

How to increase NATO capabilities interoperability, when dealing with the 'Unexpected'

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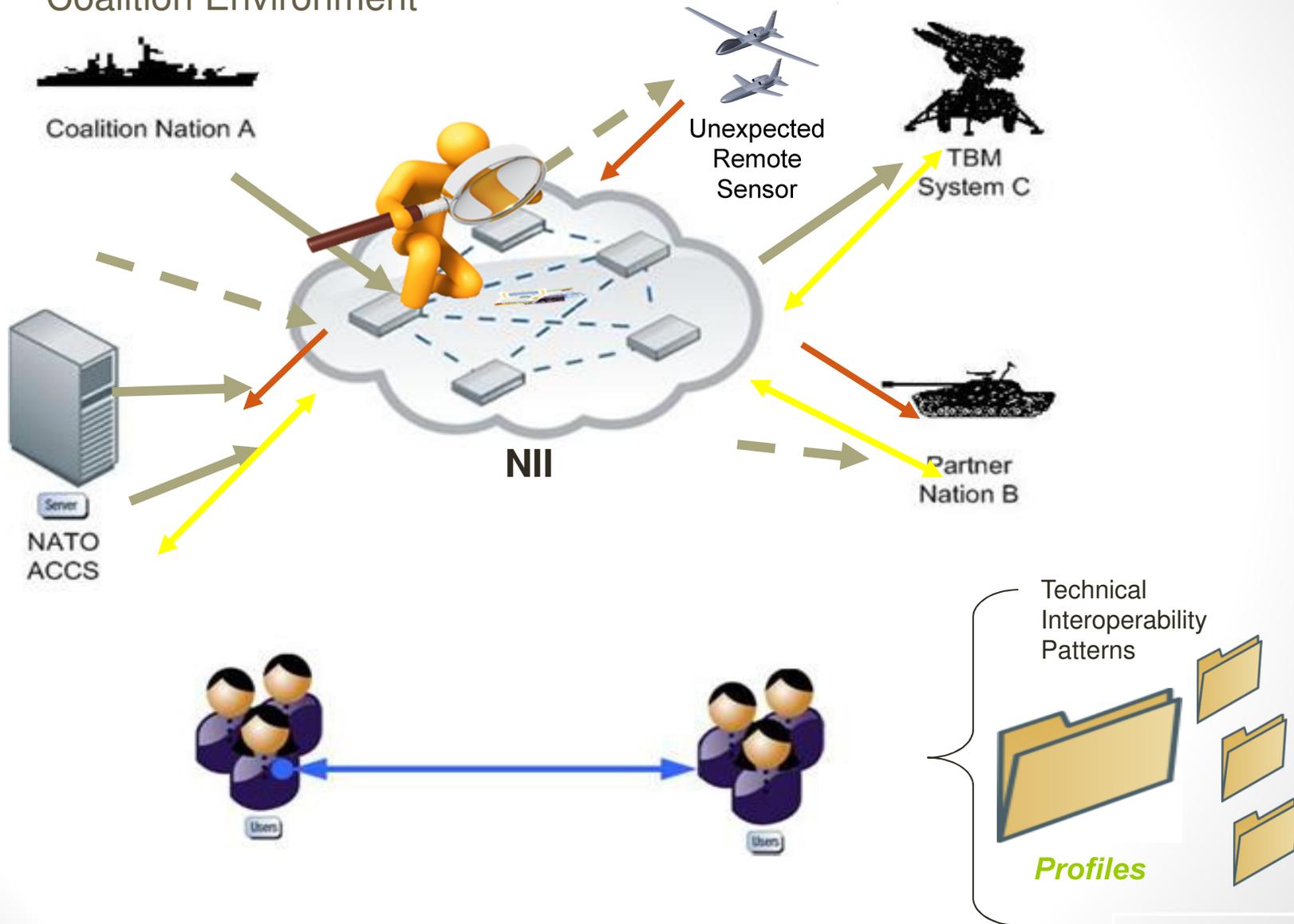
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 1. Findings
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Introduction: Interoperability Challenges with “Unexpected” in Coalition Environment



Introduction: Why ACCS is a good Case?

