

Introduction to NCOIC Net-Centric Patterns

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October 27, 2010

The NCOIC at a Glance

Members are Global Leaders:

Academic institutions

Air Traffic Management
providers

Service providers
Consulting
Engineering
Logistics

Defense suppliers
All military services
Multinational

Government agencies

Human service agencies

Integrators
Commercial systems
Defense systems

IT firms
Communications
Data management
Human-Machine interface
Information assurance

Standards bodies

A global organization focused on an industry neutral approach to NCO adoption:

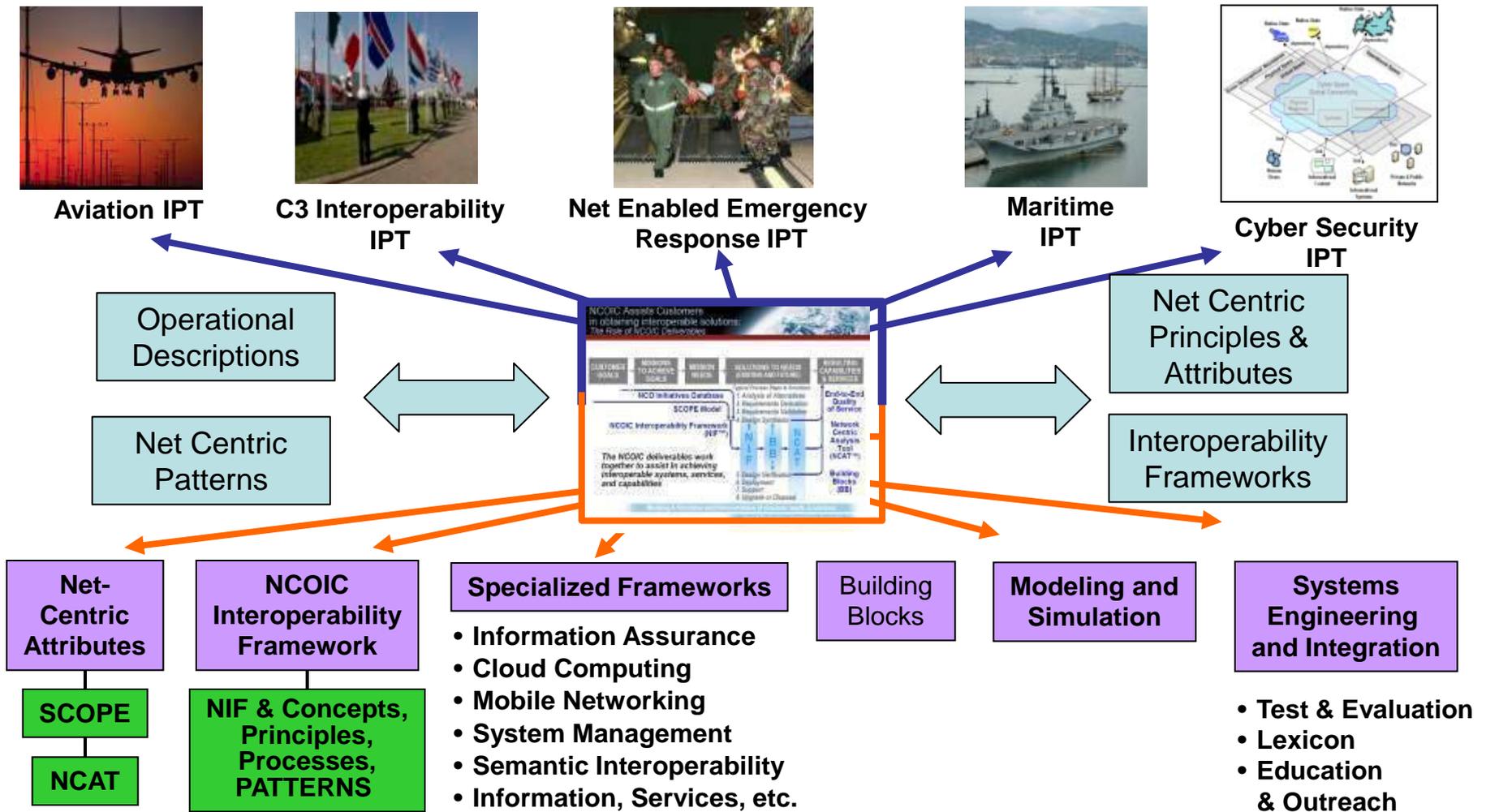
- Use of Open Standards in NCO domains
- Net-Centric Architecture Concepts and System Design Best Practices
- Tools for Evaluation and Assessment of Net-Centric Systems
- “Building Blocks” catalog of components & services compliant with NCOIC recommendations



