Federated Mission Networking & Mission Threads

MSG-211 Lecture Series on M&S Standards in NATO Federated Mission Networking

Kevin Galvin

Thales UK

Presenter, MSG-211

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Federated Mission Networking & Mission Threads

In session you will be introduced to:

- Federated Mission Networking (FMN)

  - What it is

  - The FMN Vision

  - Why it is required

  - Spiral Development

  - Role of Architecture in FMN

- FMN Interoperability Architecture

  - Architecture Principles

  - Architecture Views

- The role of Mission Threads

- How they are developed in the context of FMN and NAFv4

What is FMN?

- The mission of Federated Mission Networking (FMN) is to provide:

Enhanced Operational Readiness & Effectiveness Today and in the Future

- FMN will improve command and control (C2) and decision-making in coalition operations through improved secure information exchange and collaboration. It will provide the agility, flexibility, security and scalability needed to manage the emerging requirements of any mission environment in coalition operations.

- FMN is based on principles such as cost effectiveness and maximum reuse of existing standards and capabilities.

FMN Vision: Day Zero Interoperable Forces

- FMN vision has two components, one for the current strategic environment and one for the future:

  - **Operate Together: Exploit our Strategic Advantage**

    FMN ensures that Affiliate forces communicate, train and operate effectively together FROM THE START.

  - **Adapt Together: Effectively Transform Capabilities to Maintain our Edge'**

    FMN will support decision making at ALL LEVELS of future operations in ANY MISSION ENVIRONMENT.

Why FMN?

Lessons Identified building AMN during ISAF

Two major stand-alone coalition
mission networks:

- a U.S. led network - CENTRIXS-GCTF (CX-G),

- a NATO led network - ISAF S*CR*T (IS),

Separated by guards and gateways:

- no free flow of information

- limitations in information sharing

- communication delays

→ IO issues contributed to serious incidents and blue-on-blue engagements.

'Painful' IO issue resolution consuming valuable resources (time, money, …)

Very limited reusability for future missions with potential coalition partners (incl. GO/NGO)
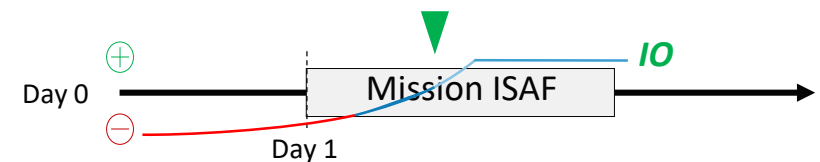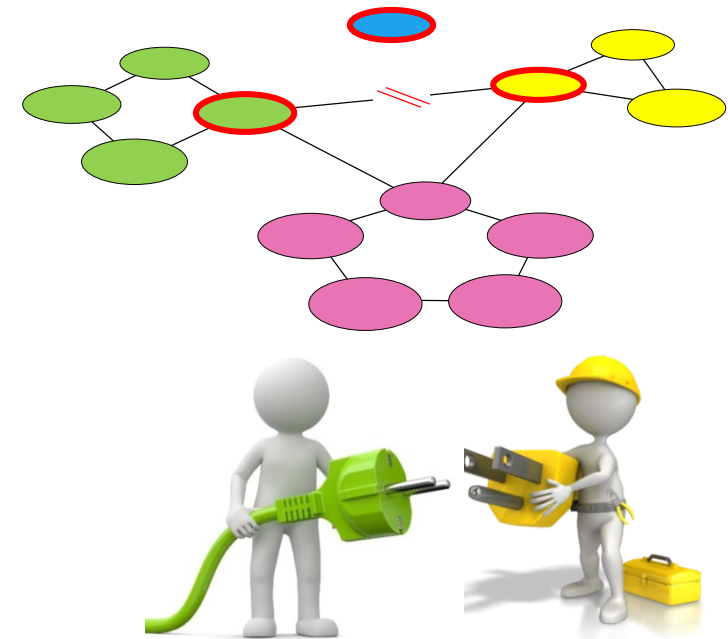
Spiral Development & Implementation

- FMN is developed using a Spiral Development process.

- Every FMN Spiral has a well-defined, agreed set of objectives to define the scope and an agreed schedule.

- The FMN Spiral Specifications consist of a specification introduction; documents with requirements, **an interoperability architecture** and a standards profile; a set of service and procedural instructions; and various supporting documents.

- It is created for one specific spiral.

- Given the incremental maturity vector for spiral development, multiple spirals will be active at the same time in different stages of their lifecycle and therefore, similar documents may exist for other active spirals.

Execution of FMN
From Vision to Roadmap to Specifications

Role of Architecture in Developing FMN

- Architecture underpins FMN by:

  - Providing an **Interoperability Architecture** for each spiral.

  - Using/Providing a set of **Reference Mission Threads** that can then be used by nations to create their own **Tailored Mission Thread**.

FMN Architecture Management Plan

- The FMN Architecture Management Plan (AMP) describes the scope of the FMN Framework architecture.

- It also includes descriptions of:

    - the architecture strategy,

    - the architecture activities,

    - the roles and tasks ,

    - the architecture products,

    - the lifecycle stages and phases of architecture(s),

    - the architecture workspaces,

    - the interaction between architecture(s),

    - the use of architecture dashboards, quality control and

    - the FMN architecture structure.