US
Canada
Luxembourg
Albania
Croatia

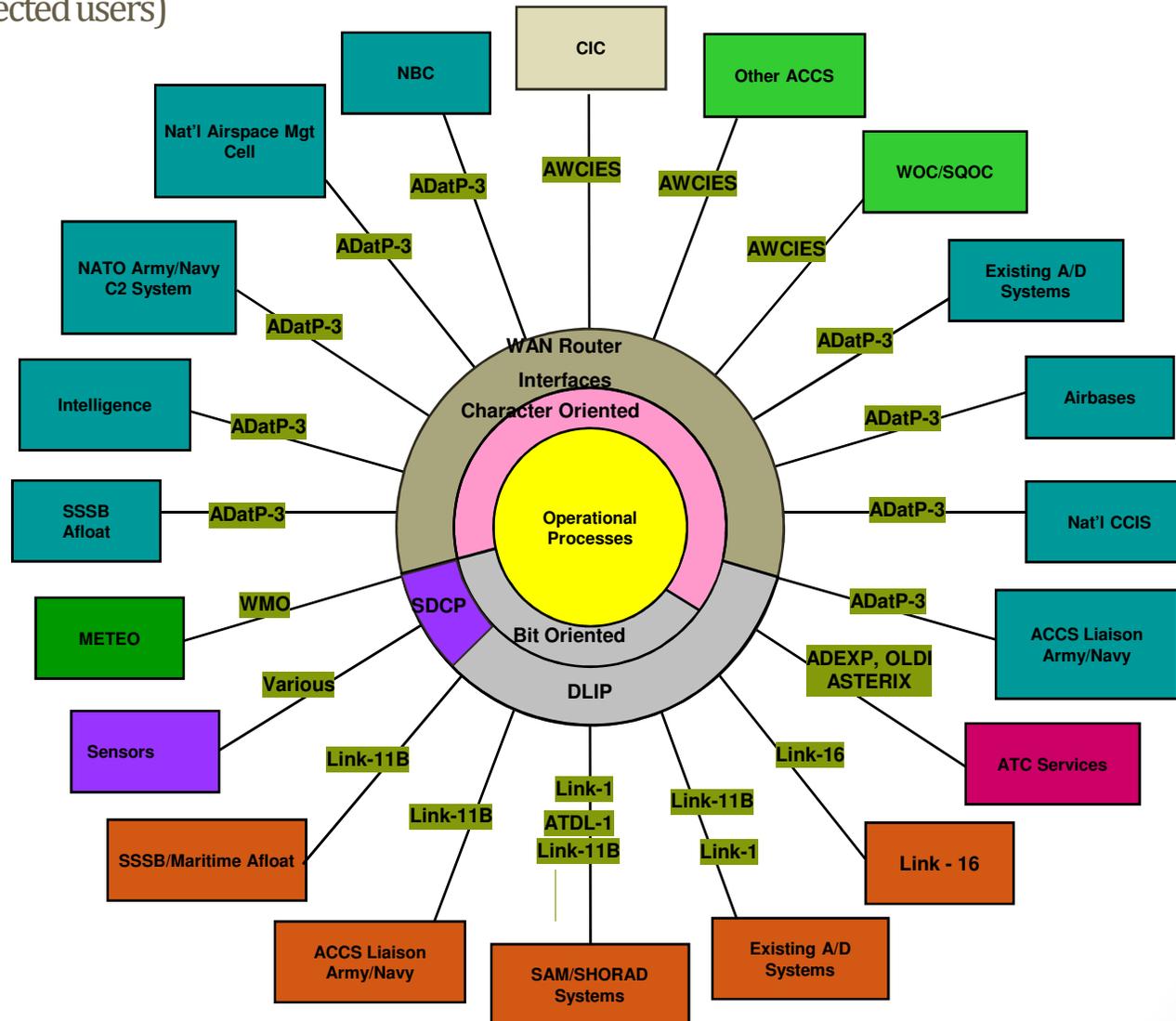
No "fixed" ARS
or CAOC



Core Validation
Replication NATO
Replication National

- ◆ ARS
- ◆ DARS
- CAOC
- DCAOC
- CARS
- ▲ STVF

AWCIES with 6500 Physical Interfaces Represents I/O Challenges Similar to other Coalition Capabilities (connect to unexpected users)

