INTERNATIONAL DATA LINKS SOCIETY
AUSTRALIA/NEW ZEALAND CHAPTER

Simplifying critica

ADF TACTICAL DATA LINK AUTHORITY

Which Interoperability Standards to Use – And When

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IDLS AS/NZ TDL Interoperability Summit – Mon 12 Nov 18

ABCANZ
American, British, Canadian, Australian and New Zealand Armies' Program
FVEY LEAD FOR LAND FORCE INTEROPERABILITY

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SUF 2018: What Interoperability Standards to Use and When

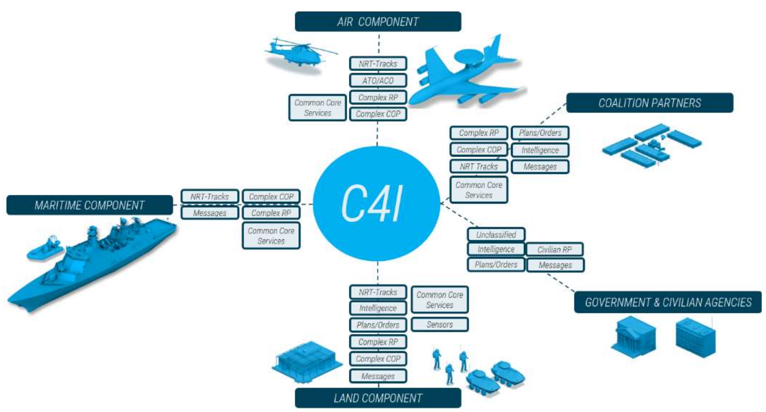
Simplifying critical decision making

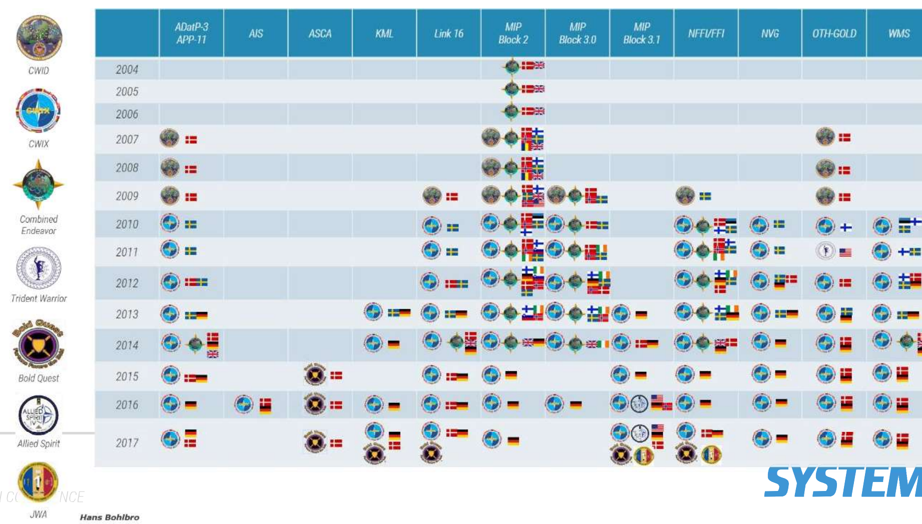
This presentation is a result of a customer-requested breakout session during the 2018 SitaWare User Forum and is designed to help you consider which interoperability standard(s) to use – and when.

