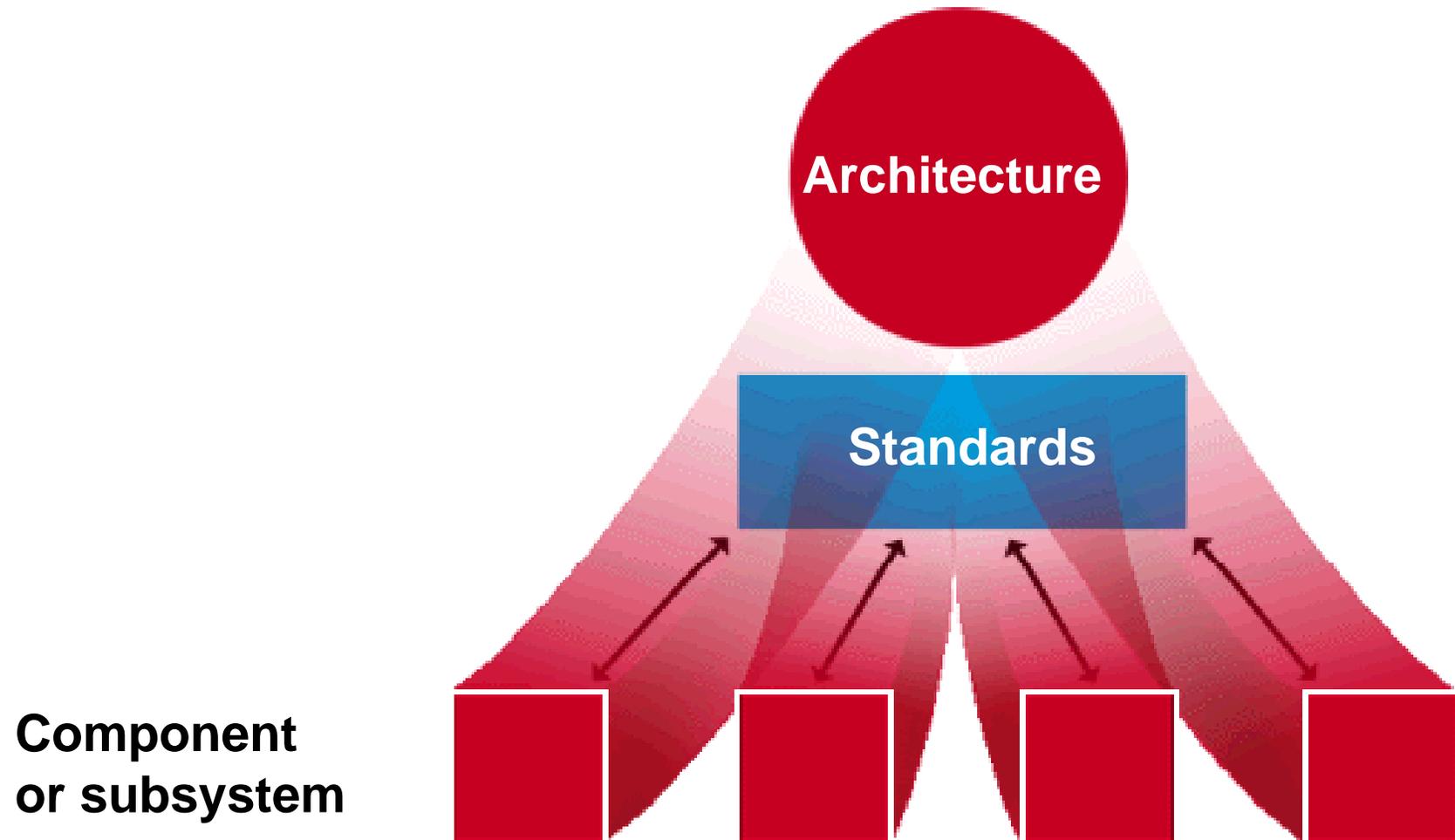
Component
or subsystem



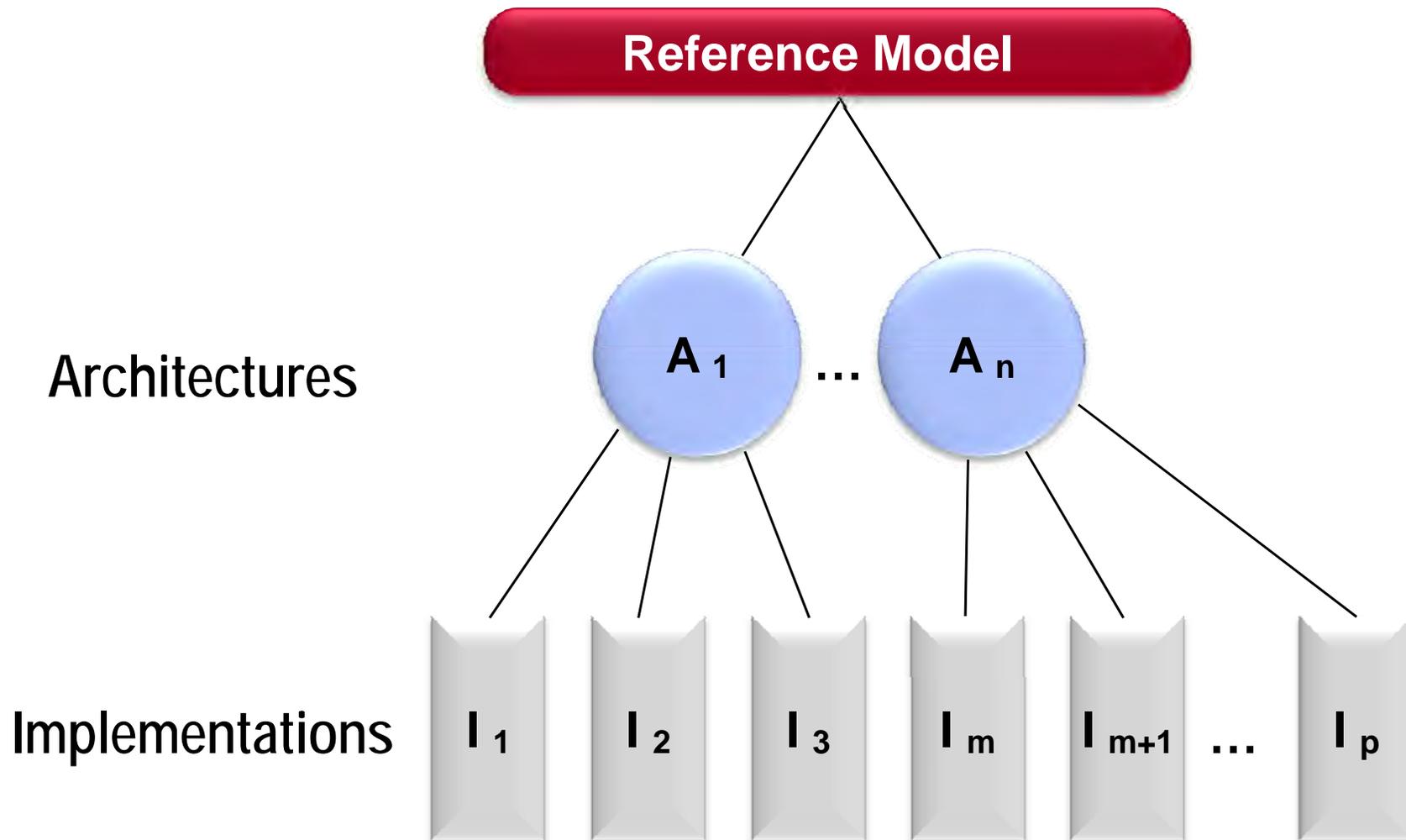
Integration via interface standards



Integration via architecture



Gaining a systems perspective



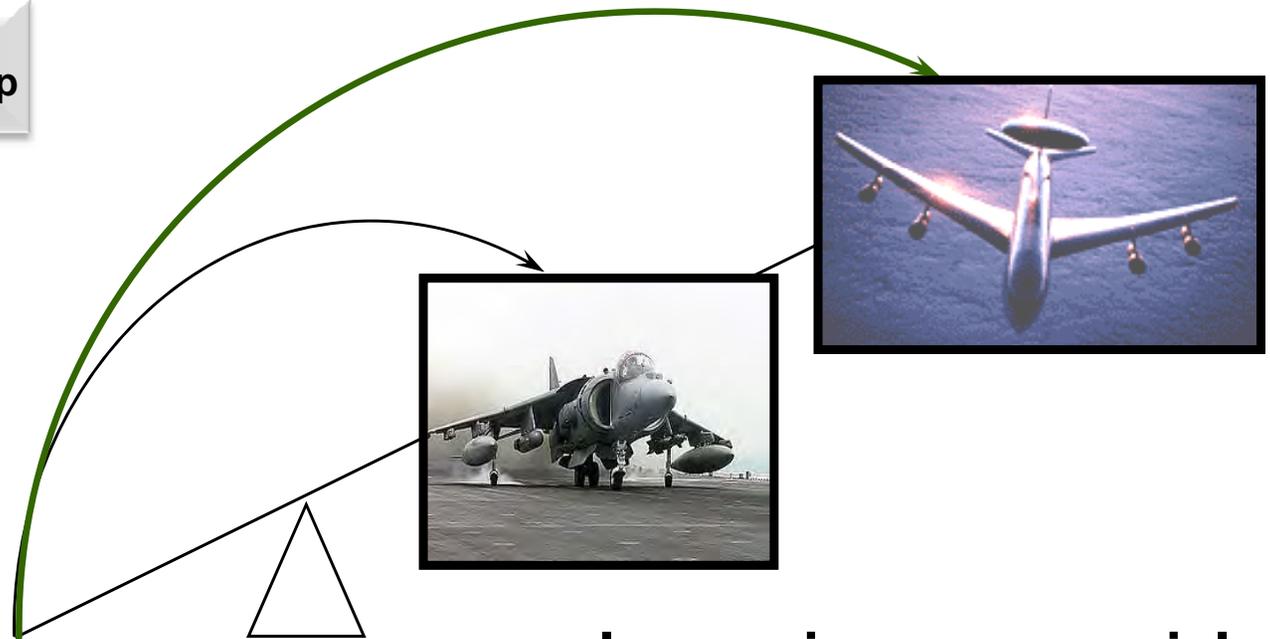