**Prescriptive
Guidance On How To
Build Interoperable,
Network Centric
Systems**

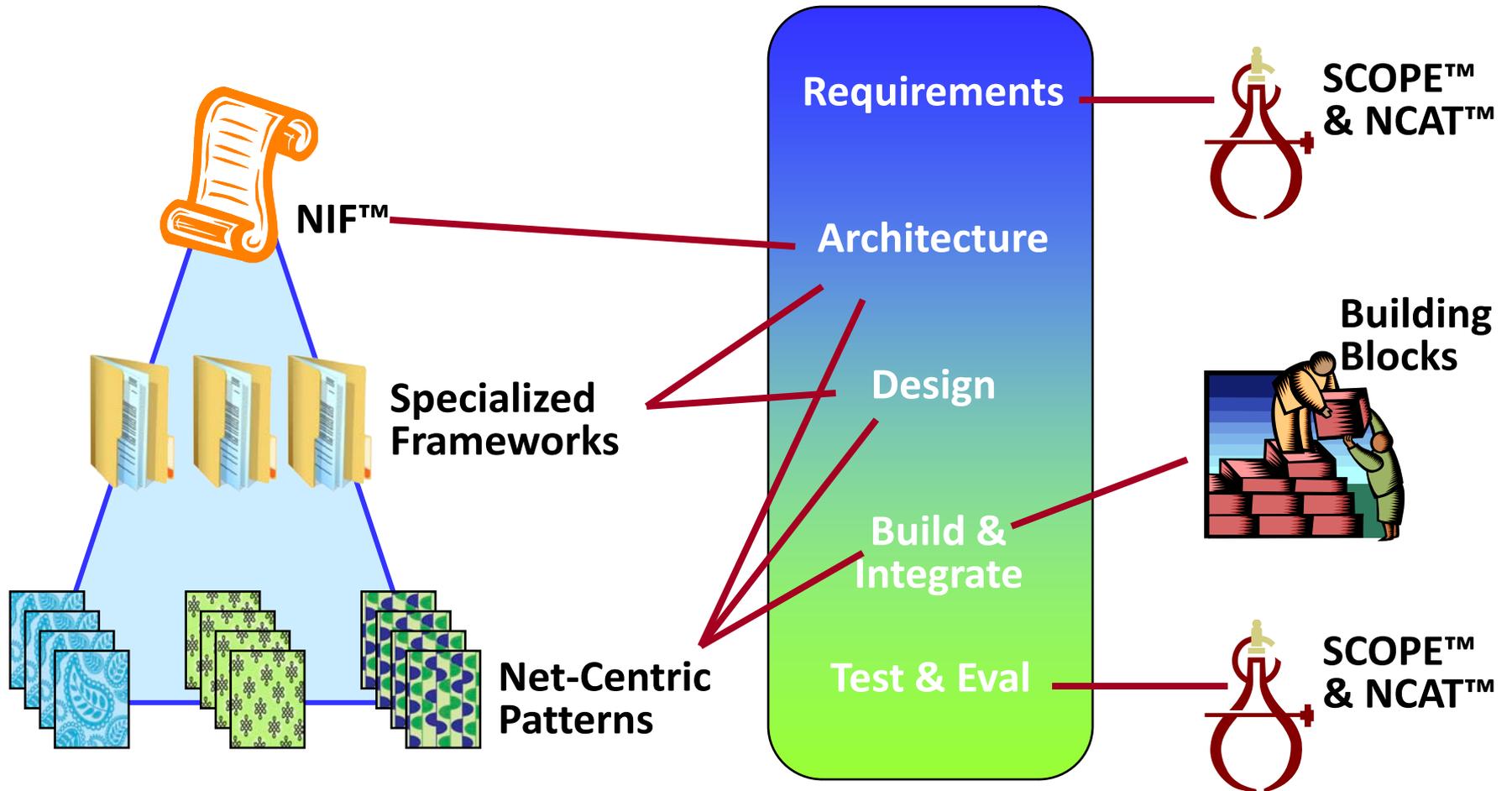
Unity of Effort

Different Domains, Similar Needs



Functional Teams provide the technical expertise to serve customer domains.
The Integrated Project Teams provide operational information from customer domain perspectives.

Where Net-Centric Patterns fit into the NCOIC



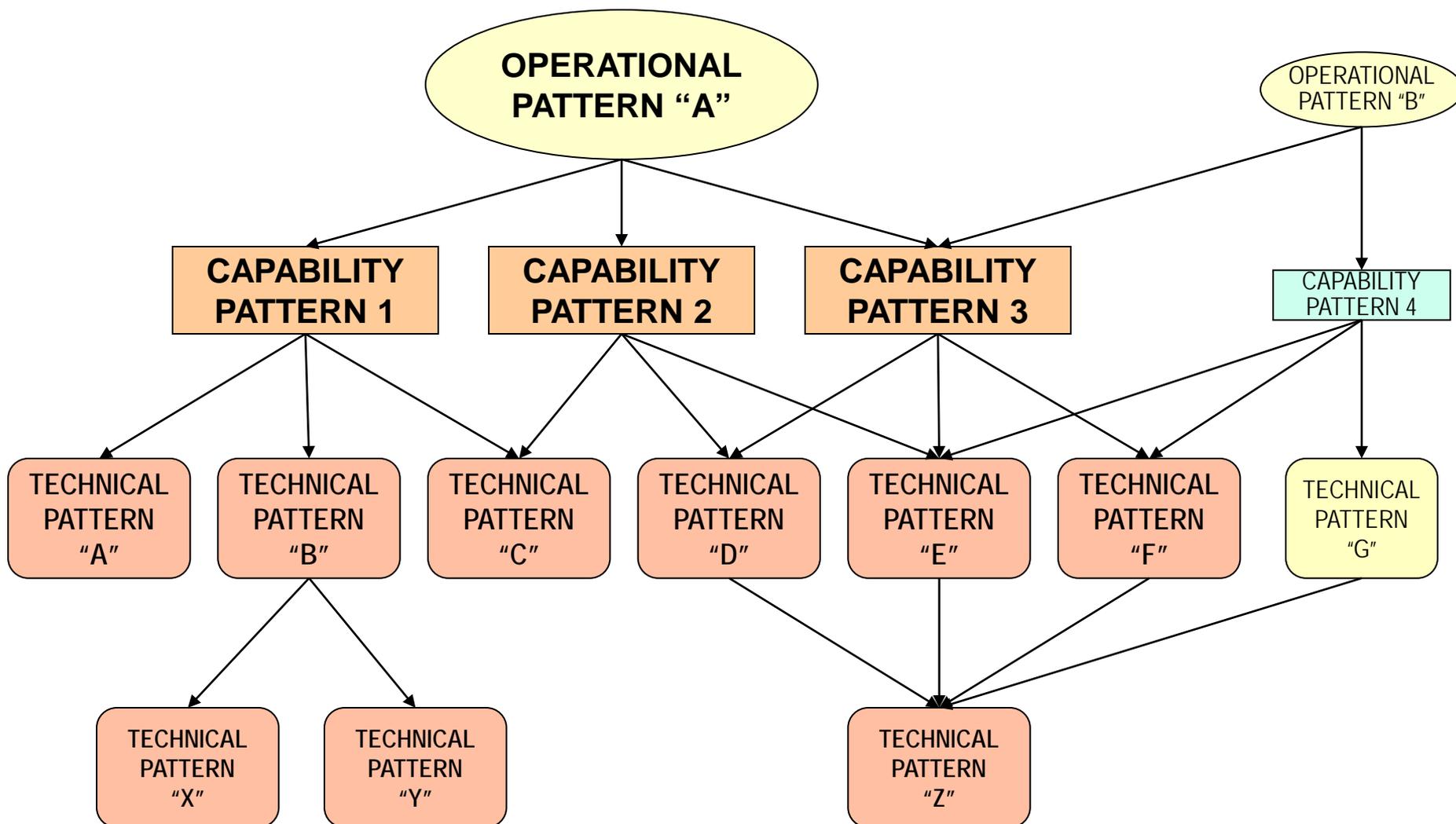
Why Patterns?