Category	Name	Complexity	Near-RT Tracks	Complex RP/COP	2525 Symbols	2525 Graphics	Messages
SitaWare	SHC	★★	●	●	●	●	
	STC	★	●		●	●	●
Two-Way	ADATP-3 / APP11	★★		●			●
	LINK 11	★★	●				
	LINK 16	★★	●				
	MIP	★★★		●	●	●	
	NFFI / FFI	★	●		●		
	NVG	★		●		(●)	
	OTH-GOLD	★★	●	(●)	(●)		●
	VMF	★★★	●	●	●	●	●
One-Way	WAIS	★	●				
	AIS	★	●				
	ADS-B	★	●				
	ASTERIX CAT 048	★	●				
	WMS	★		●	(●)	(●)	
	KML	★★		●	(●)	(●)	

Legend: Primary option (green) Alternative option (blue)

	SHC SITAWARE	STC SITAWARE	ADatP-3 APP-11	ADS-B ASTERIX	AIS	KML	Link 16 STANAG 5516	MIP STANAG 5525	NFFI/FFI STANAG 5527	NVG	OTH-G	VMF STANAG 5519	PDF	WMS OGC	XMPP
RAP	Out	Out		In			In/Out	Out	Out						
RCP	In/Out	In/Out	In/Out			Out		In/Out							
REP						In								In	
REngP	In/Out							In/Out						In	
RGP	In/Out	In/Out	In/Out			Out	Out	In/Out	In/Out	In/Out	Out	In			
RIP	In/Out	In/Out	In/Out			Out		In/Out		In/Out		In			
RLP	In/Out	In/Out	In/Out			Out		In/Out		In/Out	Out				
RMP	Out	Out	In/Out		In	Out		Out		Out	In/Out				
RMedP	In/Out	In/Out	In/Out			Out		In/Out		In/Out	Out				
(J)COP	In/Out		In/Out			Out		In/Out		In/Out					
P&Os	In/Out	Out	In					In/Out		In/Out			In/Out		
Chat		In/Out													In/Out





Hans Bohlbro

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Presentation Abstract

- *Military interoperability for Command and Control (C2) systems is supported by a multitude of international standards and standardised systems; with TDL being an exemplary example of such standardised systems.*
- *This presentation will take a closer look at the interoperability standards from an information exchange viewpoint and how they may best be applied to exchange C2 information in Joint, as well as Inter-Agency and Multi-National/Coalition, domains.*

Background

THE INTRICATE WORLD OF JOINT C2 INTEROPERABILITY

- *The ability to communicate and coordinate with allied partners is essential to modern-day combined and Joint operations. However, since most nations use individual communications hardware and standards, the challenge to ensure interoperability between several partners can quickly seem overwhelmingly complex.*
- *We encourage you to provide feedback on this presentation and the associated customer handbook, and to tell us about your own challenges with interoperability, so that we can take this into consideration in future editions.*
- *Send your comments and suggestions to: interoperability@systematic.com*

About this Presentation

1. Why do we need multiple interoperability standards
2. Why is interoperability a challenge
3. Which one to use and when
4. What you need to know about the other systems
5. Why you should rely on interoperability tests
6. New Zealand Defence Force –
   NEA Programme Interoperability Use Case

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TABLE OF CONTENTS

- Choose the Right Tool for the Job
- Level of Options and Intricacy
- Recognized Pictures – Situational Awareness
- Recommended Interoperability Matrix
- The Complexity in Interoperability Standards
- Comparing and Contrasting Interoperability Standards
- 6 Steps to Interoperability