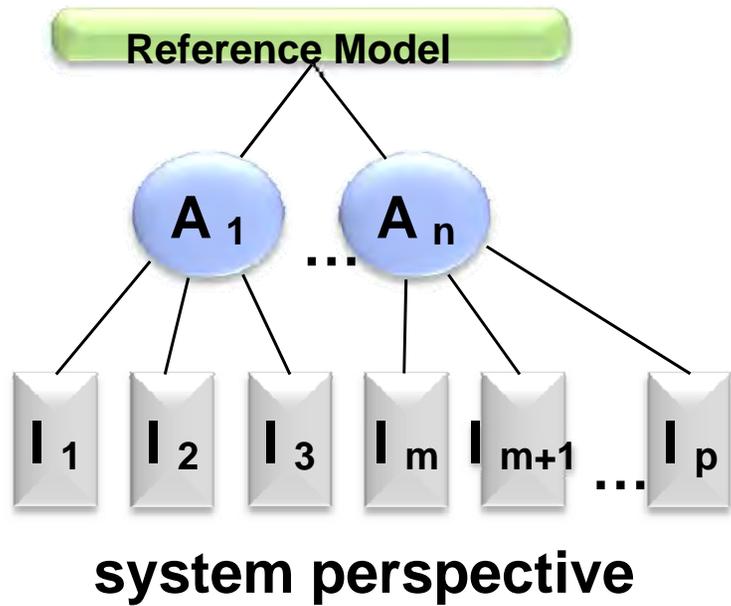
An open systems approach

An open systems approach can be used to address your business concerns for improving the cost, schedule, and performance curves of your acquisition strategy.

An open systems approach creates a more evolvable system by capitalizing on these key elements

- a systems vision
- a common architecture
- the use of standards and standards-based implementations

Achieve acquisition efficiency by –



leveraging commercial economies of scale

The open systems approach
is a tool,
not a silver bullet.