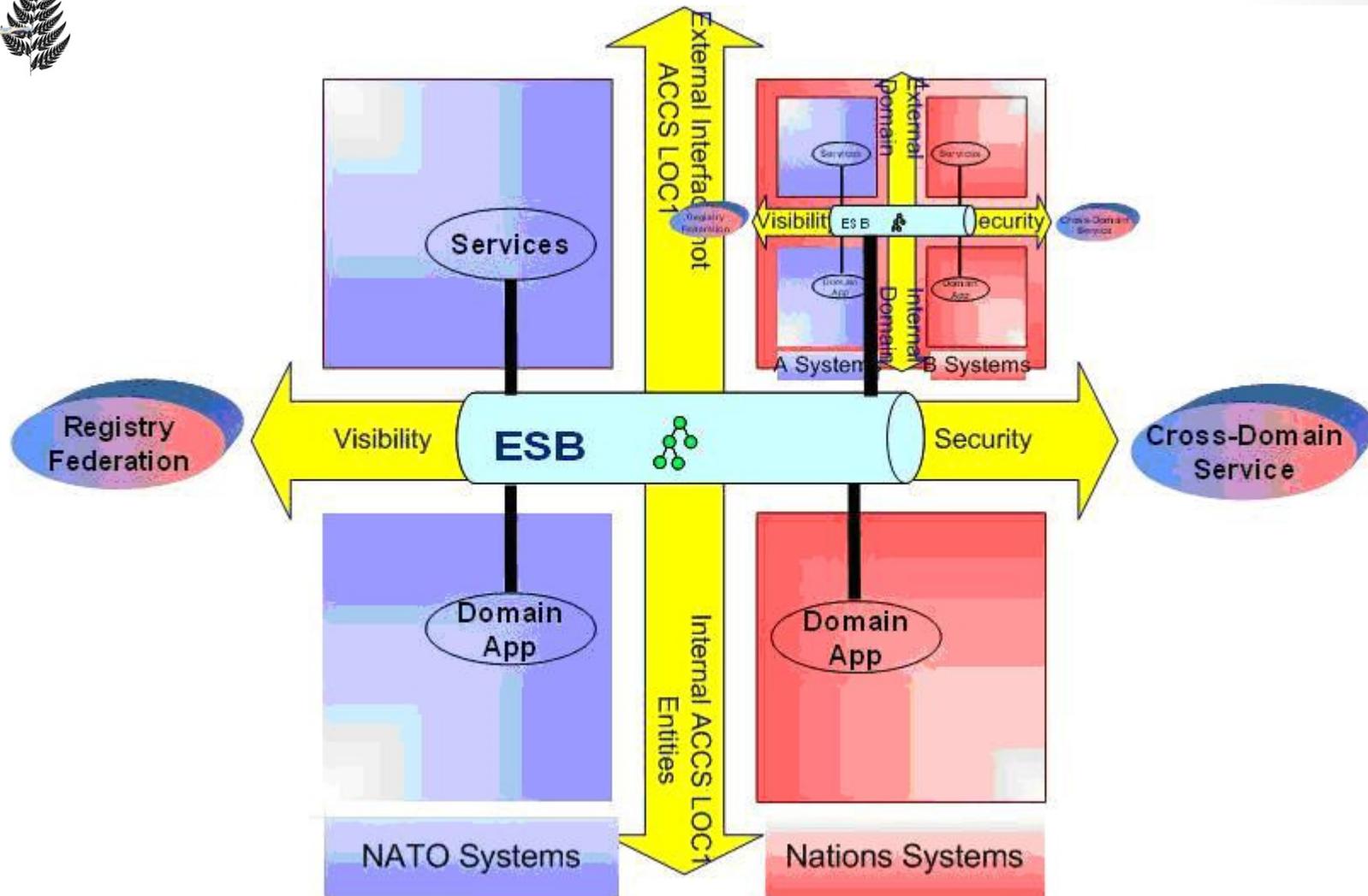




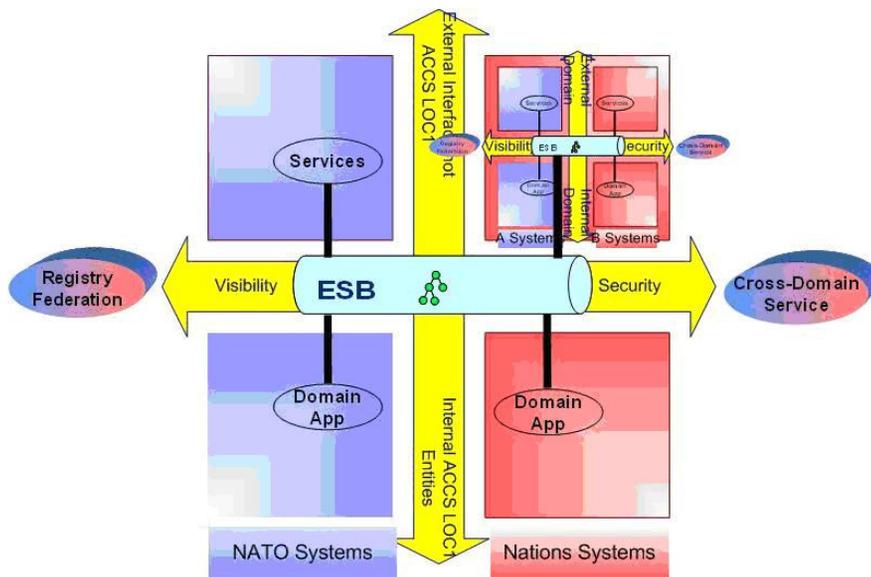
ESB Federation Strategy (Innovative Approach)

- The strategy is to **federate all vendor-independent ESB initiatives** and allow NATO and Nations' systems to flexibly share information
- The ESB federation could be **built incrementally** with systems being added or replaced in a **repeatable pattern**
- Topologically, the ESB federation can be seen as a complex network of systems, applications and services connected to nodes, which are the ESBs: The **Fractal Approach**