Some Interoperability Acronyms You Should Know

ADatP-3
Allied Data Publication 3

ADS-B
Automatic Dependent Surveillance – Broadcast

AIS
Automatic Identification System

APP-6
Allied Procedural Publication 6

APP-11
Allied Procedural Publication 11

COP / JCOP
(Joint) Common Operational Picture

KML
Keyhole Markup Language

Link 16
Tactical Data Link 16

MIL-STD-2525
Joint Military Symbology

MIP
Multilateral Interoperability Programme

NFFI / FFI
NATO Friendly Force Information

NVG
NATO Vector Graphics

OTH-GOLD
Over-The-Horizon GOLD

R_P
Recognized Picture

VMF
Variable Message Format

W-AIS
Warship Automatic Identification System

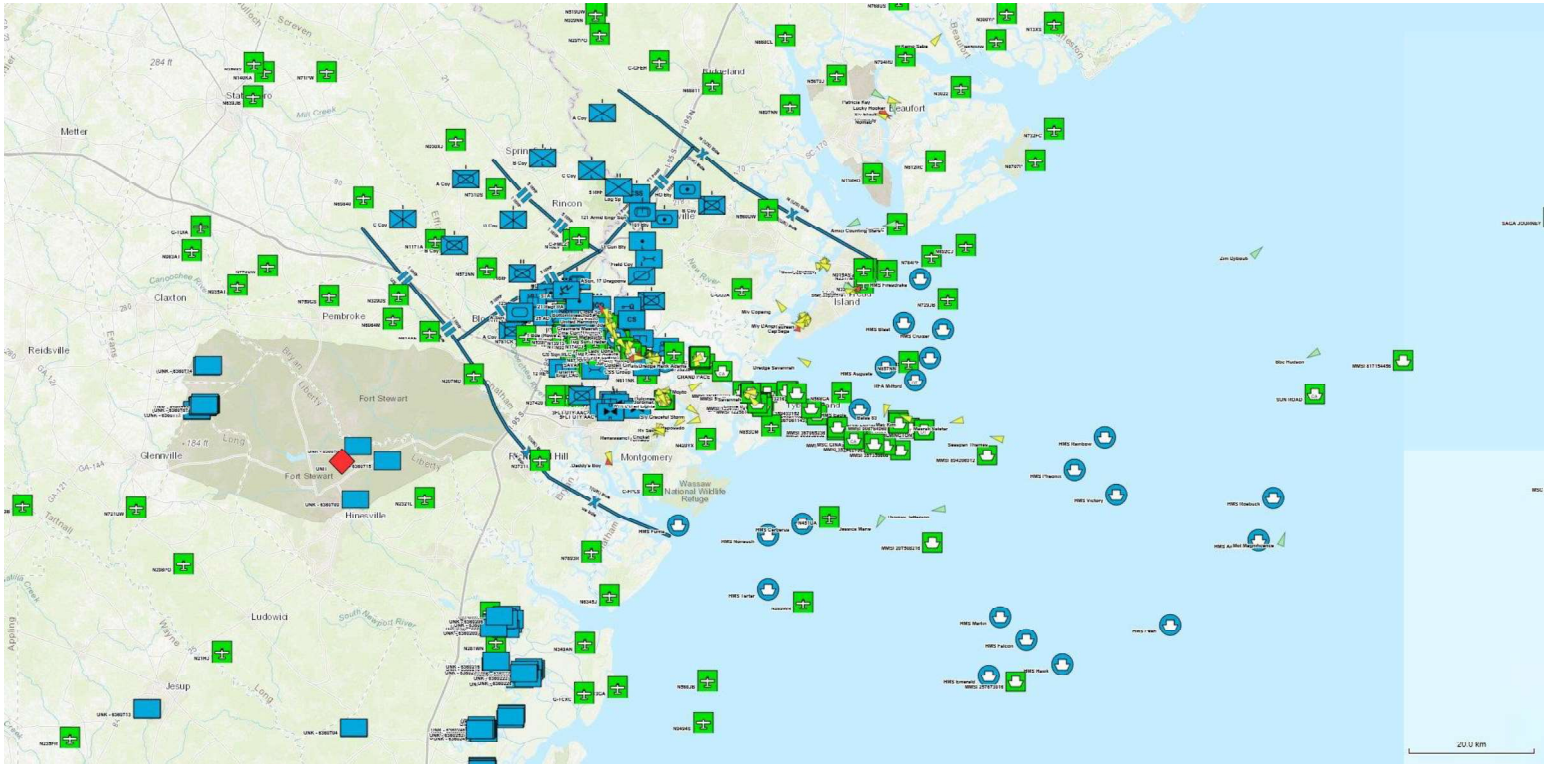
WMS
Web Map Service

XMPP
Extensible Messaging and Presence Protocol

Read the full definitions here
www.systematic.com/standards

NIEM Standard Tested - Exercise Bold Quest 17.2

Whole Exercise (US, UK, CivPop/EM, Land, Maritime, etc)