Introduction

Open Systems: Product & Approach

▶ **Succeeding with Open Systems**

Reprise: Open Systems Today

You are not the first

Programs that used elements of an open systems approach

Intelligence and Electronic Warfare Common Sensor (IEWCS)

Virginia Class Submarine (originally NSSN)

Multi-Sensor Torpedo Recognition and Alertment Processor (MSTRAP) System

Case studies for these exist and prove the advantages.

Other examples of use of the open systems approach

Joint Surveillance Target Attack Radar System (JSTARS) Common Ground Station (CGS) program

Navy Area Theater Ballistic Missile Defense (TBMD) (Block IVA) program

JSTARS

LPD 17

Joint Strike Fighter (F-35)

Remember the key changes

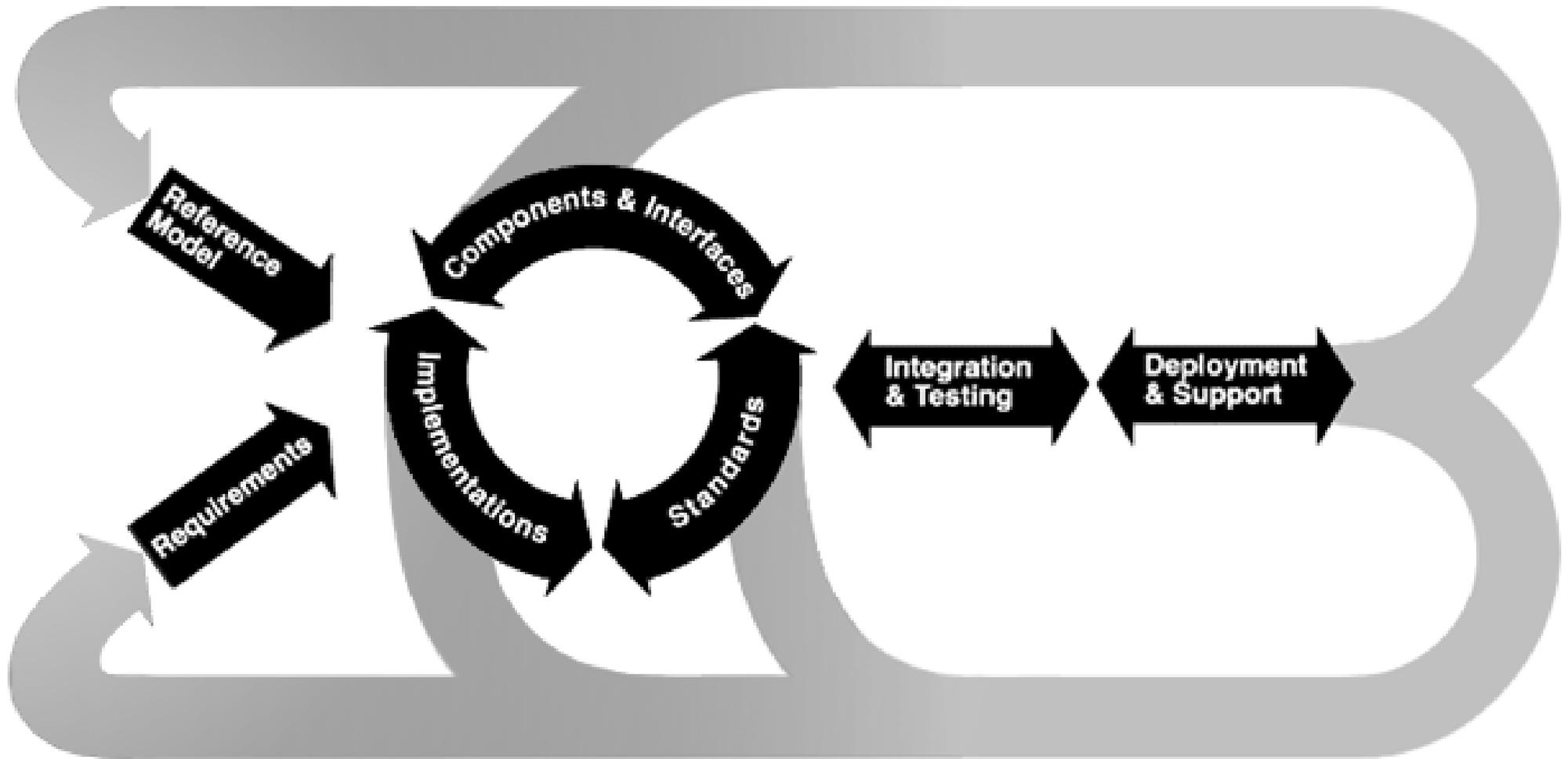
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Engineering view of an open systems approach



Some realities

Myths of open systems, hype and media embellishment.