- The AMP was approved on 29/04/2021

FMN Interoperability Architecture

- The FMN Interoperability Architecture:

  - provides high level guidance and design information for all FMN Spiral compatible capabilities by clarifying the Spiral scope and fulfilling Operational and Security requirements.

  - is intended for use by FMN Affiliates in the planning, definition, costing, implementation, verification and validation of FMN capabilities.

  - it promotes "Interoperability by Design" principle, however is not specifying any quantitative requirements, or attempt to set the Individual Goal for any Affiliate.

Architecture Principles

- The FMN Interoperability Architecture Principles:

    - Mission Effective

    - Interoperable

    - Service Oriented

    - Incremental

    - Information Centric

    - Reusable

    - Secure

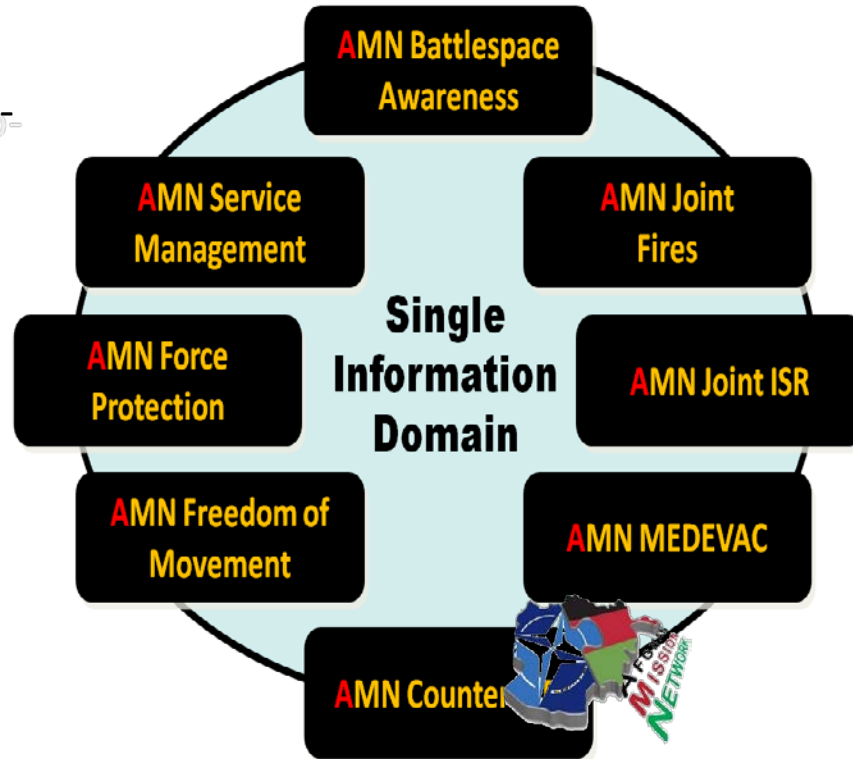   - Managed

    - Federated

    - Standardize

Architecture Views

- The following are used to support the Spiral Specifications and provide information exchange between working groups:

  - Capability View

  - Procedures Dependencies View
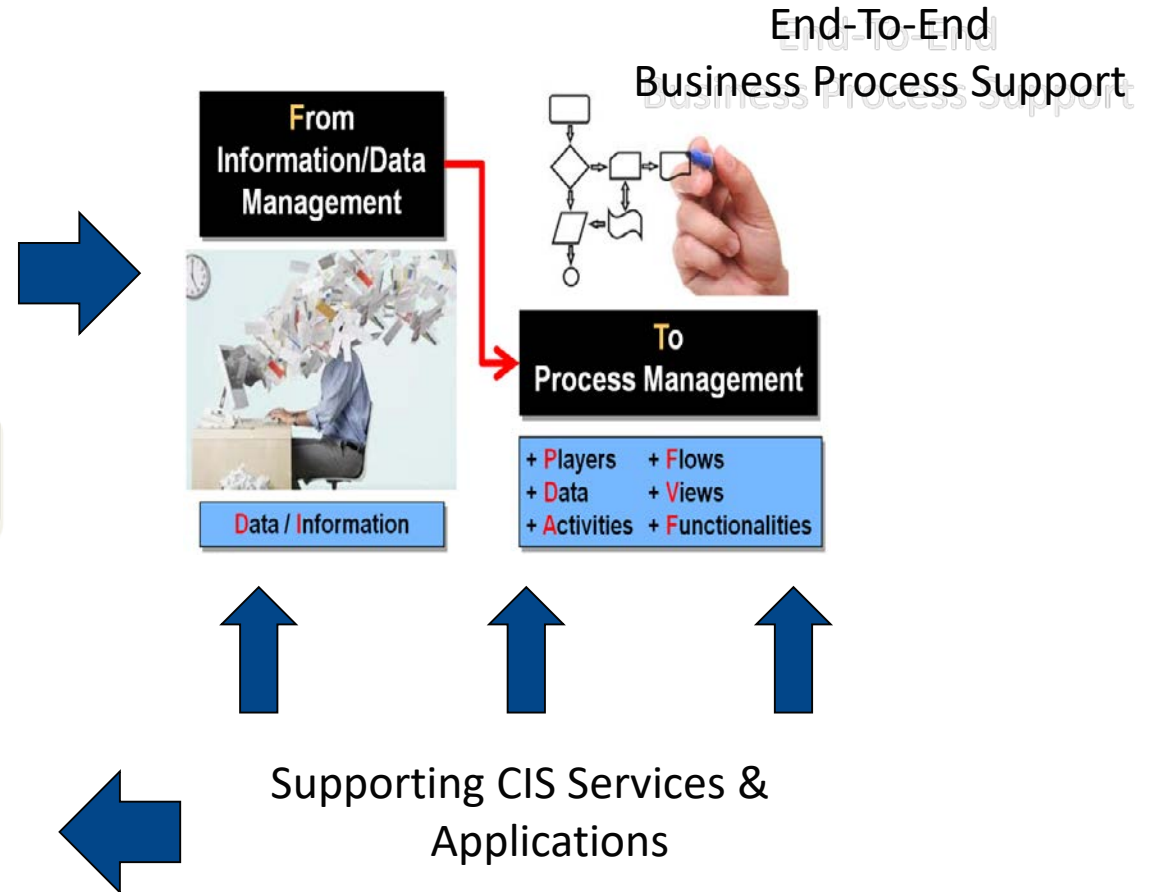
  - Service Dependencies View