ESB Federation Coarse Grain Strategy: ACCS NNEC*

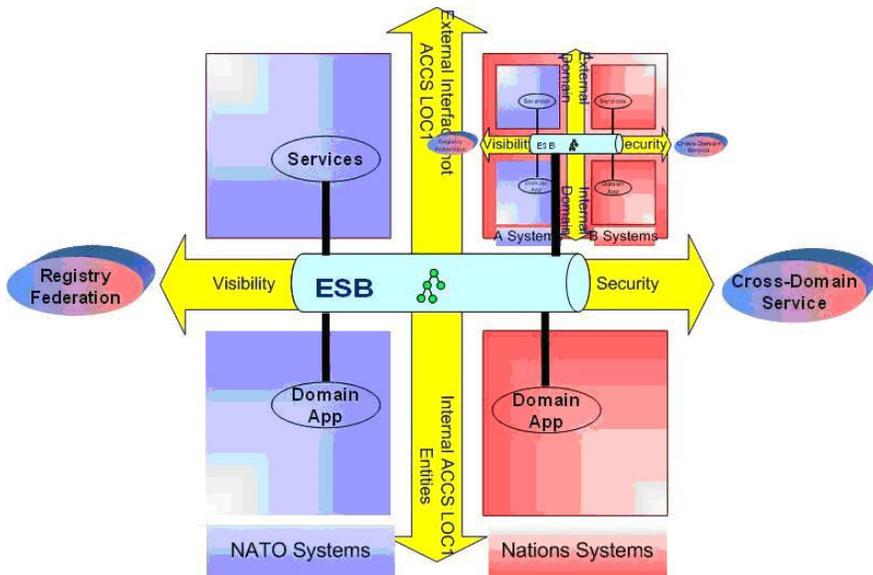


ESB Federation Strategy Based on Four Similarity Elements



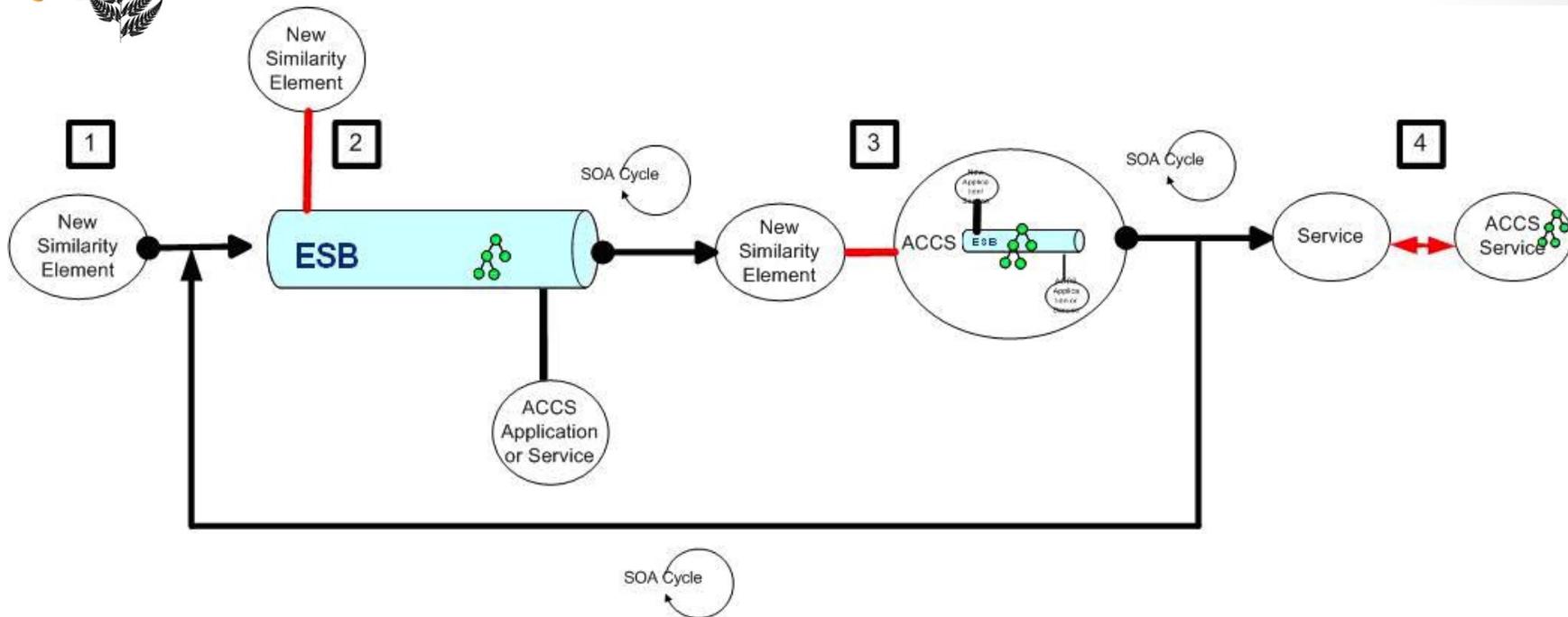
- 1) Visibility
- 2) Security / IA
- 3) Required Information
- 4) Other ESB connections