Technological changes can cascade.

Kind and frequency of testing can change

Rate of change drives life-cycle costs.

Short half-life of technical and market info

Extensions to standards
can undermine openness.

Expectations of benefit without reasonable
investment and execution.



Some Keys

Plan your transition

- Assess the readiness of your staff, systems, and programs
- Plan for change

Focus on people

- Educate *everyone* involved

Plan the changes to your process

- Start a pilot project - start small and learn as you go
- Start a market research group

Communicate your systems vision

Build effective strategies

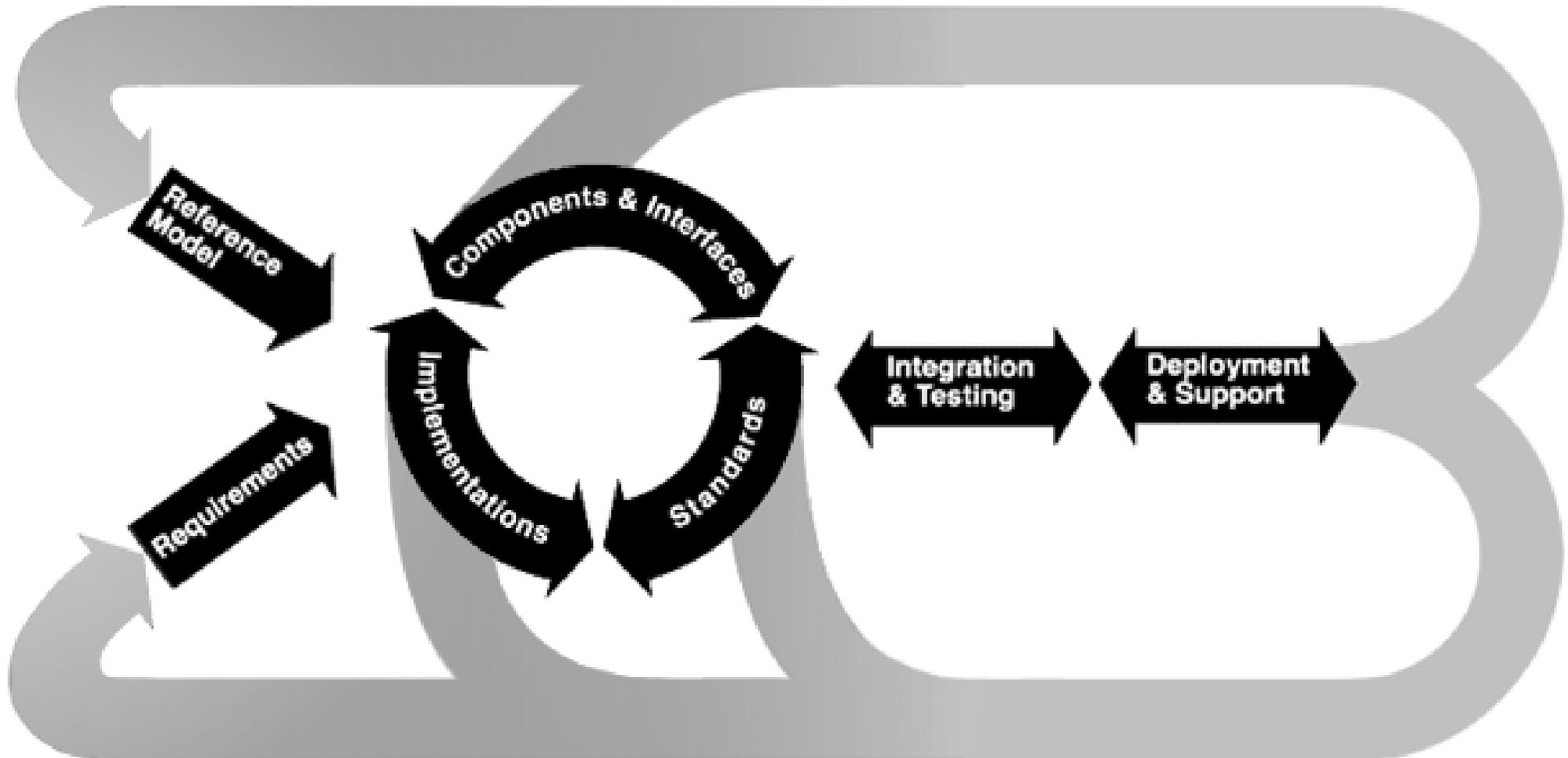
- Consider alternative strategies for contracting
- Chart the migration path to evolutionary systems