- **Standards alone do not guarantee interoperability... we also need guidance on architectural approaches, behaviors, design rules, design principles, etc**
- **Often the “best” Standard depends on the mission and performance requirements**
- **In a System-of-Systems, legacy systems cannot be forced to update to newest standard**
- **Does Everyone Understand the Standard the Same Way?**

NCOIC Net-Centric Patterns → A vehicle for prescriptive recommendations on which standards to use, how to use them, and other essential guidance

Three Types of Net-Centric Patterns



Typical use of NCOIC Resources



Activity	NCOIC Resource
Concept Development	<ul style="list-style-type: none">▪ Specialized Frameworks▪ Operational Patterns
Architecture Development	<ul style="list-style-type: none">▪ NCOIC Interoperability Framework▪ Specialized Frameworks▪ Capability Patterns▪ Network Centric Assessment Tool
System Design	<ul style="list-style-type: none">▪ Specialized Frameworks▪ Technical Patterns▪ Network Centric Assessment Tool▪ Building Block Catalog
System Assessments	<ul style="list-style-type: none">▪ Network Centric Assessment Tool

Net-Centric Pattern Contents

1. Introduction and Problem Description

1.1. Context

1.2. Problem Statement

1.3. Expected Benefits

2. Recommended Solution

2.1. Actors

2.3. Interfaces

2.2. Pre-Conditions

2.4. Structure

2.5. Behavior

2.6. Post-Conditions

2.7. Standards

3. Additional information

3.1. Lessons Learned

3.2. Constraints & Opportunities

3.3. Known Uses

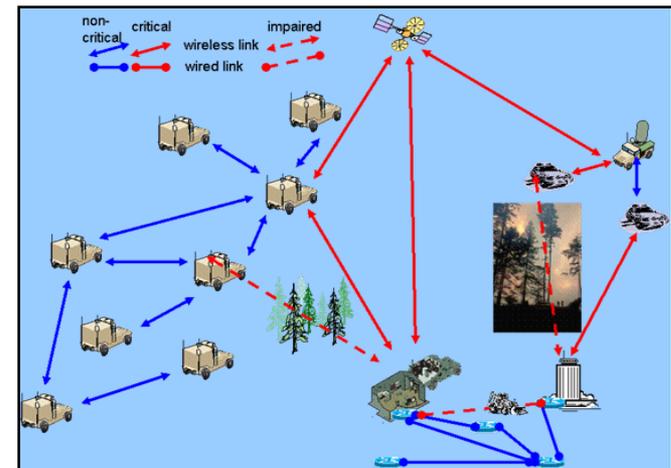
3.4. Potential Capability

3.5. Related Patterns

3.6. References

4. Verification

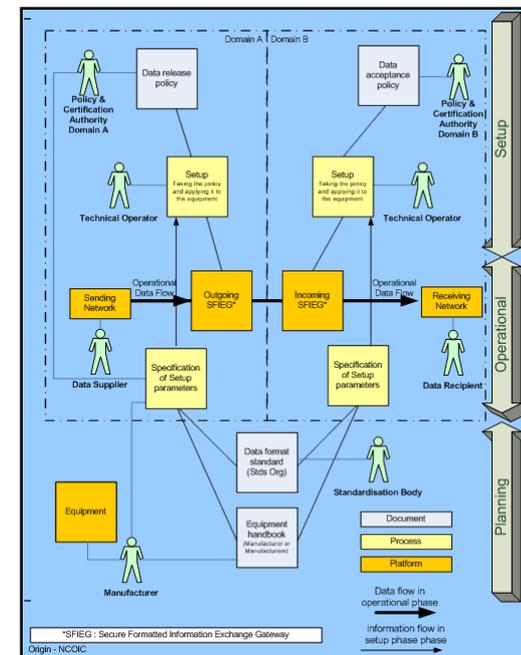
What is the problem being solved, and the context?



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Actors and interfaces involved in the NCP or otherwise required to implement it



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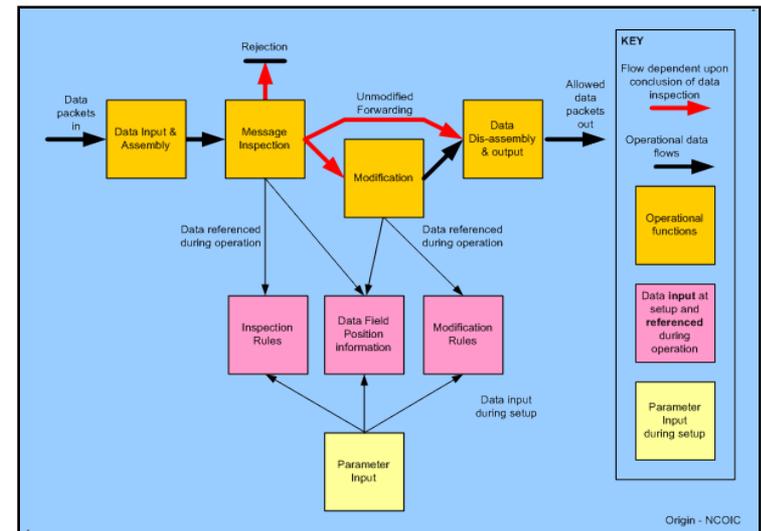
Pre-Conditions are prerequisites that must be in place before the pattern can be applied. If not met, the pattern cannot be successfully applied to the problem at hand.

Post-Conditions are the concrete results of applying the pattern. State what is the outcome of applying the pattern, including any limitations and/or consequences.