Five Environmental Parameters Generating Irregularity of Patterns



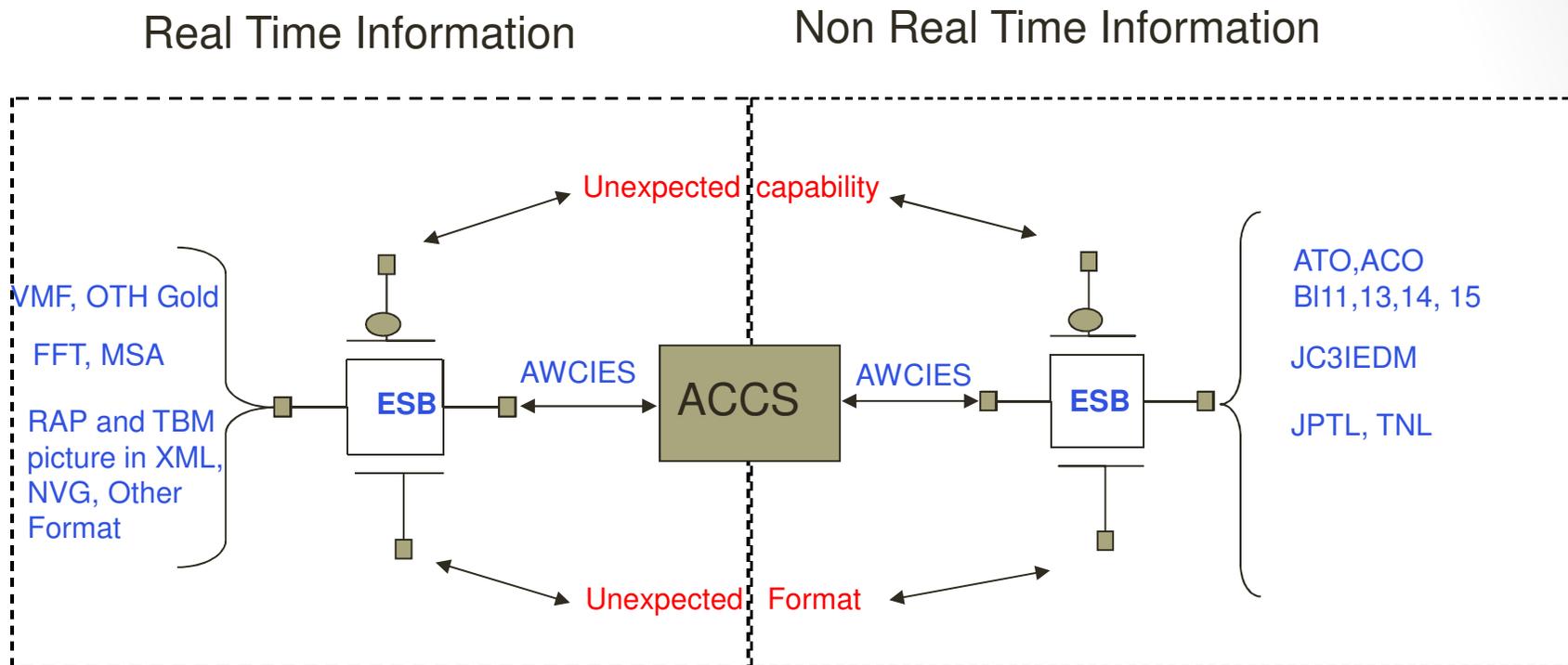
- 1) Operation type (i.e., relief, asymmetric,...)
- 2) NATO partnership (i.e. EU, UN, PfP,...)
- 3) Technology availability (i.e IPv6, Web,...)
- 4) Interoperability targets (i.e ambition, strategy, objectives, effects,...)
- 5) Time (i.e., operations duration, deployment timeframe, operation date,...)