What should you be looking for?

So far we have talked about things for you to do.

How can you tell whether a program is really taking an open systems approach?

Use the engineering process for reviewing program plans



And require an implementation that is consistent with architecture and model

Make use of the MOSA PART

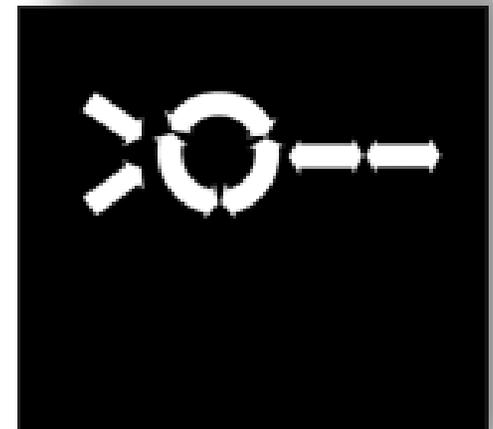
The Modular Open Systems Approach (MOSA) Program Assessment and Rating Tool (PART):

- intended for use by DoD Program Managers to assess their implementation of MOSA throughout the acquisition life-cycle
- an analytic tool to evaluate the degree that MOSA is implemented in a program
 - presented in terms of five key MOSA indicators:
 - Enabling Environment
 - Modular Design
 - Key Interfaces
 - Open Standards
 - Conformance

Focus on program system vision, architecture, interfaces, and standards

Look for evidence of

- reference models
- market research
- architectures, components, and interfaces
- preparation to select standards
- selection of standards
- liaisons for selected standards
- liaisons with other programs
- profiles of selected standards



Create sound open systems RFPs

SOW (Section C)

- open system implementation and migration plan
- market research
- escrow accounts
- IPPD