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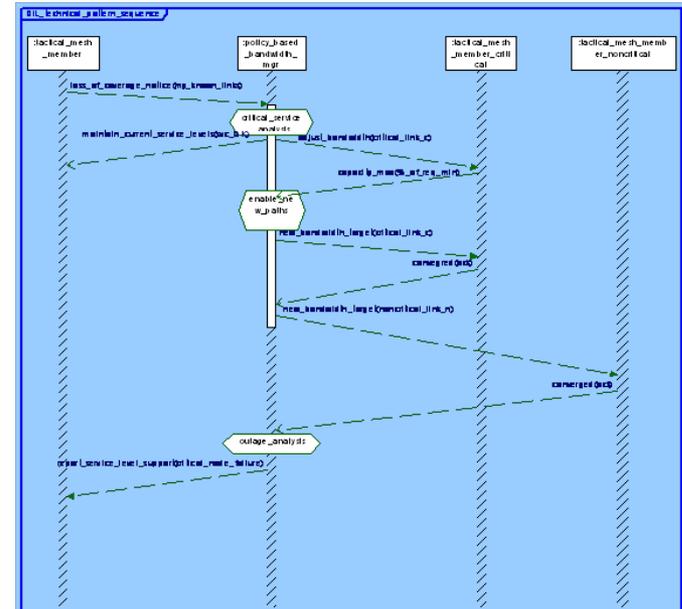
Graphical or textural description of any structure (architectures, etc) to be imposed on the solution



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Required behavior (dynamic interaction) of structure elements, actors, or interfaces. Includes “rules”, principles, algorithms, etc.



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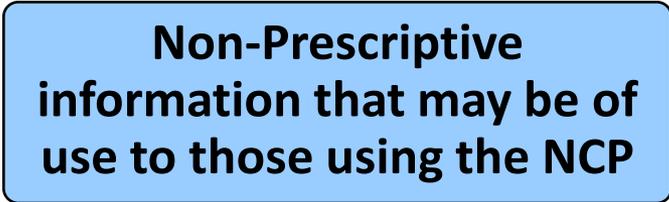
4. Verification

Standard	Name and Number	Purpose	Notes
OSPFv2	IETF RFC 2328 (STD:54)	link state advertising on DIL links	When using IP technology
OSPF Traffic Engineering	IETF RFC 3630 Traffic Engineering (TE) Extensions to OSPF Version 2	traffic engineering to utilize DIL links	When using IP technology
IEEE 802.1D	Spanning Tree Protocol	link layer weighting of DIL links	When using COTS bridges
DAMA (MIL-STD-188-181)	181C - Interoperability Standard For Access To 5-kHz And 25-kHz Uhf Satellite Communications Channels	DAMA	When using UHF satellite communications technology
DAMA Control (MIL-STD-188-185)	185 - Interoperability UHF Milsatcom Dama Control System	DAMA control of DIL SATCOM links	When using UHF satellite communications technology

Detailed identification of all Standards required for implementation of the NCP

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**Non-Prescriptive
information that may be of
use to those using the NCP**

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Table of detailed verification criteria for vendors wishing to certify that their product are compliant with the NCP

NCOIC Net-Centric Patterns



RELEASED

- **SAGM Mobile Communication and Networking**
- **Legacy Services**
- **Design Phase Service Integration**
- **Information Dissemination Shared Database**
- **Land Force Tracking Gateway Network Centric**
- **All Hazards Alerts and Warnings**
- **Disconnected, Intermittent, Limited (DIL) Communications Management**
- **Simple and Extensible Email Services (SEES)**
- **Secure Formatted Information Exchange Gateway (SFIEG)**
- **Core Network Access**

COMING SOON

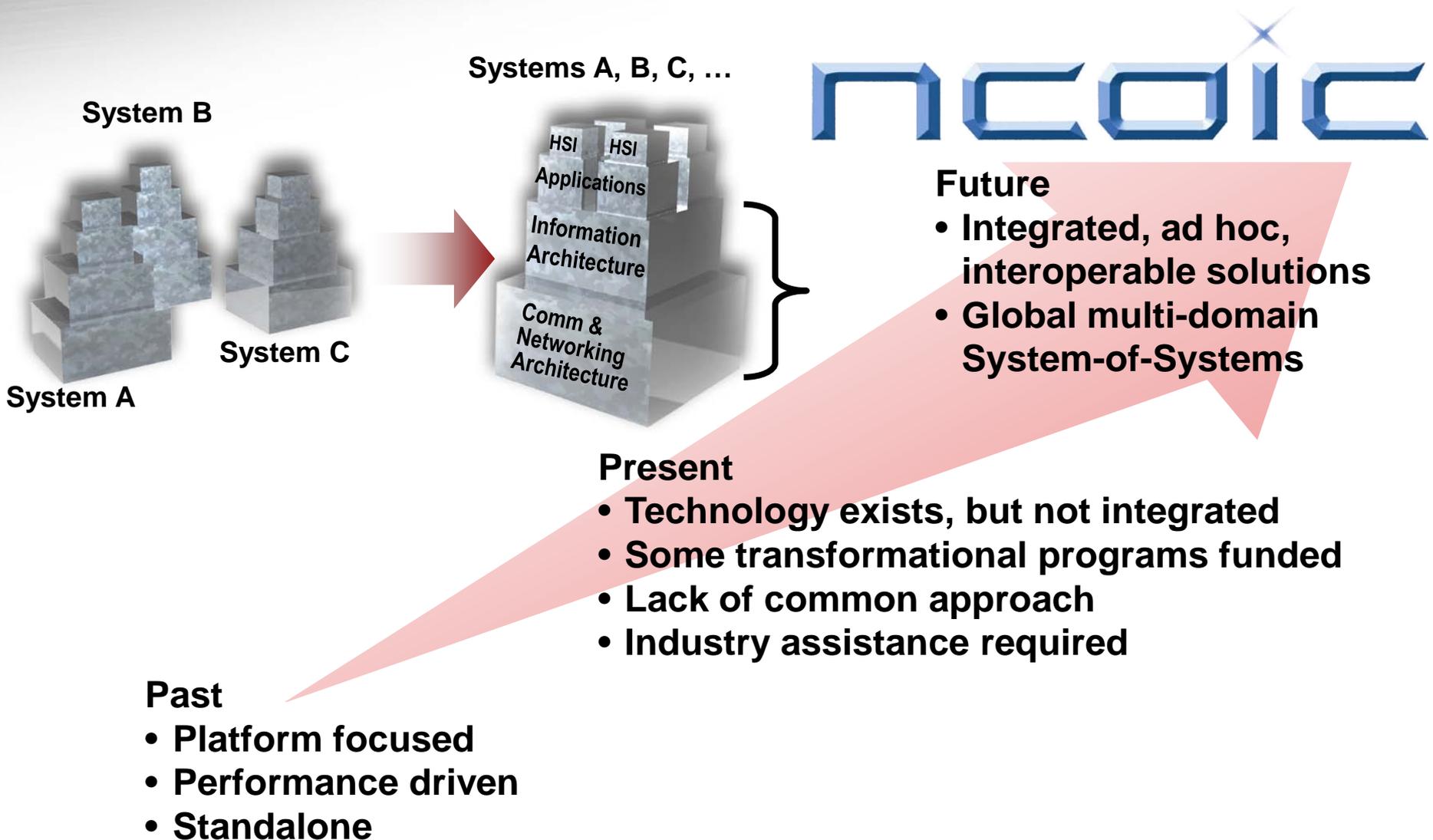
- **Flight Data Object Dissemination**
- **Live, Virtual, & Constructive Integrated Middleware Environment**
- **Net-Centric Cyber Simulation**
- **Access Network Discovery**
- **High Level Architecture (HLA)**
- **Distributed Interactive Simulation**
- **Services Interface Technical Pattern**
- **Resource Tracking Information Exchange**
- **More in work...**