These views are aligned to NAFv4 and the C3 Taxonomy.
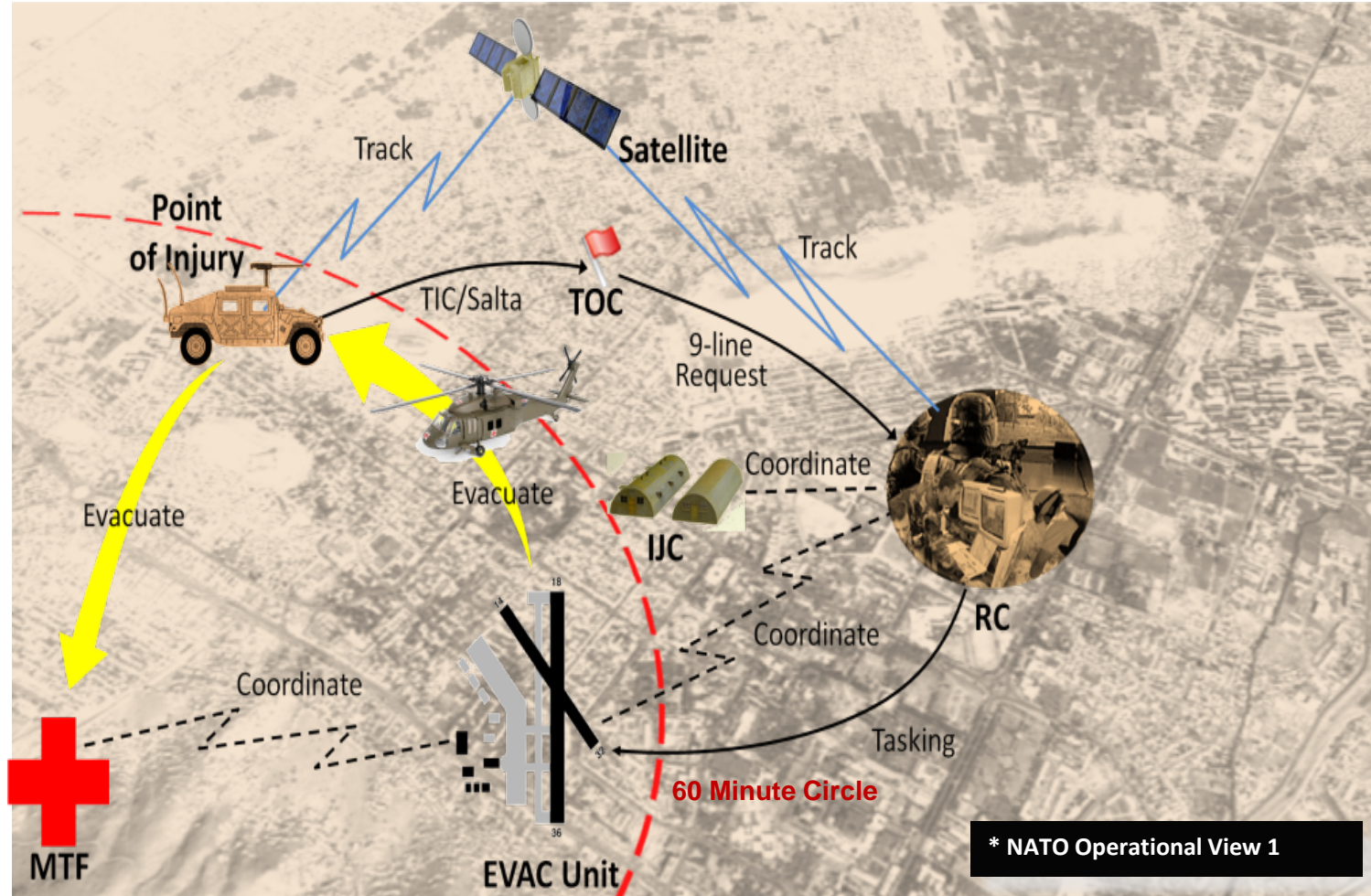
Mission Threads History

Mission Threads are an operational description of end-to-end processes that accomplish the execution of a mission.

Single Information Domain

- AMN Battlespace Awareness
- AMN Joint Fires
- AMN Service Management
- AMN Joint ISR
- AMN Force Protection
- AMN MEDEVAC
- AMN Freedom of Movement
- AMN Counter...