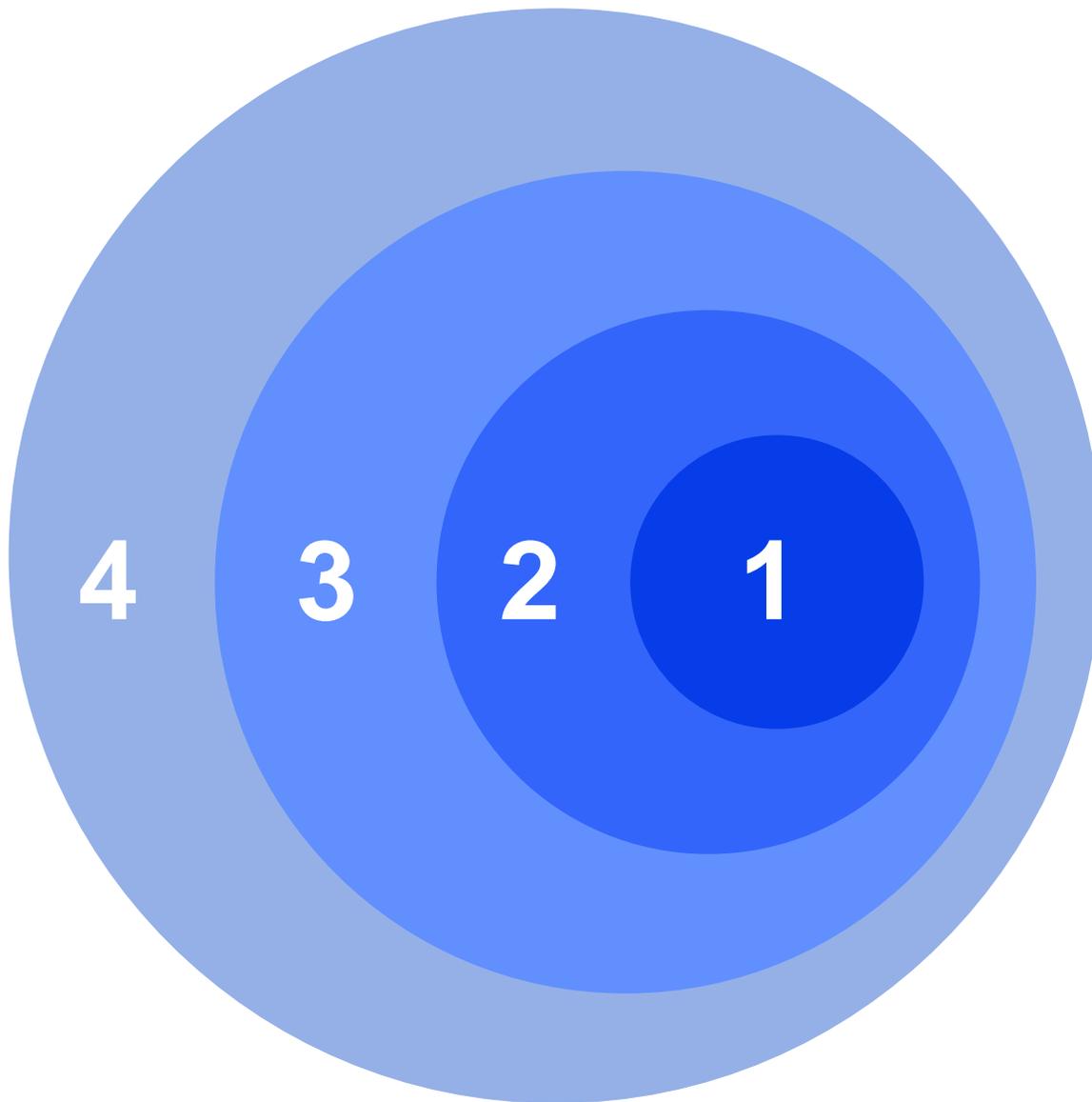
Instructions to offerors (Section L)

- evidence of open systems experience and understanding
- opinions on profile
- their definition of open systems

Evaluation factors (Section M)