TDL Standards in the Joint Environment (COP & CIP/RIP)

Air Domain

- Link 16 / 22
- MADL
- TTNT
- CEC
- JICD 4.2
- JREAP-C
- IBS-COP
- SADL
- CDL
- [ACO / ATO]

Maritime Domain

- Link 11 / 16 / 22
- JICD 4.2
- JREAP-C
- IBS-COP
- SADL
- CDL

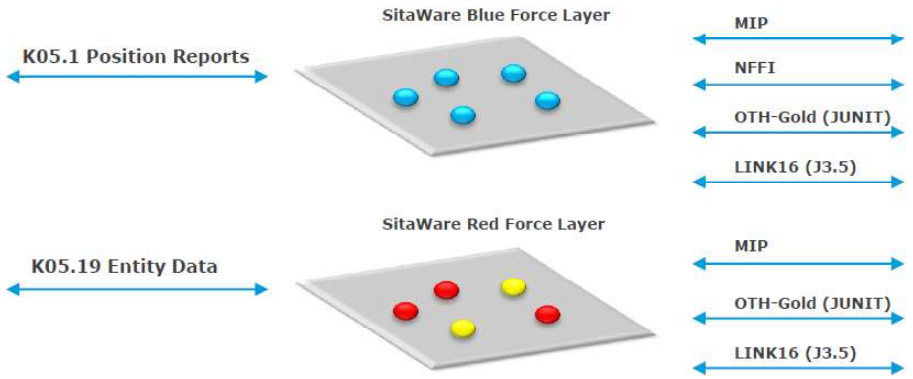
Land Domain

- VMF
- MIP (3.1 / 4.x)
- JICD 4.2
- JREAP-C
- IBS-COP
- SADL
- CDL

VMF Gateway for SitaWare Headquarters **NEW**

Add-on Product for IRIS Forms 5.7 and SitaWare Headquarters 6.8 Coalition Gateway (October 2018)

- Automatic Exchange of Blue and Red Picture
- TCP/UDP VMF contract in SitaWare Headquarters
- Support for VMF Headers MIL-STD-2045-47001(C)
- Support for VMF MIL-STD-6017 (Flat) and MIL-STD-6017A+



Information Exchange Between Domains

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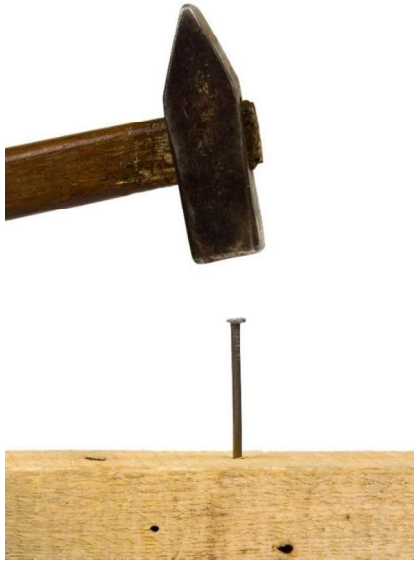
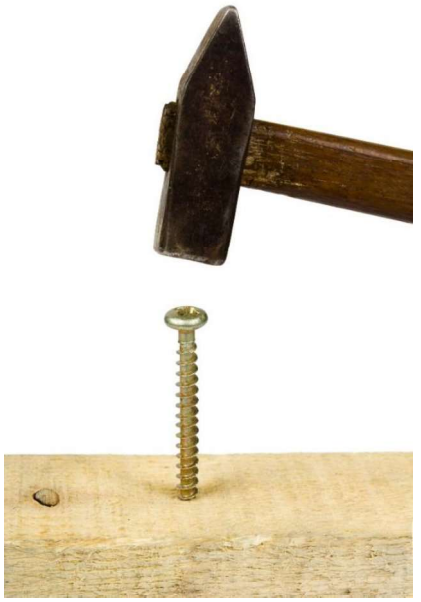
Use the right Tool for the Job

As with any task, you must ***select the right tool for the job****. While it is possible to hammer in a screw, the process – and result – would be less than ideal.*



"Made for"

vs.



