Advanced & Standardized Aircraft EW Systems Integration

2019-05-14; EW Europe

TERMA
ALLIES IN INNOVATION

Bottom Line Up Front

- Terma
  - Support the warfighter
  - Delivers solutions for EW Defensive Aids Systems (DAS)
  - Embrace Open Standards
  - Pedigree is bringing different OEM products together
  - Actively support establishment of standards that do the job
  - Recognize the benefits

Presentation Overview

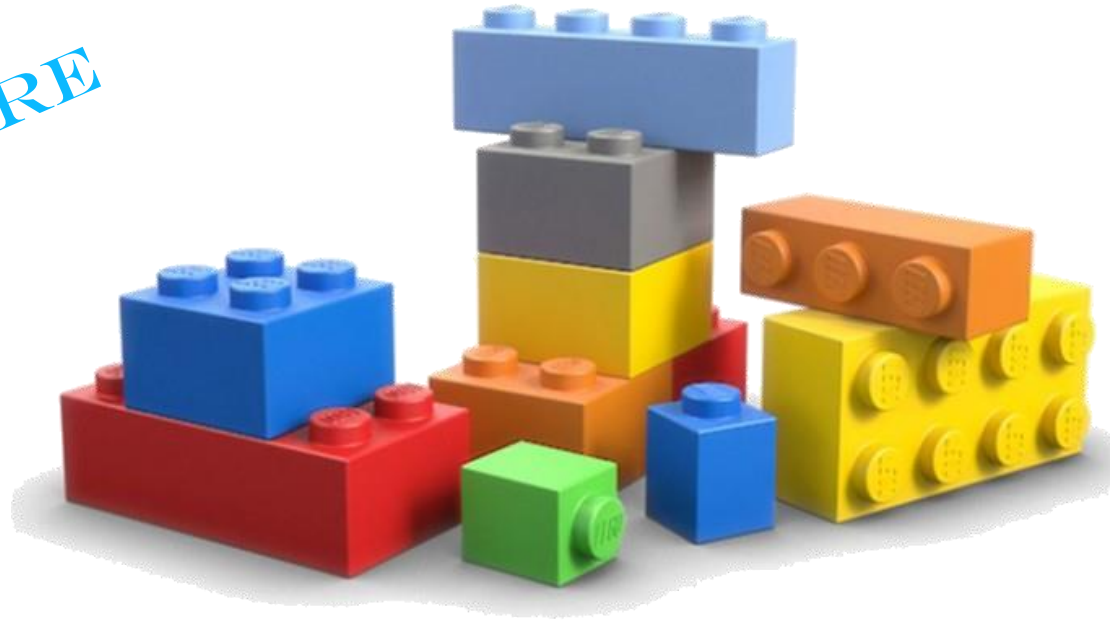
- Open Architecture Initiatives – An overview related to Airborne Self-Protection Systems
- Standardization Approach – NATO STANAG 4781 ”NDAS”
- Implementation Approach – Example case

Open Architecture Initiatives

Why an Open Architecture?

- Building a System of Systems based on different OEM systems
- Reduce the cost and dependency when building a System of Systems
- Provide flexibility for future capability expansion and sustainability

MODULARITY
VS.
OPEN ARCHITECTURE



Some Standards and approaches…

… to a Open System Approach

MOSA

Modular Open System Approach

US acquisition policy: the approach towards and Open Systems on HW and SW levels…

FACE™

Future Airborne Capability Environment

Portable SW modules: led by US Navy – good example is a recent Avionics update on US Navy C-130

VICTORY

Network centric level of interoperability: led by US Army – comprehensive, focused on ground vehicle systems

NDAS

Network centric level of interoperability: NATO initiative, led by UK with US industry and Gov. participation – focused on aircraft defensive aids

Looking across NDAS, VICTORY and FACE

- Open to NATO and partner nations
- Focused on airborne DAS
- Functional interfaces
- Static configuration

- Open to US and released for NATO for NDAS derivative
- Focused on C4ISR/EW ground vehicle integration
- Functional interfaces
- Supports dynamic configuration

- Basic standard is Open – RIGs are US Export Controlled
- Application agnostic Computing Environment
- Specific app's through RIGs
- Focused on portable SW units
- Extends UML for Data Modelling (intended for future NDAS adoption)

Standardization Approach - NDAS

A NATO Initiative

Smart Defence DAS Project (#1.32)

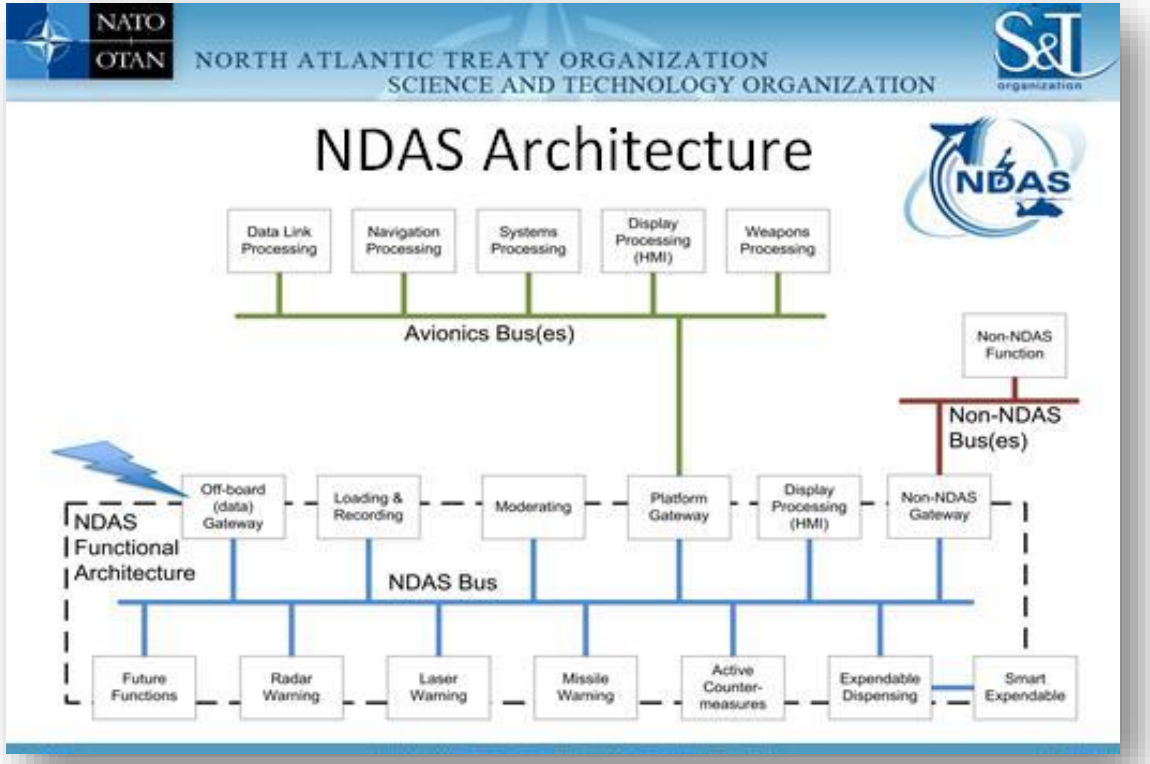
Tier 1 Project = High Priority

NDAS Objective

- To provide NATO with the **capability** to protect air assets in complex threat environments

By..