Operational Patterns

Capability Patterns

Technical Patterns

Value for the Customer



For Additional Information...

www.ncoic.org

Or Contact:

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ncoic™
Network Centric Operations Industry Consortium

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13TH ANNUAL Systems Engineering Conference

Hyatt Regency Mission Bay
San Diego, CA
Event #1870
October 25-28, 2010

[See more member stories, news coverage and highlights of NCOIC™ work.](#)

Technical Deliverables

Interoperability Frameworks and Guidance

- NCOIC Interoperability Framework (NIF™)
- Net Centric Services Framework (NCSF)
- Mobile Networking (MNO and MNE)
- Baseline Approach for a Standards Management Framework

Netcentric Attributes, Measurement and Tools

- NetCentric Assessment Tool (NCAT™)
- Systems, Capabilities, Operations, Programs and Enterprises Model (SCOPE™)

Netcentric Patterns

- Operational
- Capability
- Technical

NCOIC in the News

NCOIC Elects Boeing, Lockheed Reps to Lead Technical Council
07 Jun 2010

NCO Consortium Selects New Leaders
26 Oct 2009

[See all NCOIC Press Releases »](#)

NCOIC To Unveil Improved Data Exchange Standards
28 Jun 2010

Net-Centric Pattern for Legacy Systems
01 Apr 2010

[See all NCOIC Media Coverage »](#)

Calendar & Events

Plenary Meeting Schedule

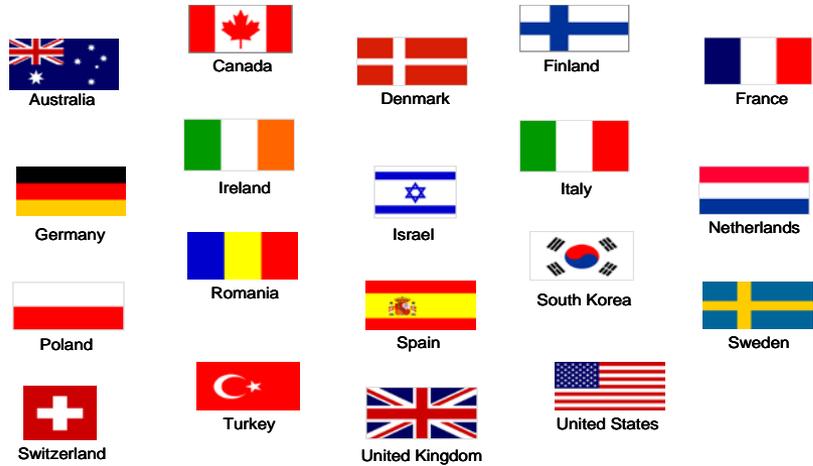
Quicklinks

- Technical Brochure
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BAE SYSTEMS

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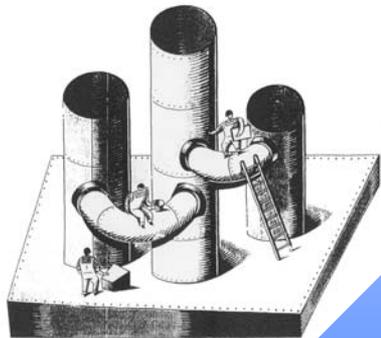
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**Net-Enabled
Future**