"Usable for"

Interoperability Standards

- *To achieve optimum interoperability, you must first choose the interoperability standard that best suits your operational needs.*

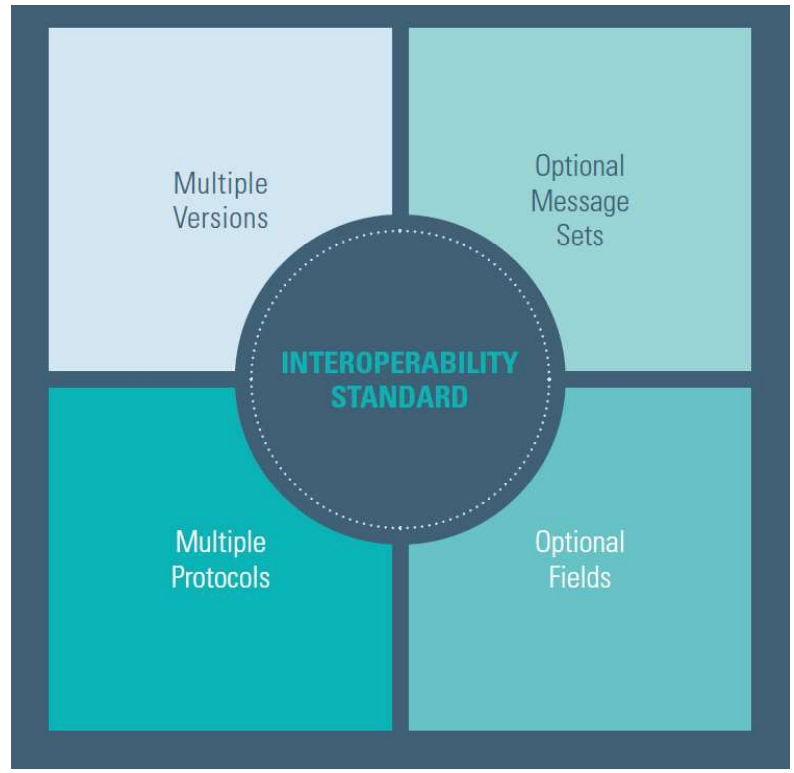
- *Every interoperability standard is designed to fulfill a specific purpose and some are intentionally more sophisticated – and therefore more complex – than others.*
  - *TDL system standards arguably fit this category (complex).*

- *Achieving successful interoperability is not just a question of conforming to the standards of your coalition partners and allies.*

- *It is firstly a matter of selecting the right standard for your own needs – and then ensuring compatibility with your partners.*
  - *ADF are among those nations that succeeded in setting standards for their own forces, through selection of TDL as a baseline for all 3 Services.*