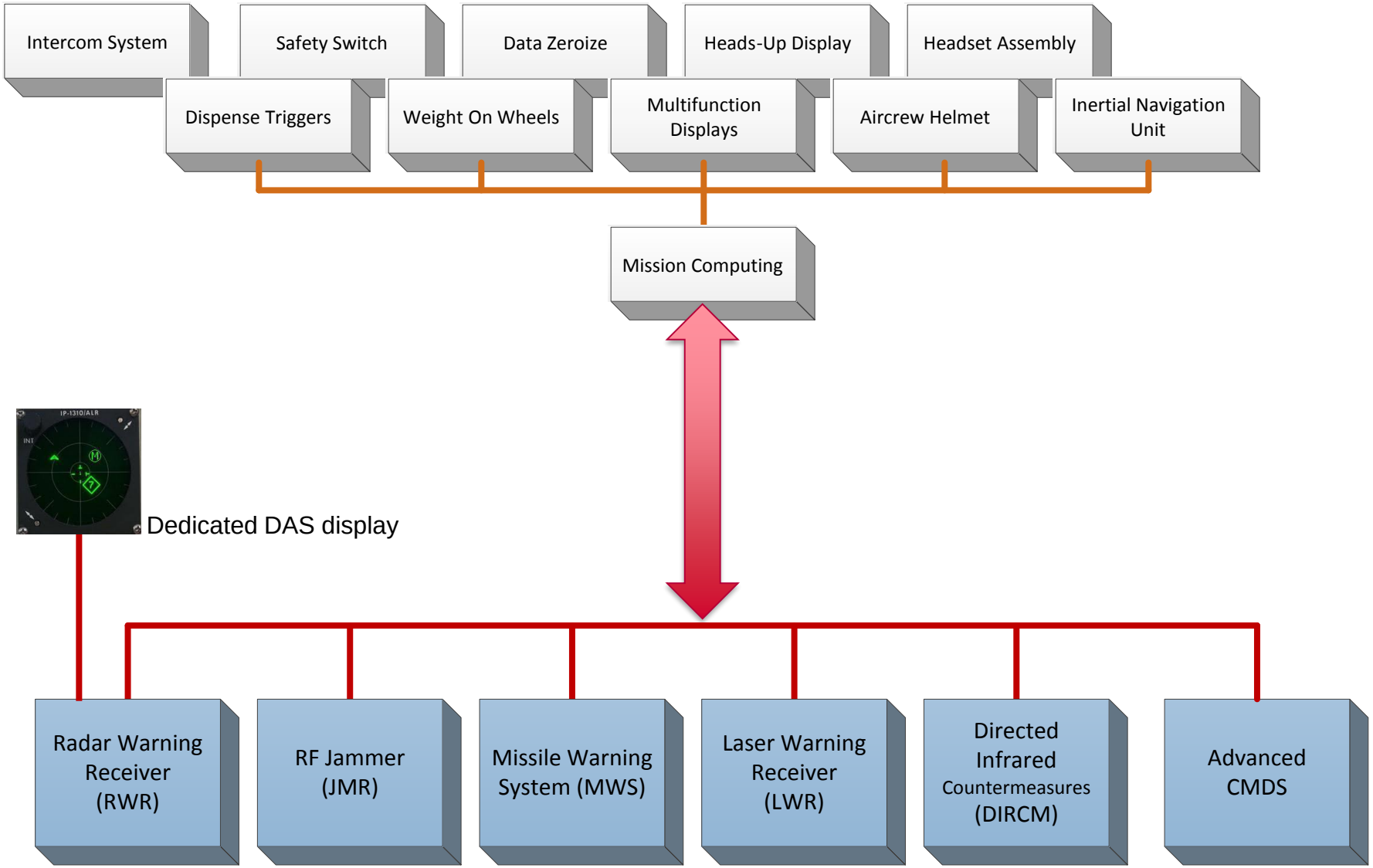
- Developing an **Open DAS System Architecture** to support the **integration** of sensor and effector systems onto operational platforms
- Make it available to NATO and partner nations in a **NATO Standard** (STANAG 4781)