AMN = Afghan Mission Network

End-To-End Business Process Support

From Information/Data Management

Data / Information

To Process Management

+ Players   + Flows
+ Data   + Views
+ Activities + Functionalities

Supporting CIS Services & Applications

Example AMN MEDEVAC

Mission Threads (NATO Perspective)

- "A Mission Thread is an operationally driven, technically supported description of the end-to-end set of activities required to execute a mission or mission task"

- Mission threads are a **convenient way to** describe a collection of operational processes, information products, and enabling technologies.

- By focusing on all relevant process aspects at the interfaces between entities, mission threads can **facilitate and help achieve DOTMLPFI alignment.***

(Ref: NATO MT Capstone Concept)

* FIC (Australia)

  DOTMLPF (USA)

  DLOD (UK)

 DORESE (France)

  PRICIE (Canada)

  See notes

Reference & Tailored MTs

- ***Reference Mission Threads*** *are mission-agnostic frameworks, maintained in a repository and ready for use when required. They enable rapid development of mission-specific products, support long-term capability development, and enable force preparation. These Reference Mission Threads are driven by doctrine and owned by the Alliance or Nations.*

- ***Tailored Mission Threads*** *are mission-specific products, developed from Reference Mission Threads in order to support a specific operation or activity. These are derived from mission requirements and owned by the mission commander.*