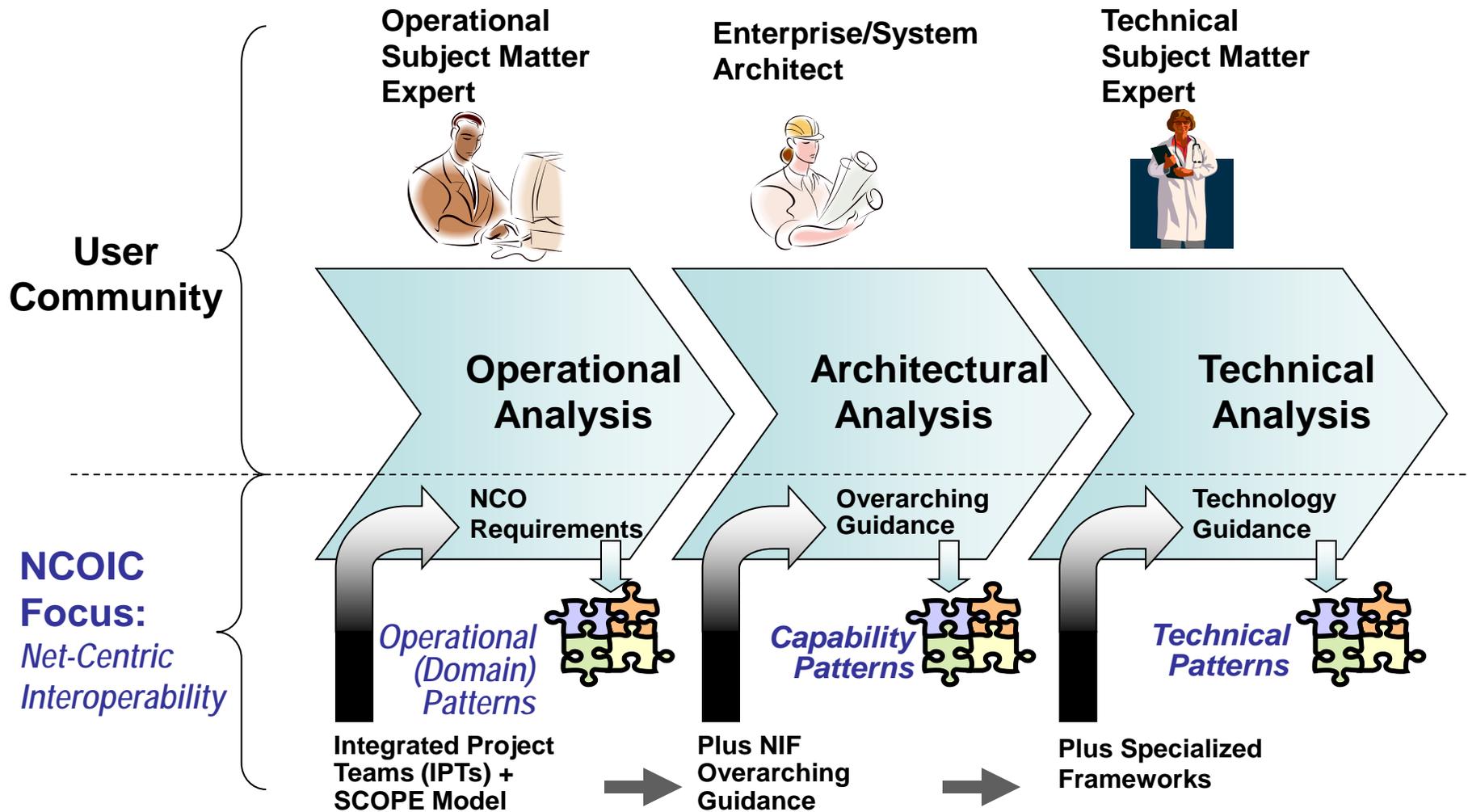


NET-CENTRIC

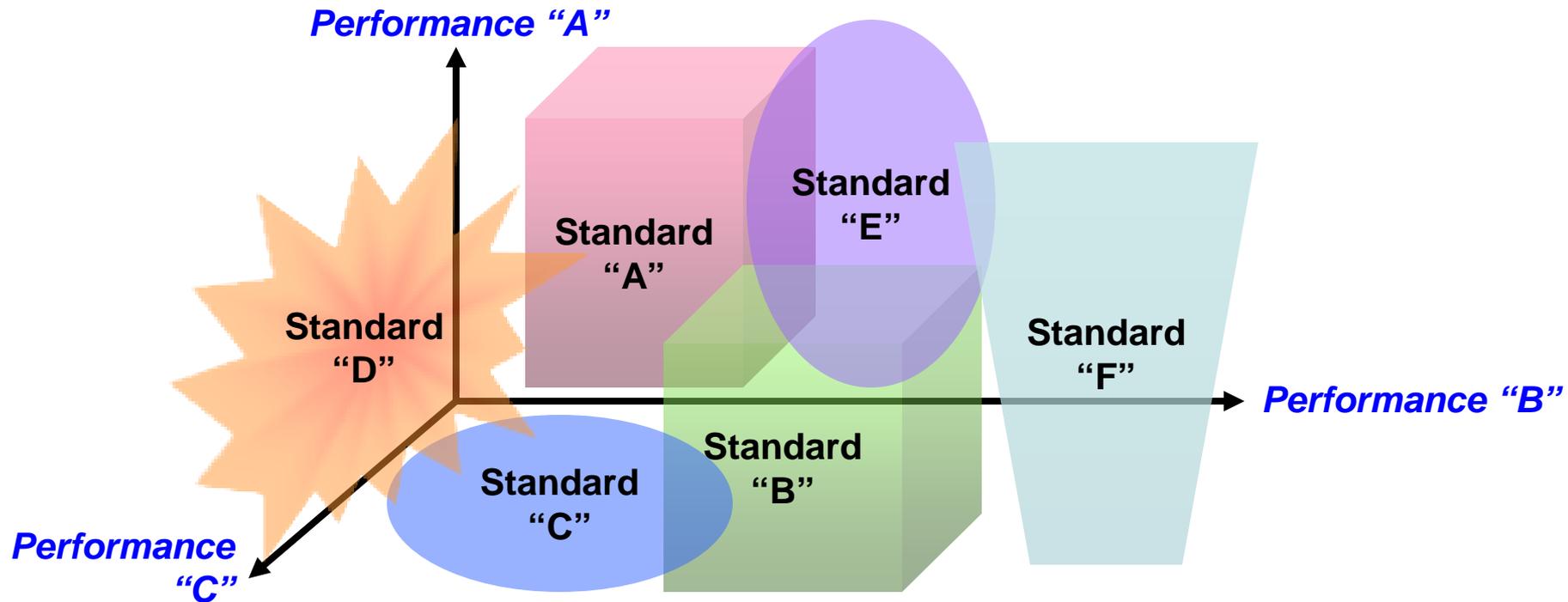


**TODAY:
Stovepiped
Systems,
Point-to-Point
Networks**

NCOIC Assists Customers in obtaining interoperable solutions: *NIF Guides Development of Net-Centric Systems*