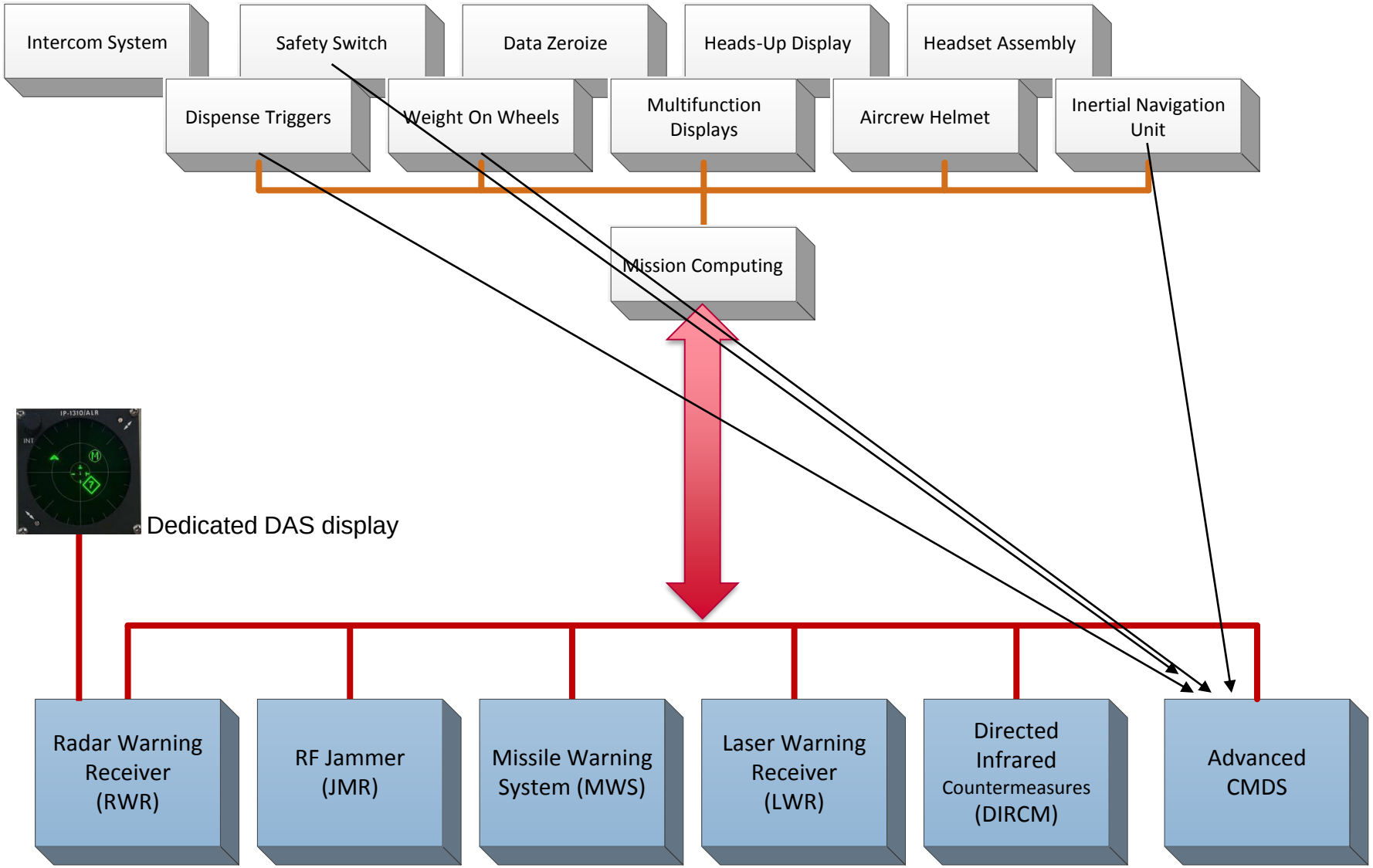
NATO Defensive Aids System - *NDAS*

NDAS Collaborators

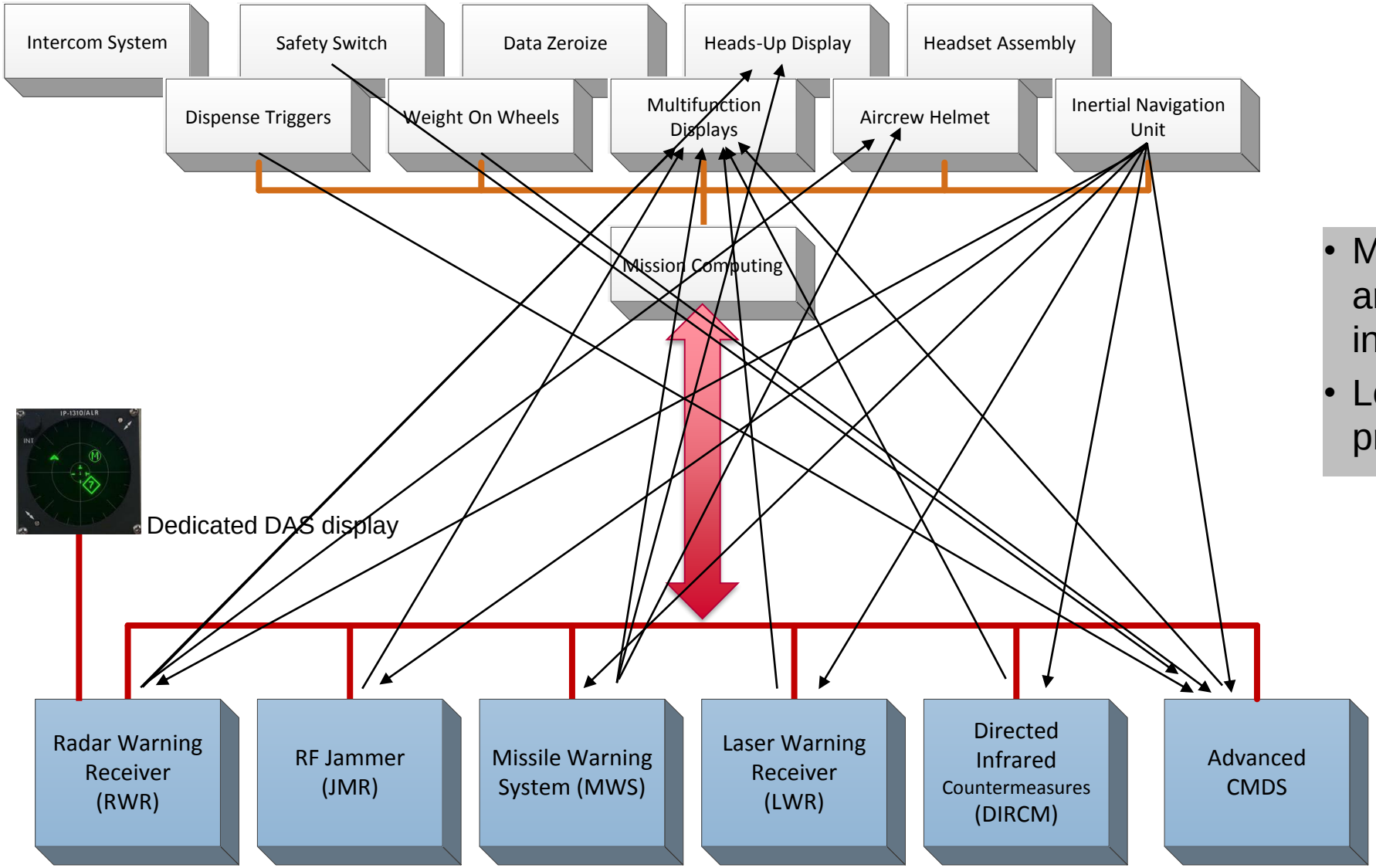
Typical DAS Integration



Typical DAS Integration

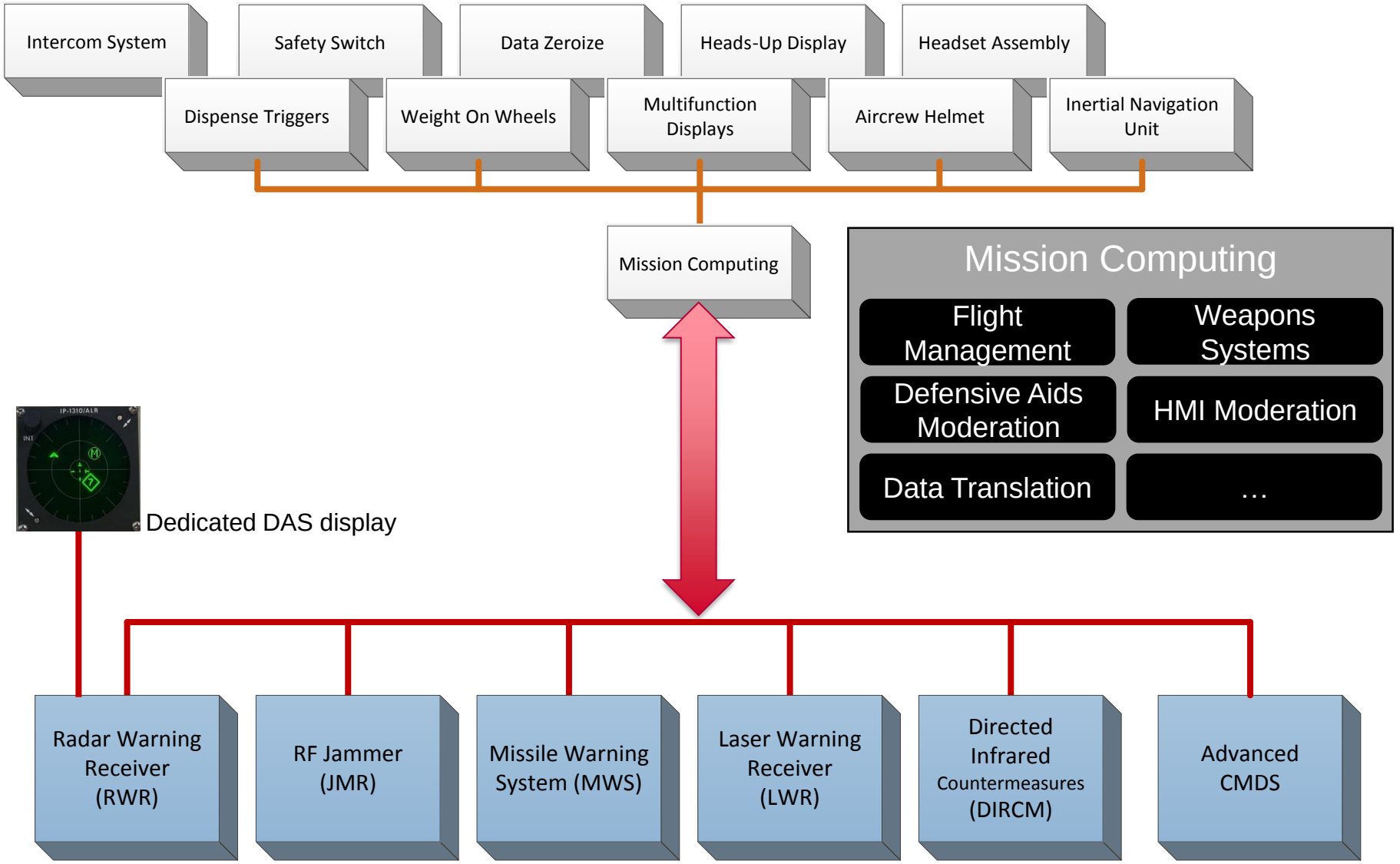


Typical EW Systems Avionics Integration

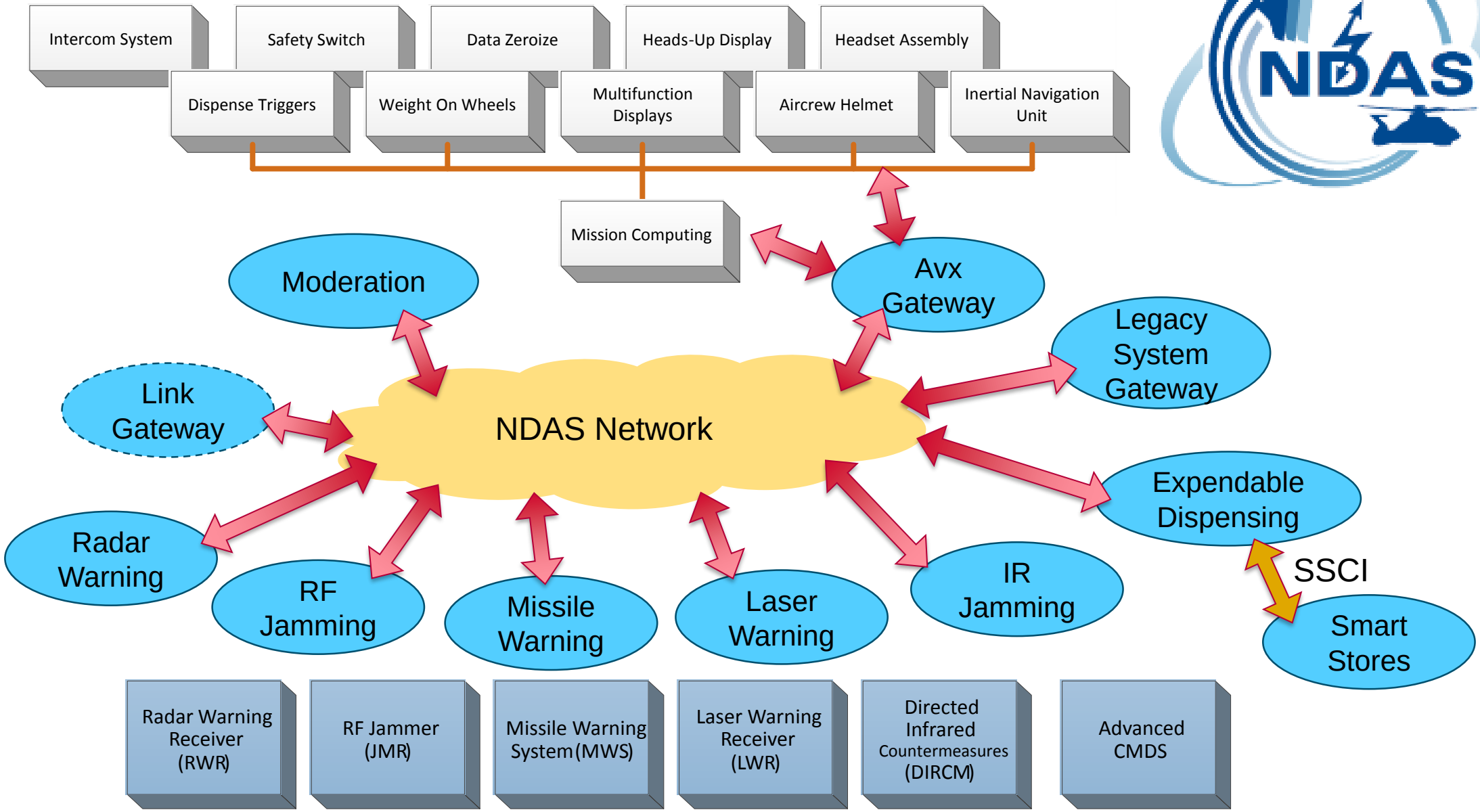


- Mix of bespoke and standardized interfaces