ESB Federation Fine Grain Strategy: ACCS NNEC* Perspective



- The ESB federation strategy can also be adopted as an **agile transition** to a potential direct/better **future interface pattern**
- However the agile **ESB federation strategy will remain** extant until it is replaced by a better strategy **because of the instability of environmental parameters (the Unexpected)**

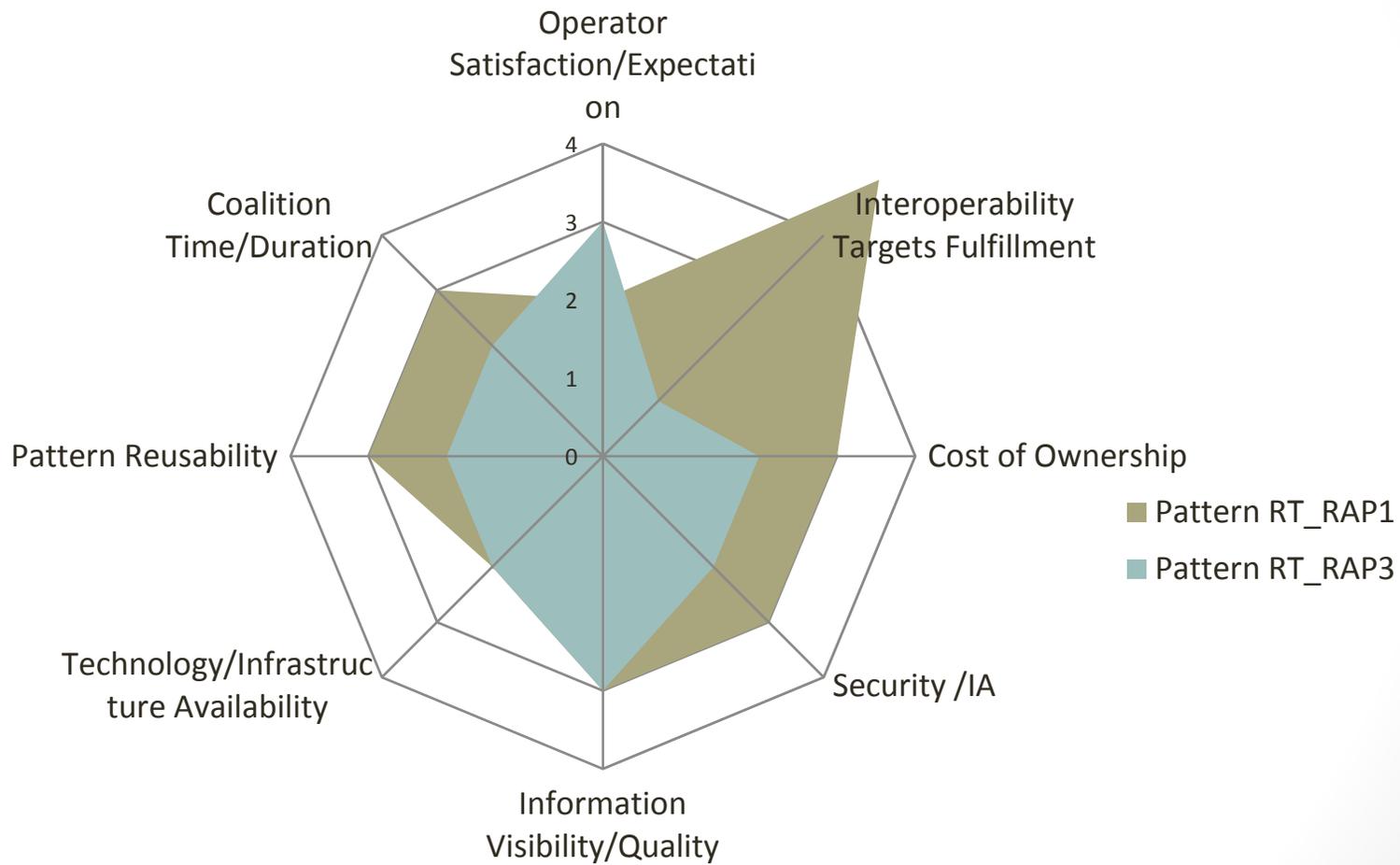
Findings: AWCIES readiness to “Unexpected Users”