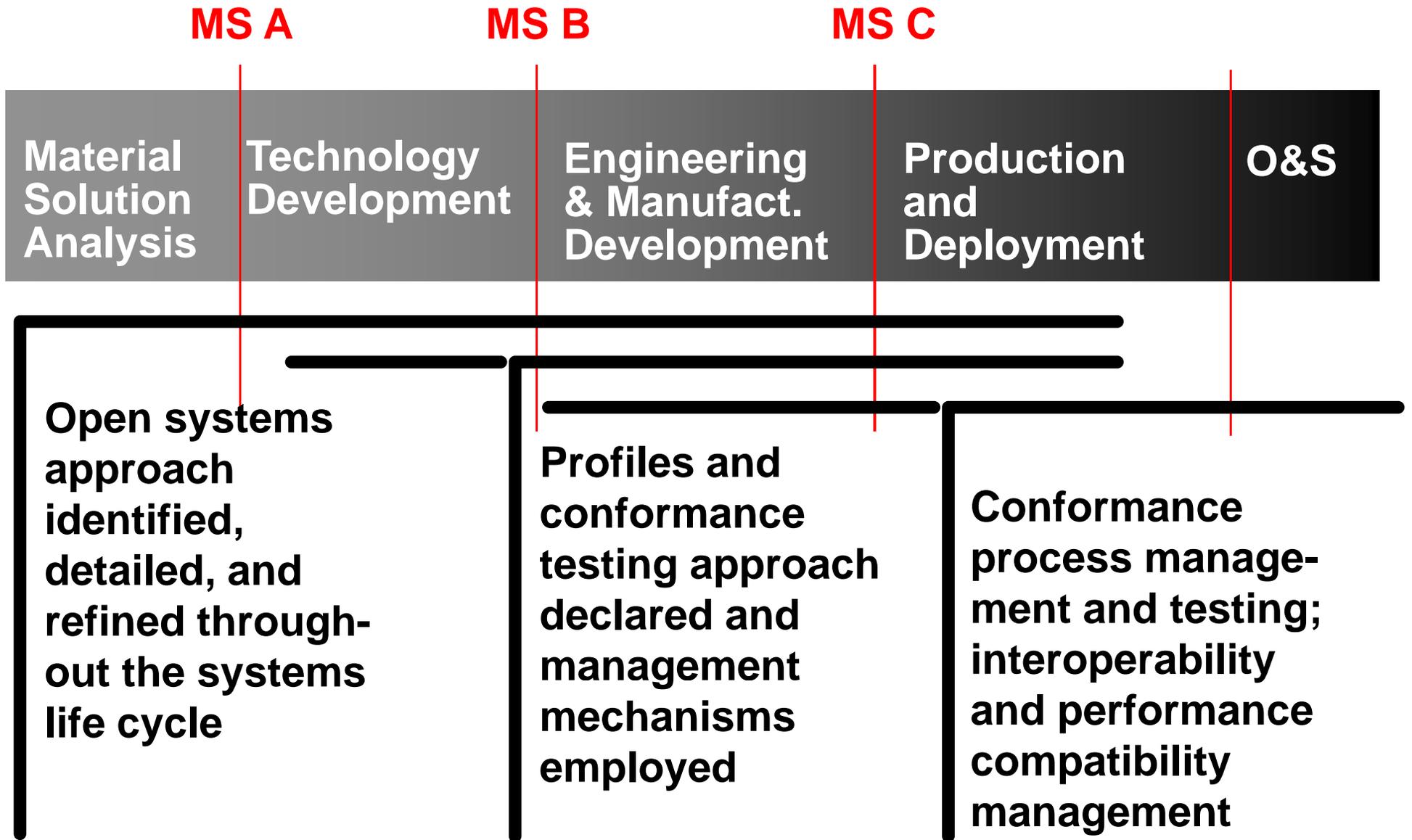
- open systems architecture
- life-cycle support strategy
- technology refreshment program
- adherence to an open systems approach
- opens systems management practices
- strength of market knowledge

Open systems testing



1. Conformance testing
measures compliance to standards
2. Interoperability testing
evaluates two or more interconnected product interfaces
3. Performance testing
measures interface performance
4. Integration testing tests integration

Open systems throughout the life cycle



Material adapted from material by Norman W. Kowalski of the Naval Undersea Warfare Center.

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Effects of Current Technology Trends

Current technology trends, e.g., SOA, cloud computing

- Open systems helps/supports these
- But OSA/interface standards alone cannot resolve issues such as security
- There are still a lot of immature and competing standards
 - Takes time to mature a usable set of standards in such new areas
 - And technology keeps moving – can pass standards by
 - Need some level of stability + vendors providing conformant products
 - Standards exist in a business environment – must balance stability and innovative advances
- Another implication: There could be an inability to consider a standard because the only implementations are from a potentially untrustworthy nation

What About Disruptive Technologies?

What makes something disruptive?

- It's new, so everyone wants it in play quickly
- So it will probably go against (some of) the standards you are using.

It may be a *necessity* to change to some new technology to counter some new threat – “the soldiers will just do it”

- An open, flexible overarching architecture will help, as opposed to stove-piped, stodgy, closed
- Also provides underlying stability on which new innovative things can build
- A disruptive technology is unlikely to unseat EVERYTHING you are using, at least not at first

Constant vigilance gives you the basis for informed decision-making, *based on your open systems architecture.*

For Additional Information

Patricia Oberndorf

Carol A. Sledge

Software Engineering Institute

Carnegie Mellon University

Pittsburgh, PA 15213-3890

Voice: 412 / 268-6138 (po)

412 / 268-7708 (cas)

FAX: 412 / 268-5758

Email: po@sei.cmu.edu

cas@sei.cmu.edu

www.sei.cmu.edu/