- Lots of proprietary protocols

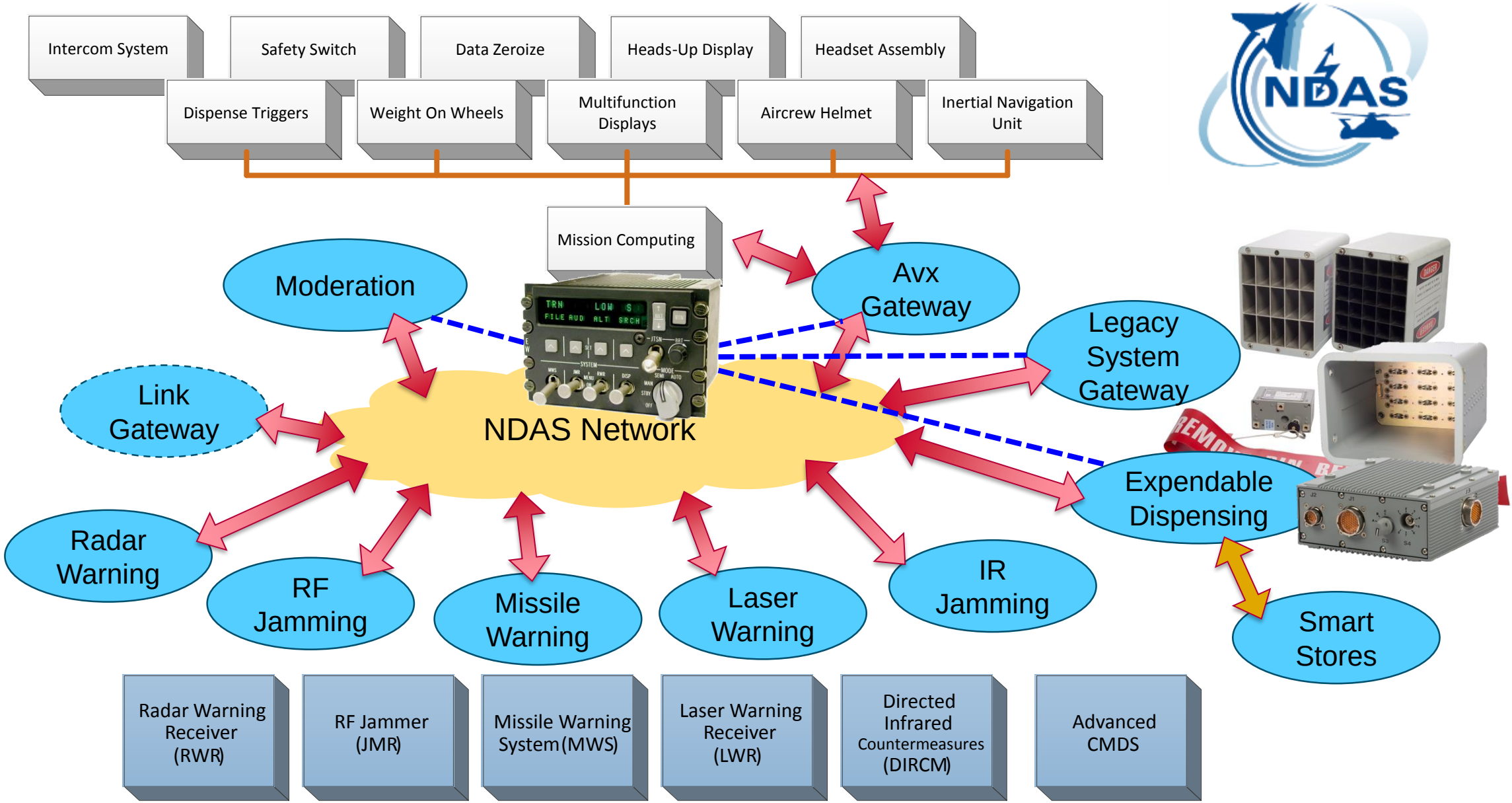
Typical EW Systems Avionics Integration



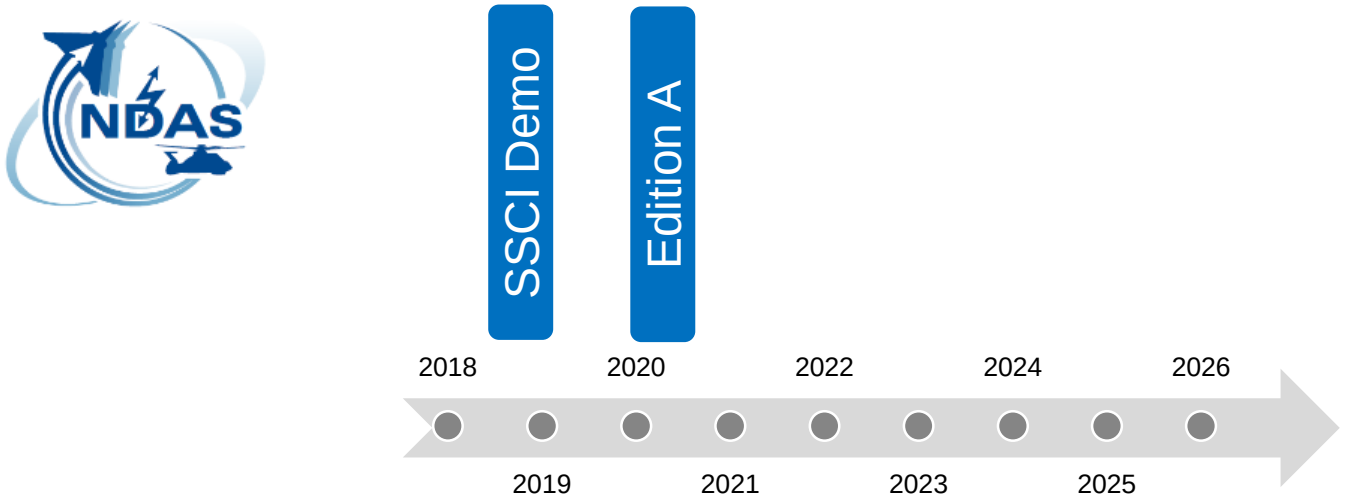
Typical EW Systems Avionics Integration

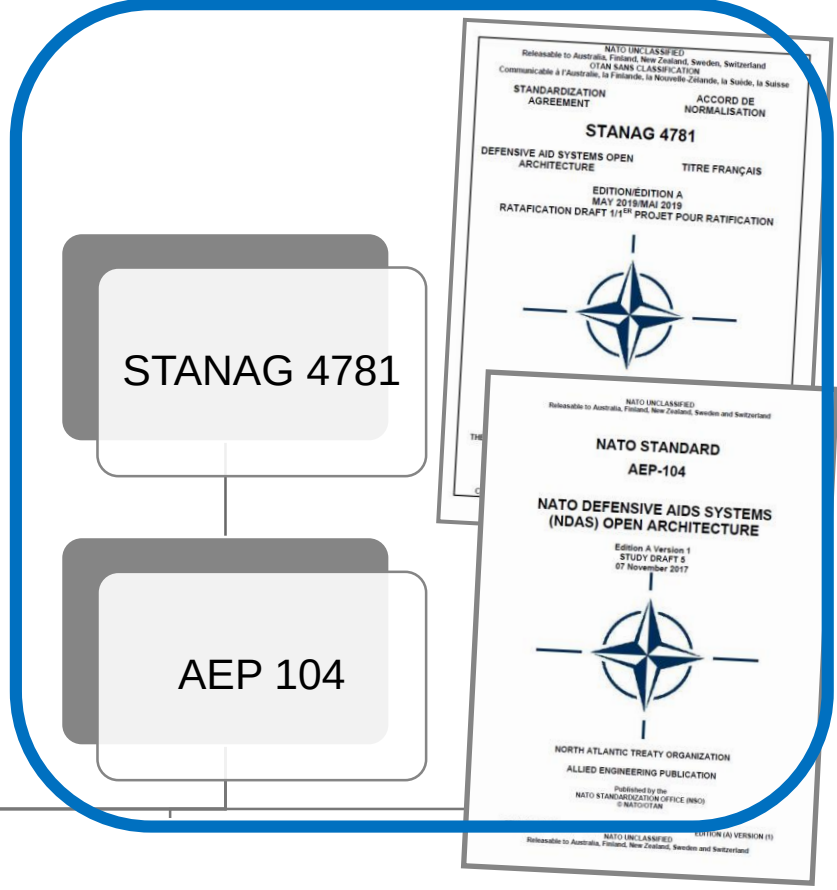


Typical EW Systems Avionics Integration



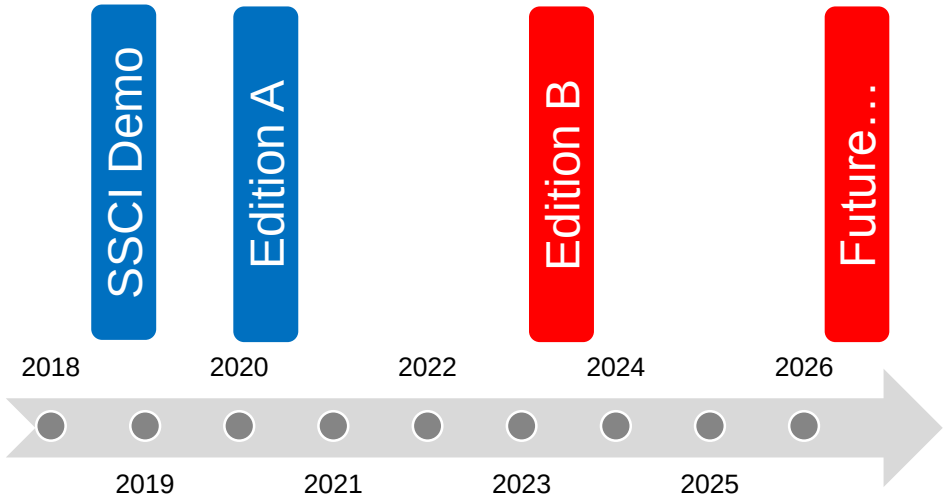
NDAS Timeline and Link to other approaches