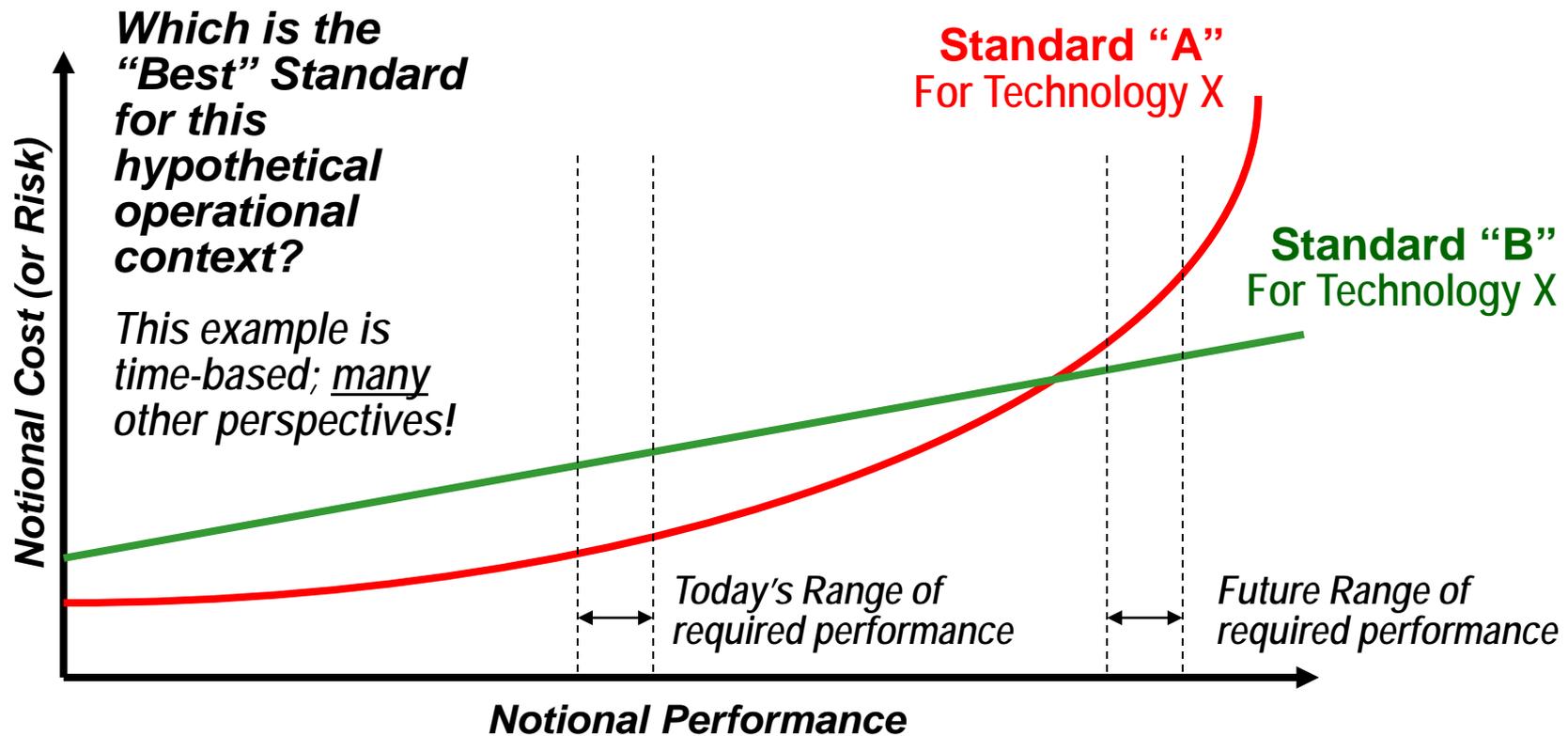
The Problem with Interoperability Standards



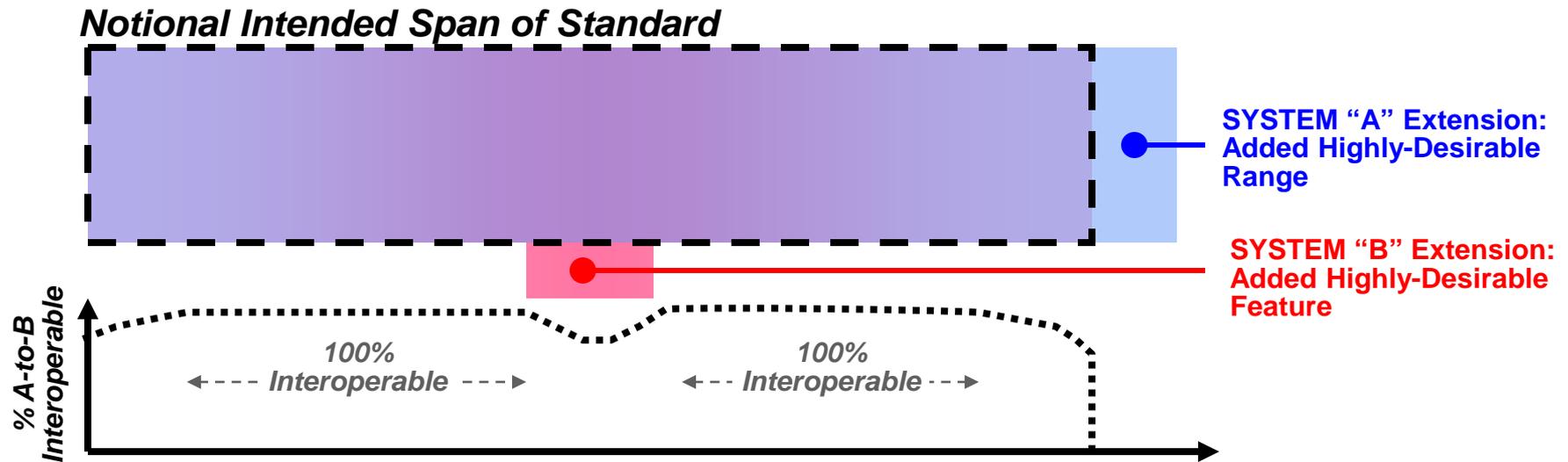
- Often the "BEST" Standard depends on the Mission
 - Real-World Condition! Often no *"One Size Fits All"*

The Problem with Interoperability Standards

- What is the appropriate level of NetCentricity for a given operational context? May impact selection of Standards!