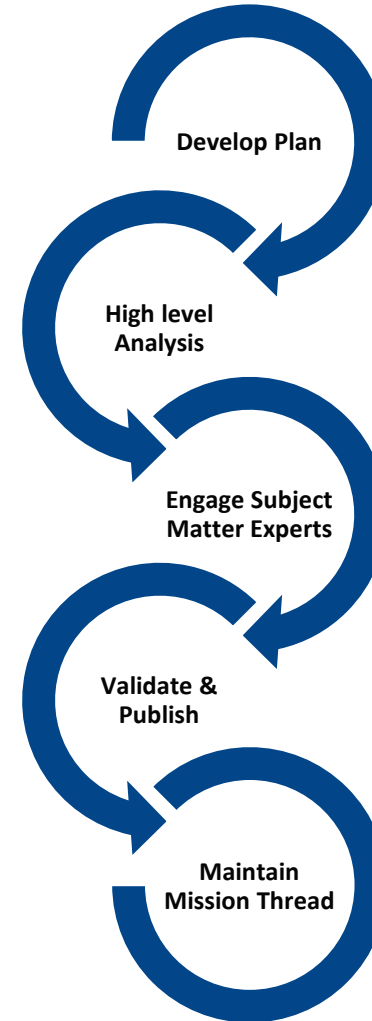
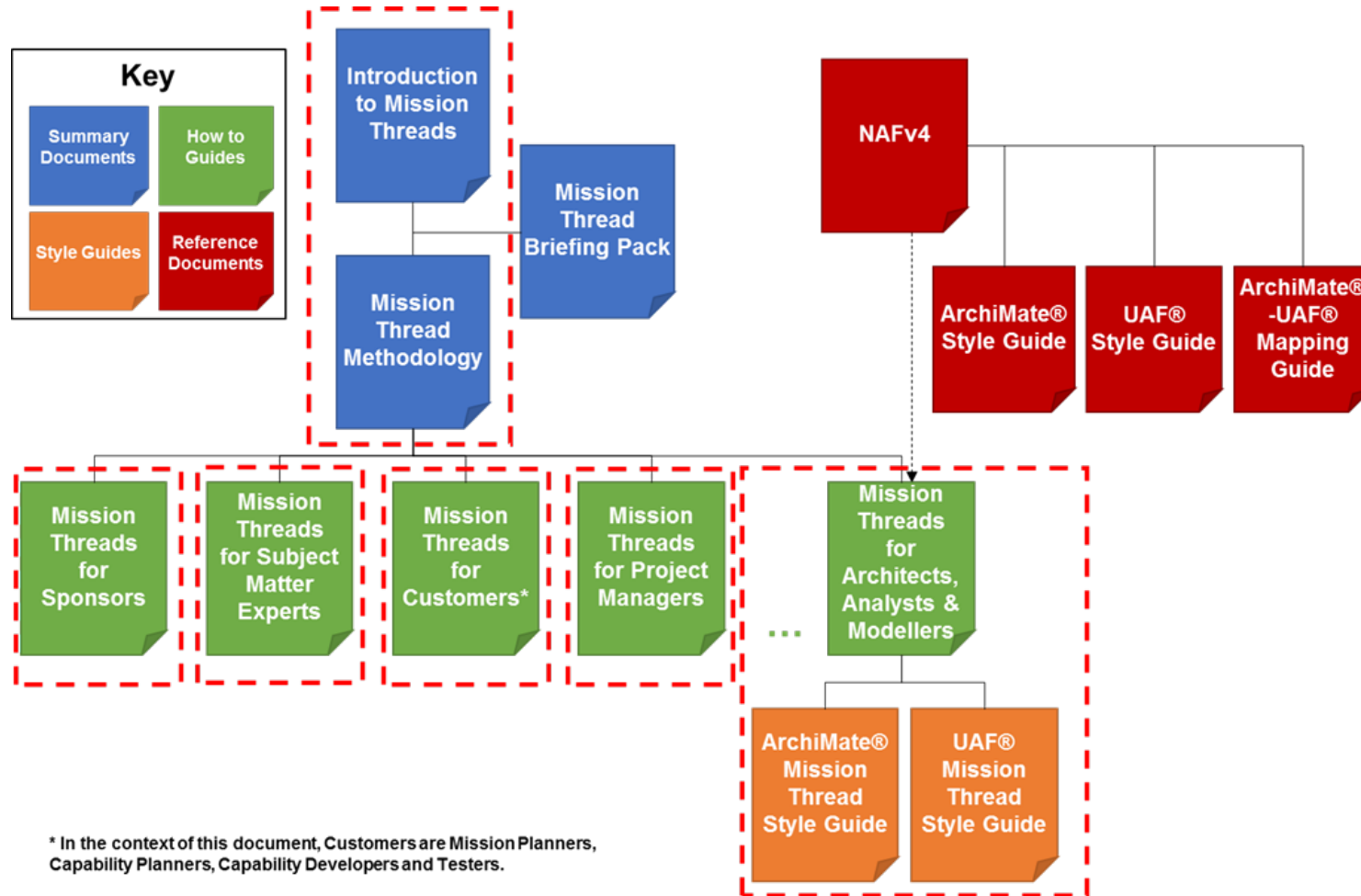# Federated Capability Development 'V' Model
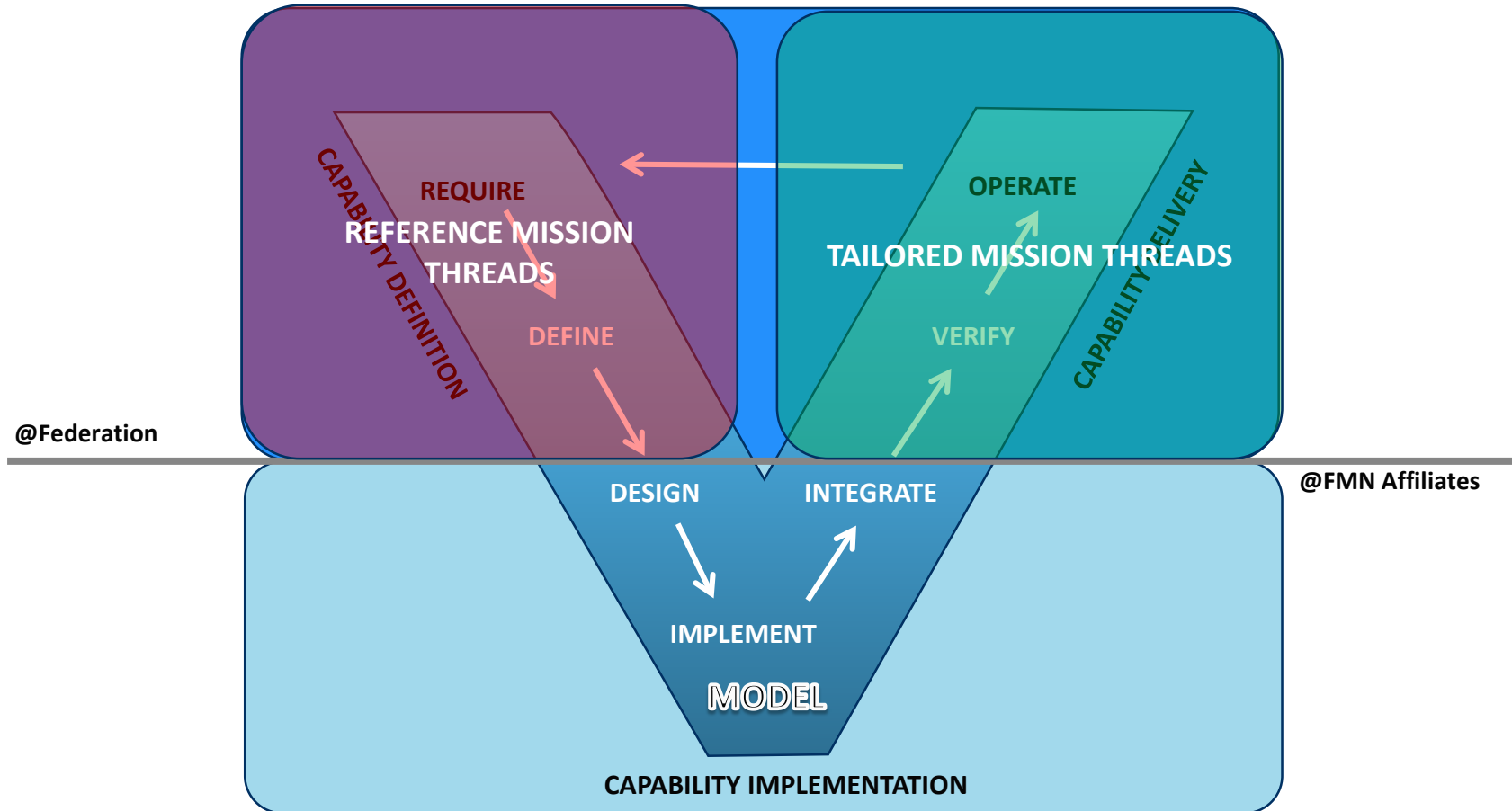
Mission Threads Process

- NOT a standalone process but instead a methodology that can be inserted into other activities

- "Customer friendly" approach – no Architecture jargon except where necessary and in those documents supporting architects and modelling community of interest

- Role based direction & guidance

- 5 Phases – Initiate, Analyse, Detail, Agree, Maintain

Develop Plan

High level Analysis

Engage Subject Matter Experts

Validate & Publish

Maintain Mission Thread

Mission Threads "How To Guides"

Key
- Summary Documents (blue)
- How to Guides (green)
- Style Guides (orange)
- Reference Documents (red)

Introduction to Mission Threads

Mission Thread Methodology

Mission Thread Briefing Pack

NAFv4
- ArchiMate® Style Guide
- UAF® Style Guide
- ArchiMate®-UAF® Mapping Guide

Mission Threads for Sponsors

Mission Threads for Subject Matter Experts

Mission Threads for Customers*

Mission Threads for Project Managers

Mission Threads for Architects, Analysts & Modellers
- ArchiMate® Mission Thread Style Guide
- UAF® Mission Thread Style Guide

* In the context of this document, Customers are Mission Planners, Capability Planners, Capability Developers and Testers.