- Architectural Description
- NDAS Network – Ref Spec 1 (CDAS')
- SSCI – Ref Spec 1 (Single Wire)

NDAS Timeline and Link to other approaches



STANAG 4781

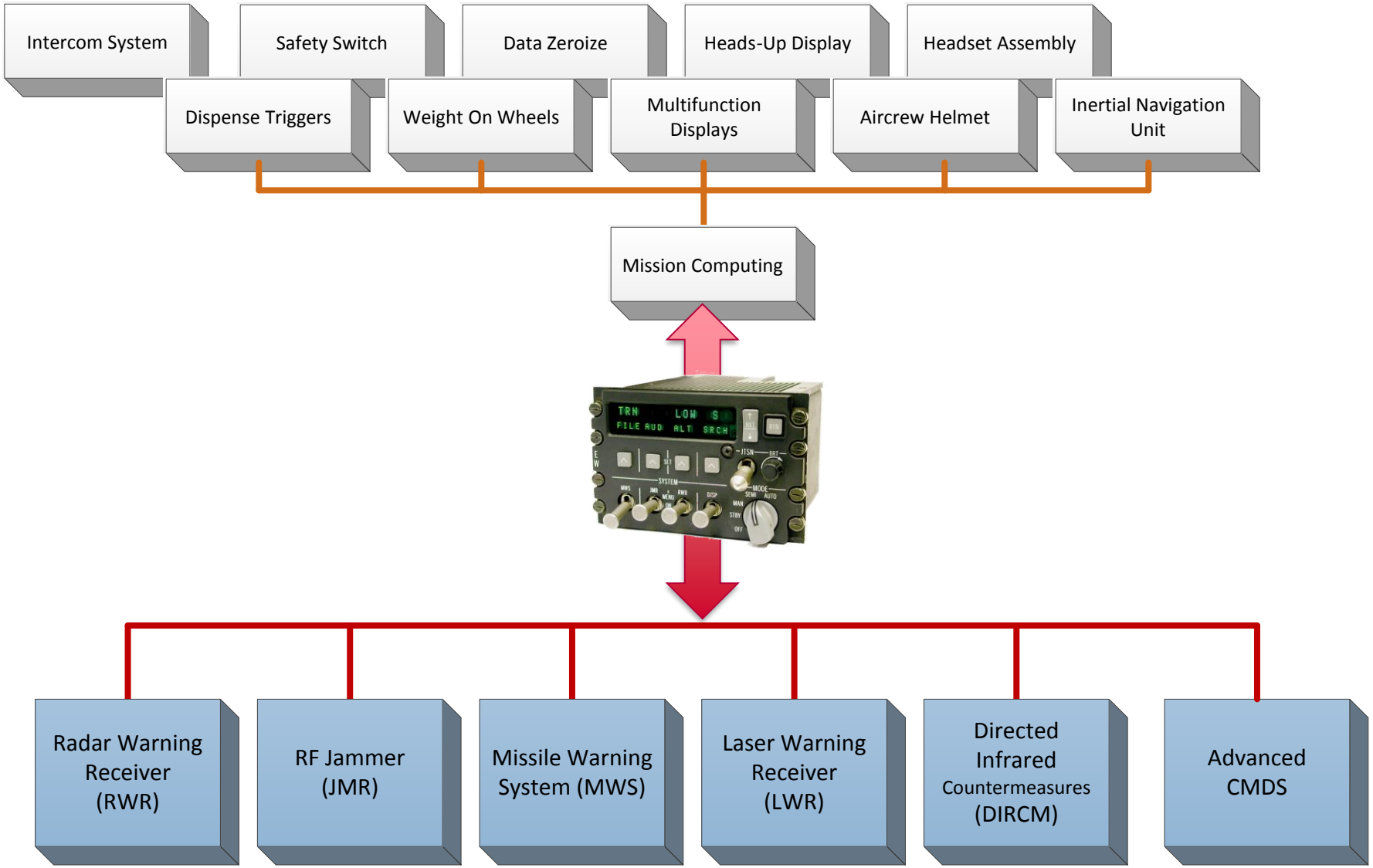
AEP 104

- Architectural Description
- NDAS Network – Ref Spec 1 (CDAS')
- NDAS Network – Ref Spec 2 (VICTORY')
- SSCI – Ref Spec 1 (Single Wire)
- SSCI – Ref Spec 2 (Hi-Speed)
- Future: Data Model (FACE)

- Add Off-boarding Support
- Add RS based on VICTORY and FACE datamodel

Implementation Approach

ALQ-213 based EW Systems Integration



AN/ALQ-213 EWMS – Reference List

Fast Jets

- ☒ EPAF F-16A/B & MLU
- ☒ USAF F-16C/D & AO/A-10
- ☒ LM F-16 Block 60
- ☒ RAF Harrier GR9
- ☒ RAF Tornado GR4/GR4A