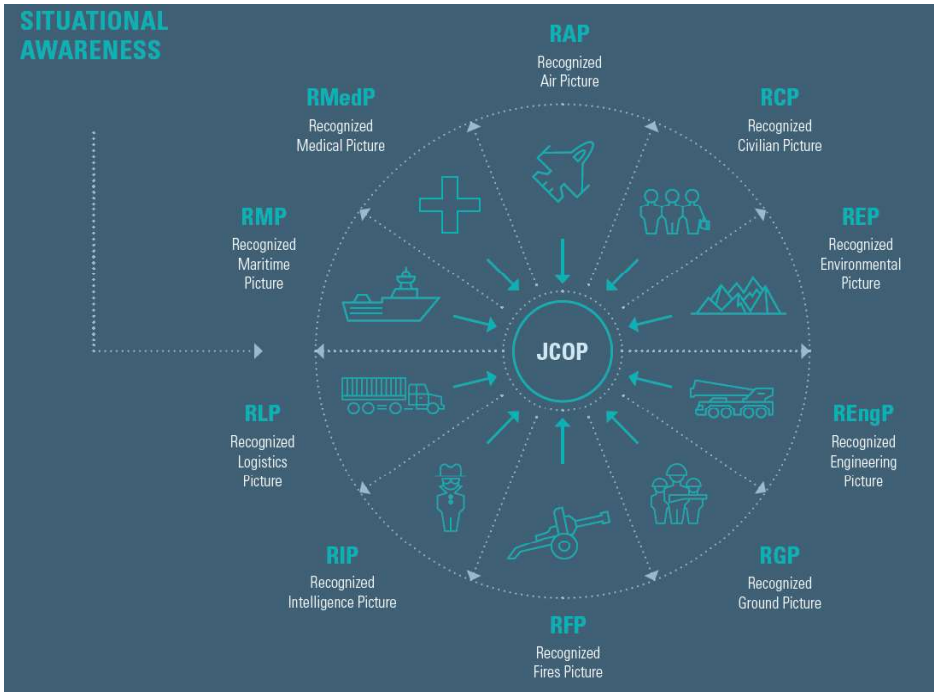
THE COMPLEXITY IN INTEROPERABILITY STANDARDS

- *Numerous elements must align for successful interoperability and information exchange between coalition partners:*
  - *Must choose common or compatible protocols and formats*
  - *Must take into account that one standard may contain multiple versions*
    - *each with optional message sets and optional fields that may be incompatible with other versions of the same standard.*
  - *Must consider the individual standard.*
    - *Some standards are designed to exchange comprehensive information (eg. MIP), whereas others strictly focus on short and specific information (eg. AIS) with lower risk of misunderstandings.*
    - *If done incorrectly, translating a richer language into a simpler system will result in the loss of information – and vice versa.*
- *Whenever you add an interoperability standard, you increase the level of complexity. Therefore, aim at keeping conversions to a minimum.*



RECOGNIZED PICTURES – SITUATIONAL AWARENESS

- ***Recognized Pictures*** *(RxP) play an integral part in the collaborative planning, combined execution of orders, and situational awareness of modern military operations.*
- *Sharing data allows forces to coordinate rapidly, avoid blue-on-blue engagements, and achieve information superiority.*
- *Recognized Pictures are collected from each of the participants in an operation – the armed forces, civilian and government actors – to compose the Joint Common Operational Picture (JCOP).*
- *Based on received Recognized Pictures and individual analysis, higher echelon headquarters correlates and composes the JCOP, which provides complete situational awareness for Commanders and partners.*
- *The success of combined Joint operations relies greatly on collective situational awareness and the ability to coordinate battle plans.*
- *Successful interoperability is the prerequisite for this to all occur.*



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COMPARING STANDARDS

- *Interoperability standards support the exchange of Recognized Pictures at vastly different levels. While some only support the exchange of simple Position Location Information, others are able to express much richer pictures that include military symbols, such as units, equipment, and control features.*
- *Interoperability standards, such as KML and WMS, are able to render and convey military symbols but they do not possess the proper geometric representation so they cannot convert the information to other standards – hence the parenthesis in the table opposite.*

Comparing and Contrasting Standards

Category	Name	Information Complexity	Near-Real-Time Tracks	Complex RP/COP	MIL-STD-2525 Symbols	MIL-STD-2525 Graphics	Messages
SitaWare	SHC	Medium	●	●	●	●	
	STC	Low	●		●	●	●
Two-Way	ADATP-3 / APP11	Medium		●			●
	LINK11	Medium	●				
	LINK16	Medium	●				
	MIP	High		●	●	●	
	NFFI / FFI	Low	●		●		
	NVG	Low		●		(●)	
	OTH-GOLD	Medium	●	(●)	(●)		●
	VMF	High	●	●	●	●	●
One-Way	WAIS	Low	●				
	AIS	Low	●				
	ADS-B	Low	●				
	ASTERIX CAT 048	Low	●				
	WMS	Low		●	(●)	(●)	
	KML	Medium		●	(●)	(●)	