Developing Mission Threads with NAFv4

NAFv4 Grid with overlay of Viewpoints used in Mission Thread Methodology

	Taxonomy	Structure	Connectivity	Processes	States	Sequences	Information	Constraints	Roadmap
Concepts	C1 Capability Taxonomy	C2 Enterprise Vision	C3 Capability Dependencies	C4 Standard Processes	C5 Effects		C7 Performance Parameters	C8 Planning Assumptions	Cr Capability Roadmap
Service Specifications (C1-S1)	S1 Service Taxonomy	S2 Service Structure	S3 Service Interfaces	S4 Service Functions	S5 Service States	S6 Service Interactions	S7 Service I/F Parameters	S8 Service Policy	Sr Service Roadmap
Logical Specifications	L1 Node Types	L2 Logical Scenario (L2-L3)	L3 Node Interactions	L4 Logical Activities	L5 Logical States	L6 Logical Sequence	L7 Information Model	L8 Logical Constraints	Lr Lines of Development
Physical Resource Specifications (L4-P4)	P1 Resource Types	P2 Resource Structure	P3 Resource Connectivity	P4 Resource Functions	P5 Resource States	P6 Resource Sequence	P7 Data Model	P8 Resource Constraints	Pr Configuration Management
Architecture Foundation	A1 Meta-Data Definitions	A2 Architecture Products	A3 Architecture Correspondence	A4 Methodology Used	A5 Architecture Status	A6 Architecture Versions	A7 Architecture Compliance	A8 Standards	Ar Architecture Roadmap

Behaviour (spanning Processes, States, Sequences)

Legend:
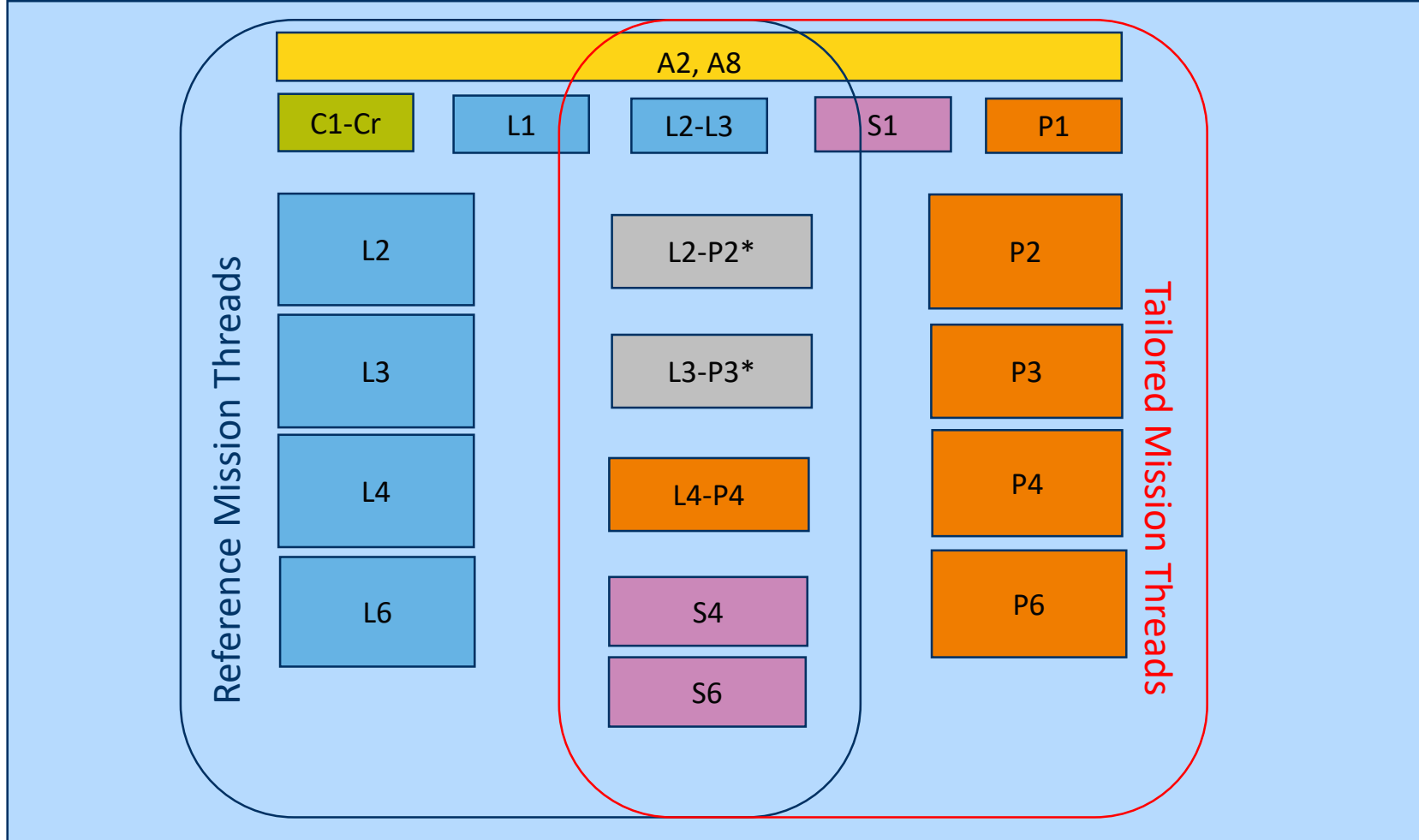- ⌐ ¬ May need to be developed based on existing taxonomies and concepts.
- ☐ Developed for Reference and Tailored Mission Threads.