Helicopters

- ☒ RNLAF CH-47D/F - Chinook
- ☒ RNLAF AS-532U2 - Cougar
- ☒ RNLAF AH-64D – Apache
- ☒ RNLAF NH-90
- ☒ RDAF EH-101
- ☒ RDAF AS-550 Fennec
- ☒ CAF CH-47F

Transport/Spec. Mission

- ☒ GAF C-160
- ☒ RNLAF Fo.60
- ☒ RNLAF C-130H
- ☒ PoAF C-130H
- ☒ BAF C-130H
- ☒ RDAF C-130J
- ☒ ROKAF C-130J
- ☒ RAF C-130J
- ☒ Italy C-130J
- ☒ USN P-8A
- ☒ Boeing E737
- ☒ RAF Nimrod MR2
- ☒ IOMAX Archangel
- ☒ ROKAF Falcon 2000S

EPAF: Belgium, Denmark, Norway Netherlands & Portugal

ALQ-213 – Superior Integration Track Record

- **CounterMeasures Dispensing System (CMDS)**
- ACMDS
- ALE-47

- **Radar Warning Receiver (RWR)**
- ALR-56M
- ALR-68
- ALR-69 DK(V)2 / C4 / LSIP
- ALR-69 A
- ALR-400
- APR-39
- SPS-1000(V)5
- CATS-100
- CARAPACE/KRP
- SEER-300

- **Electronic CounterMeasures Jammer (JMR)**
- ALQ-119/-184
- ALQ-131
- ALQ-162(V)1/(V)6
- ALQ-176
- ALQ-184(V)9
- EL/L-8222
- EL/L-8212

- **Towed Decoy System (TDS)**
- ALE-50 (integrated via ALQ-184(V)9)
- ALE-50(V)2

- **Missile Warning System (MWS) - active**
- EL/M-2160

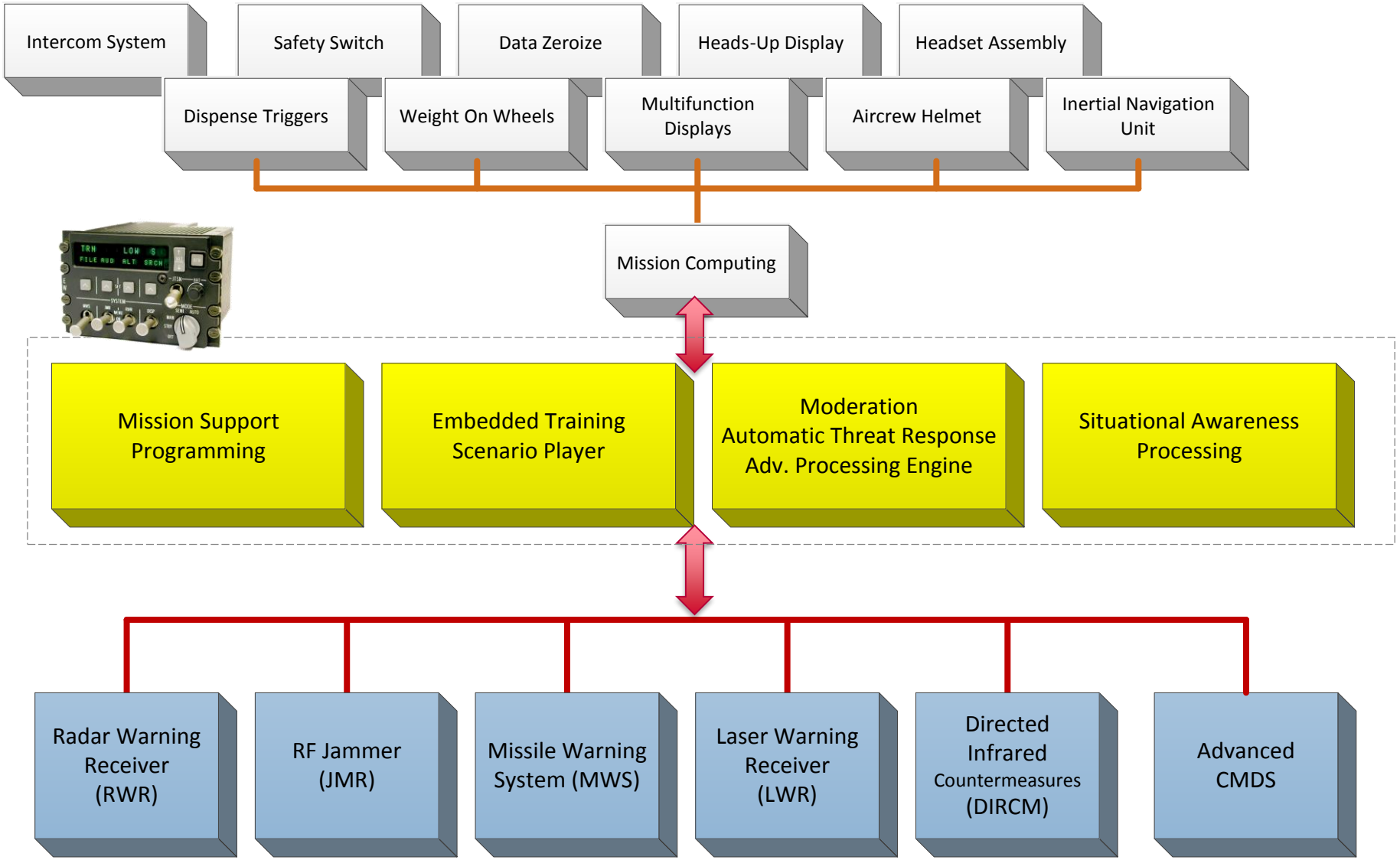
- **Missile Warning System (MWS) - passive**
- AAR-44
- AAR-47
- AAR-54
- AAR-57
- AAR-60 MILDS
- AAR-60(V)2 MILDS-F
- PAWS-II