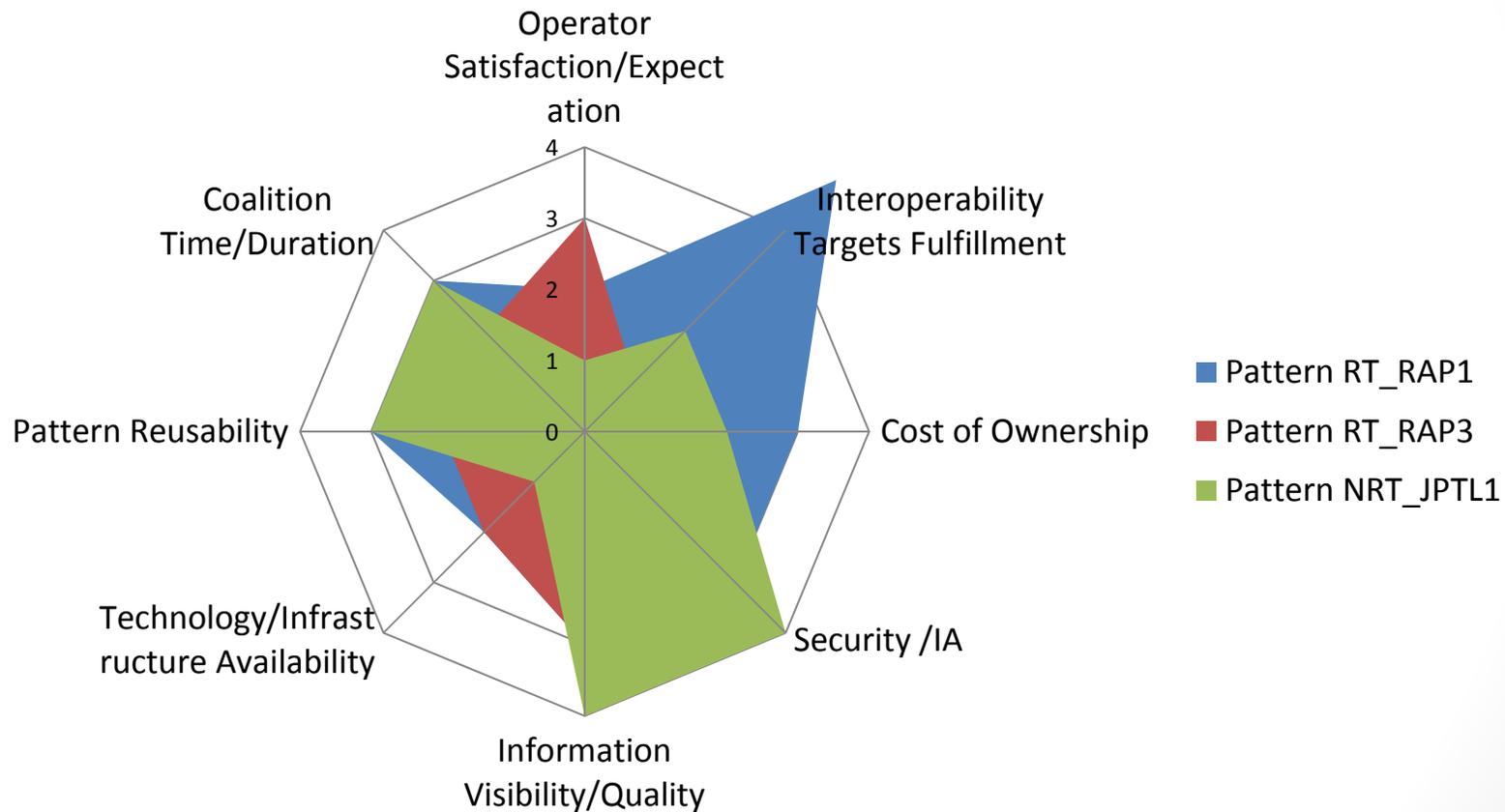
- Some future interfaces, standards and formats have been identified and assessed
- ESB federation patterns from ACCS perspective based on:
 - up to 4 different (vendor-independent) ESBs connected, environmental parameters and Likert scale multi-criteria decisions (based 8 KPIs and ROIs)
- Stakeholders involvement and governance needed