* Viewpoints not currently defined on the NAFv4 Grid but provides the traceability from the Logical to the Physical

# Mission Thread from an Architecture Perspective and FMN Responsibilities
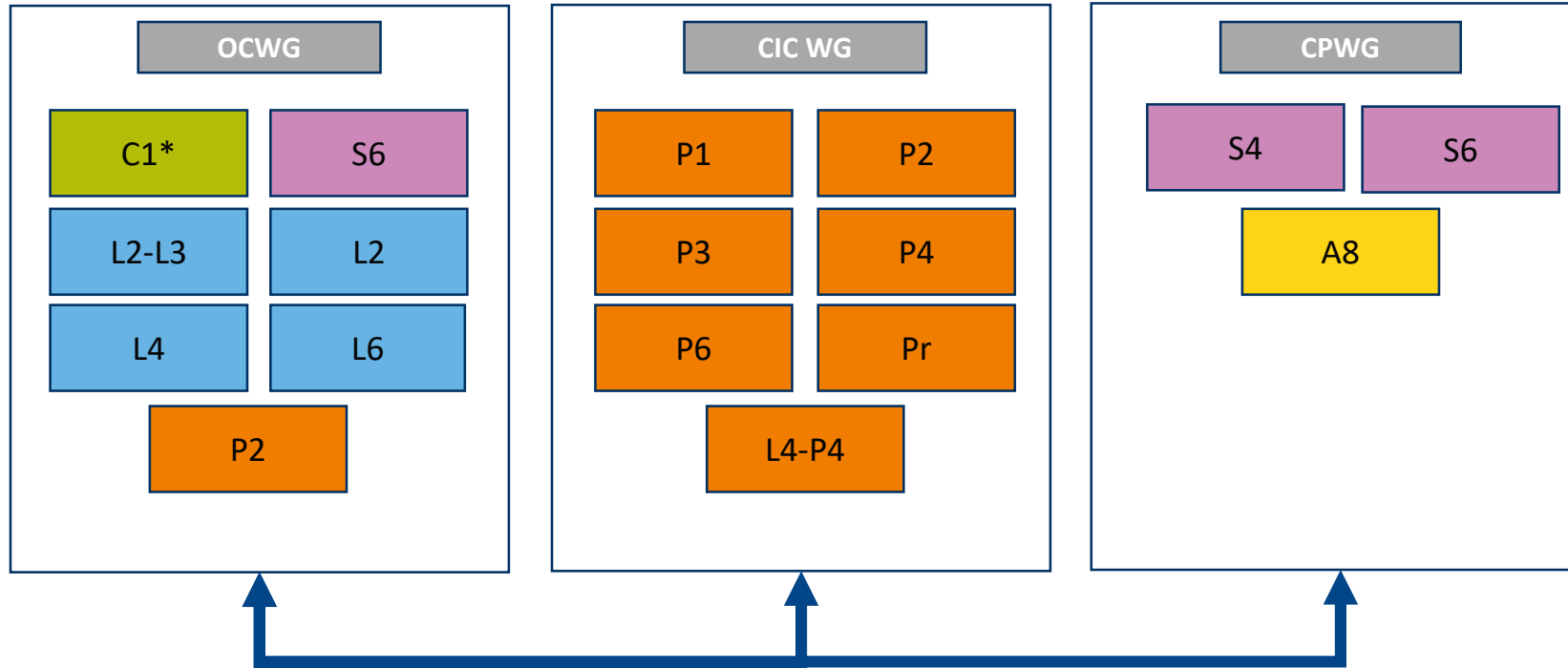
In FMN the responsibility to produce NAFv4 Views related to a Viewpoint on NAFv4 Grid was initially delegated to a number of Working Groups.

The development of supporting Mission Threads Views need Cross Working Group collaboration.