- **Laser Warning Receiver (LWR)**
- ALTAS-2QB
- AVR-2B

- **Infra-Red CounterMeasures (IRCM)**
- COMET
- ALQ-144A

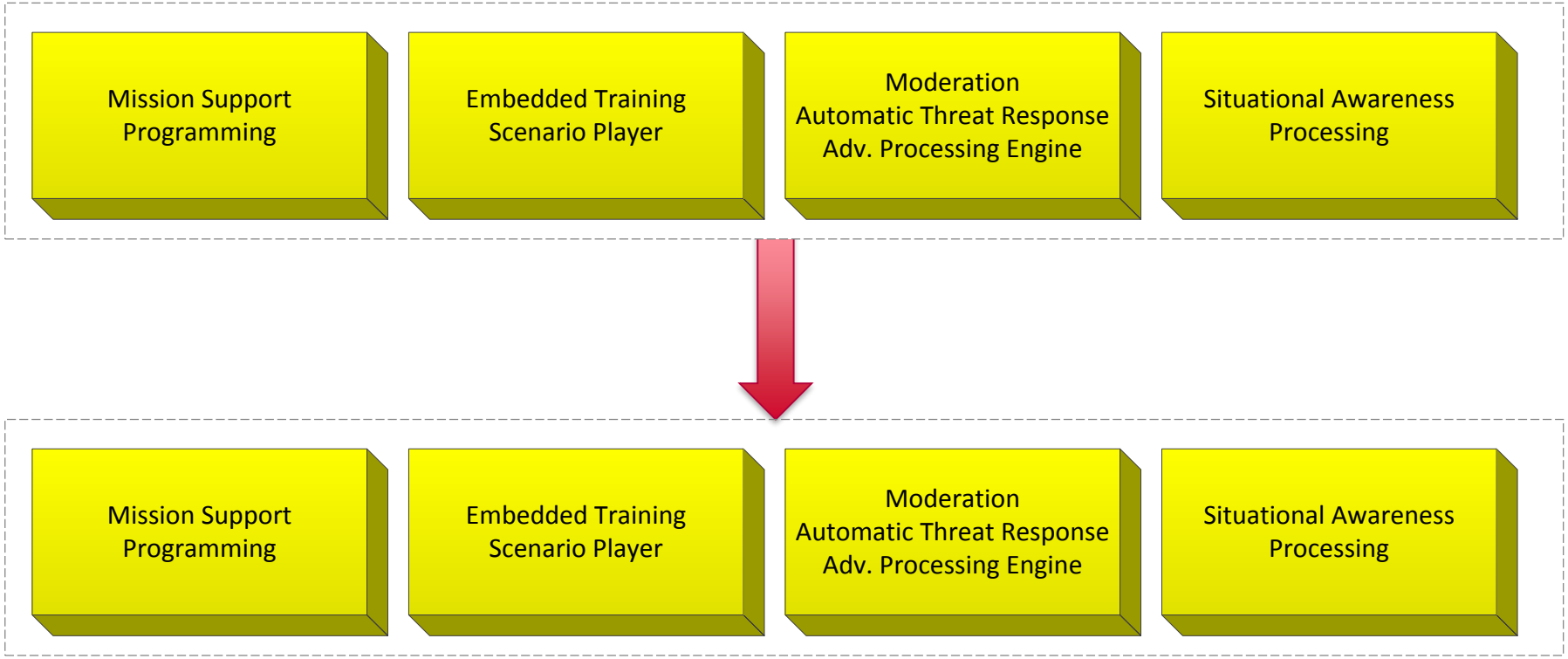
- **Directed Infra-Red CounterMeasures (DIRCM)**
- AAQ-24
- ELT-572

What the ALQ-213 brings to the fight….



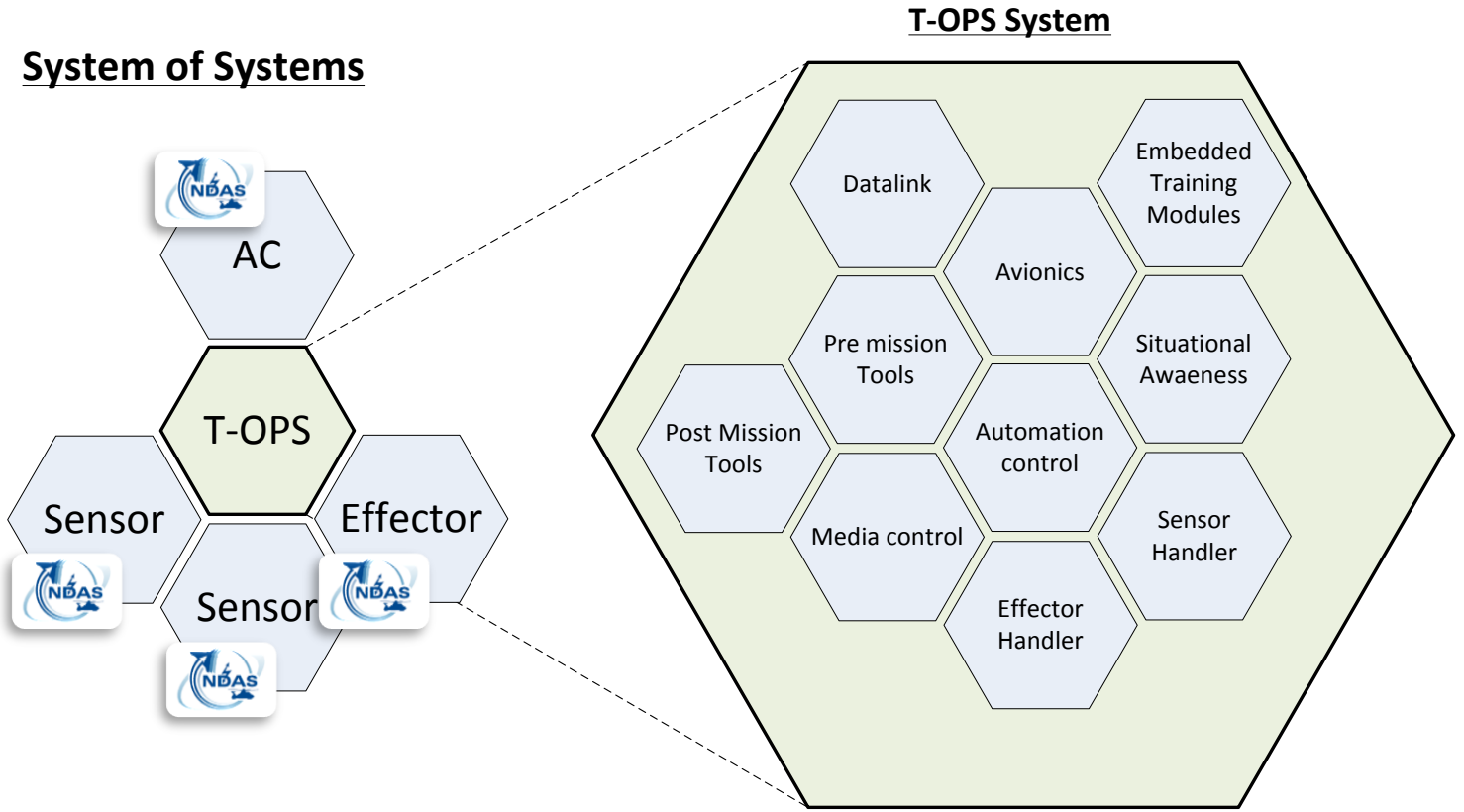
Introducing the Terma T-OPS

- Terma's new, standardized Electronic Warfare (EW) controller software
  - 25+ years of development, in close collaboration with end customers
  - Distilled into a modern, highly secure and reliable product family



T-OPS – Open System Architecture Focus

- Functional modularity
- Architectural Flexibility
- Rapid DAS Capability evolution



NDAS Based Integration Benefits

- **Improved capability**
  - Cross domain moderation
  - Smart stores communication
  - Network supported features
  - Resilience
- **Improved interoperability**
  - Established common language and interfaces
  - Functional (re-)configurability
- **Reduced cost and time for survivability upgrade**
  - Built-in scalability
  - Reduced certification efforts
- **Faster time to market**
  - Build ahead

Questions?

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