8 Key Performance Indicators (1/2)

to Measure Coalition Information Superiority Success



Key Performance Indicators (2/2)



Conclusions

- Technical **Interoperability with the unexpected** is still a **challenge**
- While not a panacea, **ESB Federation Strategy** is an **innovative approach** to enable information sharing with unexpected capabilities
- Findings implemented in current and future capabilities
- NATO led coalitions C2 can **easily implement ESB Federation Strategy**
- ESB Federation Strategy will **save cost and time** when connecting NATO forces in coalition
- KPIs provide **decisive indications to a commander** (like hotel stars for travelers)
- Still **changes and proactive actions need to be taken** to support NATO transformation and challenges (stakeholders involvement, security, governance)

BACK UP

Proof of Concept Conditions

PoC Figures	Description
Fighter Simulator	2 (TRS, IABG)
FFT Provider	3 (Imp@ct KFOR, BFTS-NO ISAF, BFTS NC3A)
FFT Format	NFFI 2.0, NFFI 1.3
Transport protocol	IP1 (TCP/IP Socket), IP3 (Web Service PUB/SUBS)
Operational Scenarios	TST, CAS
ACCS Display	DISPMX (ACCSLOC1), LUCY (ACCS Exp)
FFT Refreshment Rate	3 Min, 1Min, 10 Sec
L16 Network	SIMPLE
Fighter Location	Remote (IABG) On Site (TRS)

- Quick-Win: NNEC-2 Software Development achieved within 7 weeks.
- No change in ACCS LOC1 designed architecture
- Minor modifications in ACCS LOC 1 existing functionalities

Qualitative Results

Interoperability Targets Fulfillment Item	Status	Comment
Fighter Simulator: 1. TRS 2. IABG (EuroFighter)	1. Success 2. Limited Success	1. No comment 2. IABG was able to play only during last CWID week
FFT provider: 1. Imp@ct KFOR: 2. BFTS-NO: 3. BFTS NC3A:	1. Success 2. Success 3. Success	No Comment
FFT format: NFFI 2.0, NFFI 1.3	Success	No Comment
Transport protocol: IP1, IP3	Success	No Comment
Operational Scenarios: 1. TST 2. CAS	Success	No Comment
ACCS Display: 1. DISPMX (ACCS LOC1) 2. LUCY (ACCS Exp)	1. Success 2. Success	1. DISPMX resolution to be improved 2. No comment
FFT refreshment rate: 1. 3 Min 2. 1Min 3. 10 Sec	Success NATO UNCLASSIFIED	Optimal rate on the log files See final report