Legend: (●) = partially supported

Recognised Pictures Typically Exchanged

Abbreviation	Name	Typical Content
RAP	Recognised Air Picture	FFTs, contacts, planning data, targets, features
RCP	Recognised Civil Picture	Actors, demographics, planning data, targets, features
REP	Recognised Environmental Picture	Meteorology, geospatial
REngP	Recognised Engineering Picture	Obstacles, mines, bridges, terrain
RFP	Recognised Fires Picture	FFTs, targets, meteorology, planning data, events
RGP	Recognised Ground Picture	FFTs, contacts, planning data, targets, features
RIP	Recognised Intelligence Picture	Contacts, planning data, targets, events, actors, features
RLP	Recognised Logistics Picture	FFTs, routes, facilities, planning data, targets
RMP	Recognised Maritime Picture	FFTs, contacts, planning data, targets, features
RMedP	Recognised Medical Picture	Facilities, planning data, targets, events, features
JCOP	Joint Common Operational Picture	All

Recommended Interoperability Matrix (Land-Joint)

This matrix view applies when working with SitaWare suite of BMAs

RECOMMENDED INTEROPERABILITY MATRIX FROM A LAND & JOINT PERSPECTIVE

Primary option ■ Alternative option ■

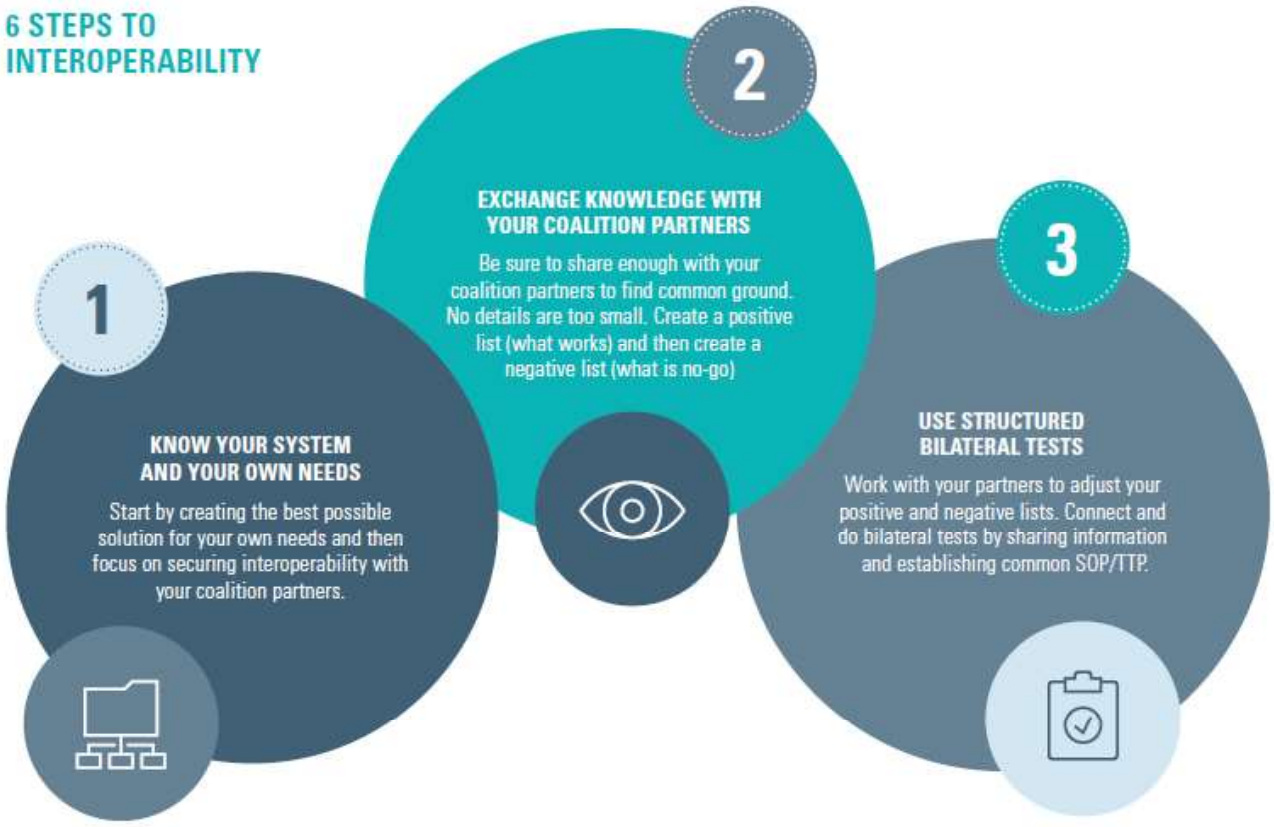
	SHC SITAWARE	STC SITAWARE	ADatP-3 APP-11	ADS-B ASTERIX	AIS NMEA 0183	KML OGC	LINK 16 STANAG 5616	MIP STANAG 5525	NFFI/FFI STANAG 5527	NVG STANAG 4733	OTH-GOLD	VMF STANAG 5519	W-AIS STANAG 4668	WMS OGC	XMPP (Chat)
RAP	Out	Out		In			In/Out	Out	Out						
RCP	In/Out	In/Out	In/Out			Out		In/Out							
REP						In								In	
REngP	In/Out							In/Out						In	
RFP	In/Out	In/Out	In/Out			Out	In/Out	In/Out		In/Out	In/Out	In/Out			
RGP	In/Out	In/Out	In/Out			Out	Out	In/Out	In/Out	In/Out	Out	In			