The Problem with Interoperability Standards



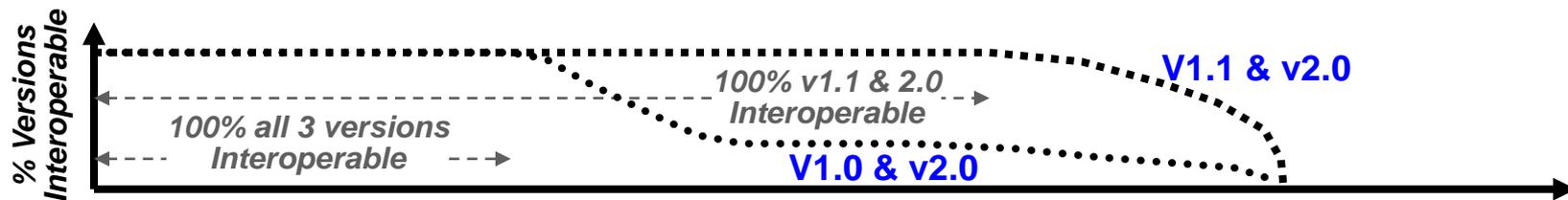
- "Bad" Standard, or "Bad" System Designs?
 - Real-World Condition!
 - In a System-of-Systems, cannot force systems to not use highly-desirable features when operating independently

The Problem with Interoperability Standards

ORIGINAL Standard v1.0

UPDATED Standard v1.1

NEW Standard v2.0: “Backward Compatible”



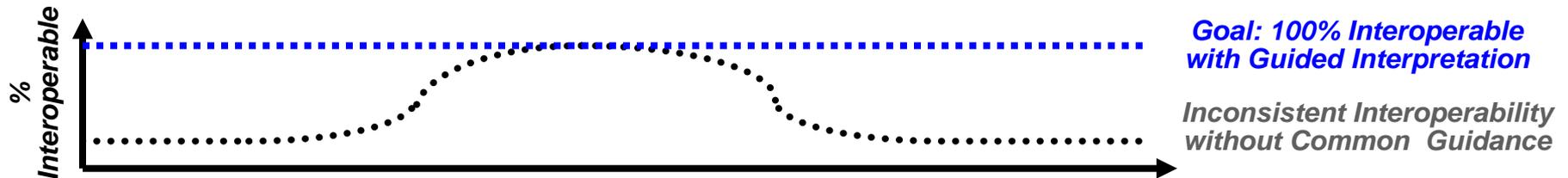
- Is Everyone Running the Same Version?
 - Real-World Condition!
 - In a System-of-Systems, cannot force Legacy systems to update to newest standard

The Problem with Interoperability Standards

Interpretation “A” of Standard

Interpretation “B” of Standard

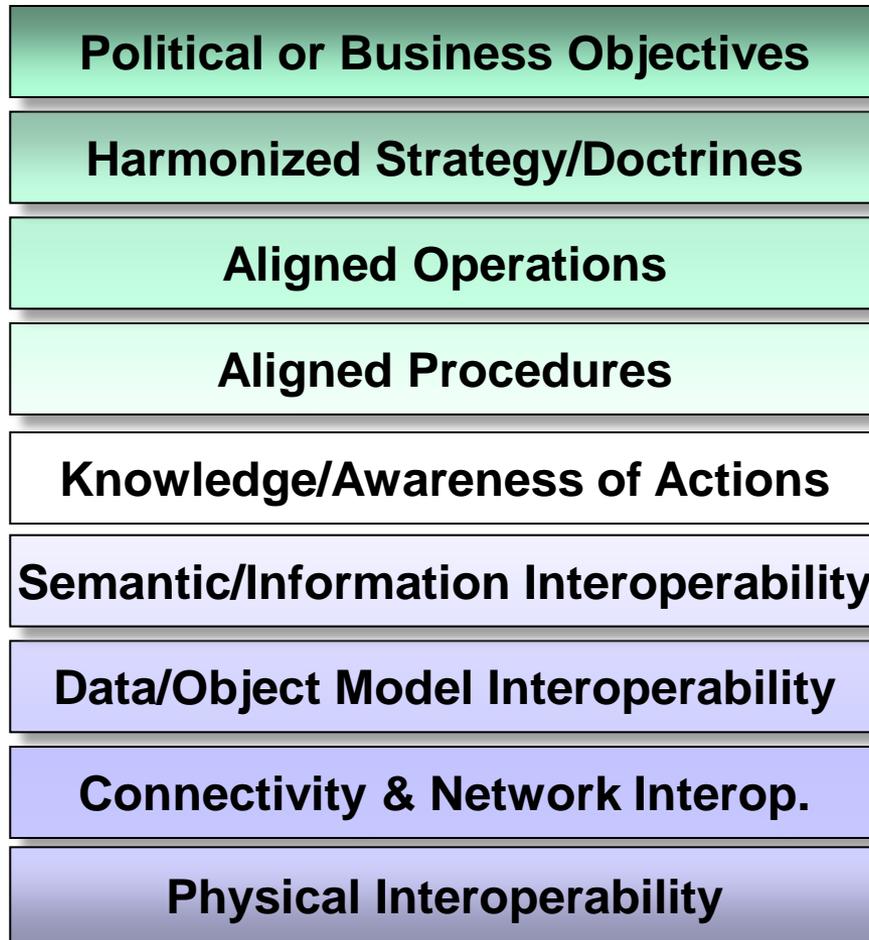
GUIDED Interpretation of Standard



- Does Everyone Understand the Standard the Same Way?
 - Real-World Condition! (Not necessarily a bad Standard)
 - Different Languages; different Cultural backgrounds
 - Same Standard applied in different Operational Domains, implemented by designers with different levels of experience, different technical disciplines, different company rules

The Problem with Interoperability Standards

Layers of Interoperability



- Standards are Interdependent!
 - Standards for a layer often dependent on standards for lower layers

Information Services

Network Transport