RIP	In/Out	In/Out	In/Out			Out		In/Out		In/Out		In			
RLP	In/Out	In/Out	In/Out			Out		In/Out		In/Out	Out				
RMP	Out	Out	In/Out		In	Out		Out		Out	In/Out		In		
RMedP	In/Out	In/Out	In/Out			Out		In/Out		In/Out	Out				
(J)COP	In/Out		In/Out			Out		In/Out		In/Out					
PLANS & ORDERS	In/Out	Out	In					In/Out		In/Out					
Chat		In/Out													In/Out

Legend:
SHC – SitaWare Headquarters Communications
STC – SitaWare Tactical Communications

https://systematic.com/defence/c4i-blog-system/better-together-effective-interoperability-in-the-coe-pays-dividends/

6 Steps to Interoperability

1. *Know Your Own System(s) and Operational Needs*
2. *Exchange Knowledge with Coalition Partners*
3. *Use Structured bi-lateral tests, to reinforce technical, process, and training maturity*



https://systematic.com/defence/c4i-blog-system/better-together-effective-interoperability-in-the-coe-pays-dividends/

6 Steps to Interoperability

4. *Embed (Coalition) Common SOP/TTPs into National SOP/TTPs*
5. *Use Structured Multilateral Test Events (FMN, MPE based)*
6. *Maintain Your Interoperability Capability and Standards*

https://systematic.com/defence/c4i-blog-system/better-together-effective-interoperability-in-the-coe-pays-dividends/

Interoperability Test Events – SitaWare Pedigree

Simplifying critical decision making

CWID

CWIX

Combined Endeavor

Trident Warrior

Bold Quest

Allied Spirit

JWA

	ADatP-3 APP-11	AIS	ASCA	KML	Link 16	MIP Block 2	MIP Block 3.0	MIP Block 3.1	NFFI/FFI	NVG	OTH-GOLD	WMS
2002-6												
2007												
2008												
2009												
2010												
2011												
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