* This was the NCV7 in NAF v3.1 and the closest Viewpoint on Grid is the C1

Mission Threads in relation to the 'V' Model

Empowering NATO's Technological Edge
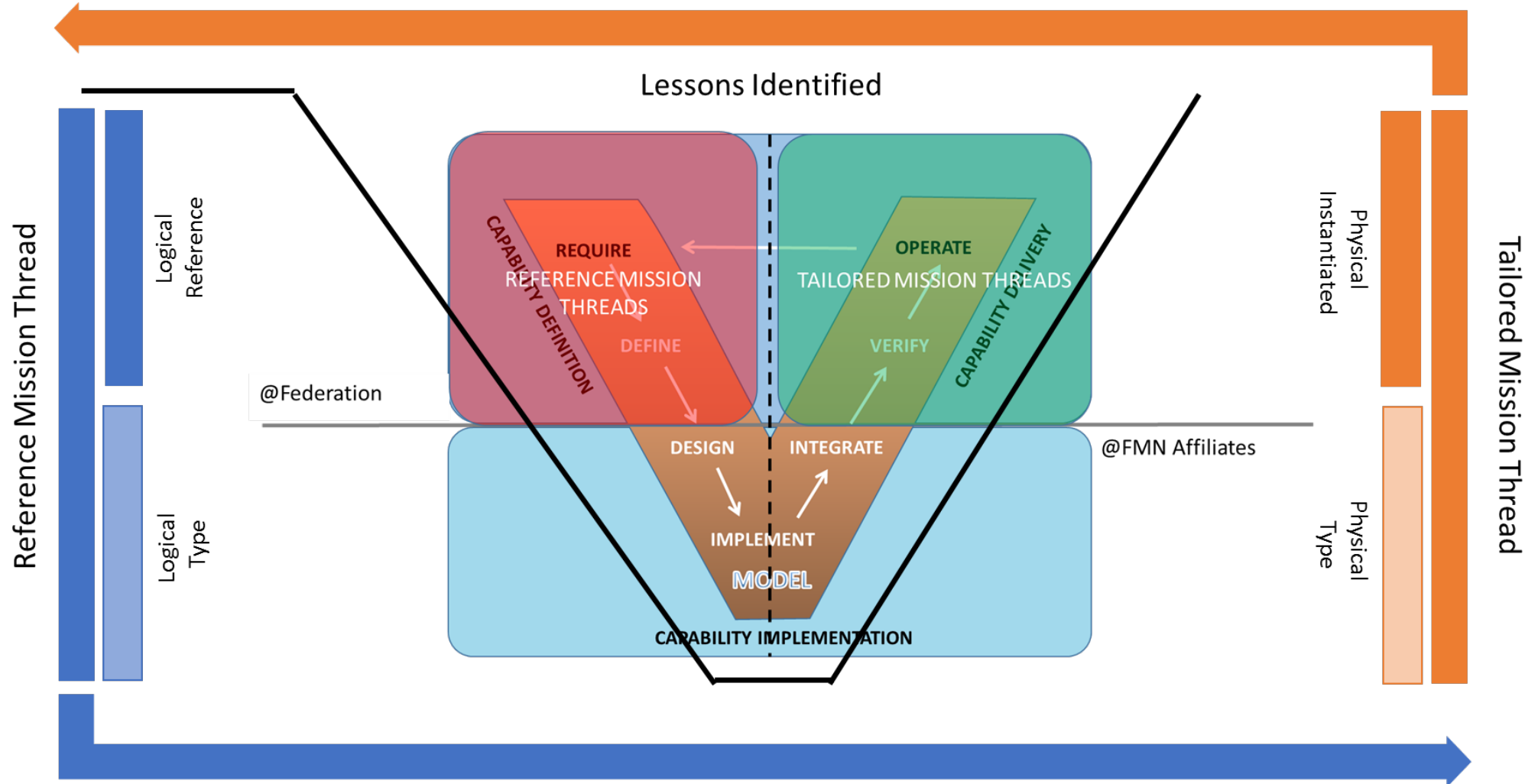
Traceability Matrix

		Technology (Hardware/Software)			People (Organization & Skills)	Process (includes Information)
		Capability				
Reference Mission Thread	Logical Reference	Equipment Concept e.g. Land Tactical Vehicle	Technology Concept e.g. Persistent Structured Data Store	Material Concept e.g. Ground to Ground Anti-Vehicle munition	Conceptual Role e.g. Tactical Unit	Reference Process e.g. "Operate" within C3 Business Process Taxonomy
	Logical Type	Equipment Class e.g. Combat Tank	Technology Class e.g. Relational Database	Material Class e.g. Anti-Armour	Operational Role e.g. Tank Crew	Standard Operational Activities e.g. Allied Land Tactical Procedures
Tailored Mission Thread	Physical Type	Equipment Type e.g. Challenger 2	Technology Type e.g. Microsoft SQL	Material Type e.g. Missile, Rocket or Mortar	Actor Type e.g. UK Army Tank Crew	Operational Activities e.g. UK National Doctrine
	Physical Instantiated	Actual Equipment e.g. Numbered vehicle of the type	Actual Technology e.g. Microsoft SQL Enterprise Edition v15	Actual Material e.g. Javelin Anti-Tank Missile	Actual Actor e.g. UK 1 Royal Tank Regiment Tank Crew	Actual Operational Activities e.g. 1 RTR Standing Operational Procedures
		Capability Inclement				

Phase 1 – Develop Plan

Activities

1. Confirm that there is an operational sponsor
2. Develop a vision for the scope of activities to be covered by MT documentation
3. Identify Subject Matter Experts
4. Identify support team
5. Identify existing documentation (policy, doctrine etc)
6. Identify other activities related to the mission activity (study groups, exercises)
7. Establish Document Library & Modelling Environment

KEY

Key Role during this phase

Lead Role during this phase

Supporting Role during this phase
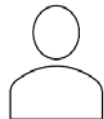
Minimum Engagement

Inputs

- Tasking
- MT Methodology
- Lessons Identified

Outputs

- Agreed Scope
- Stakeholder Communications Plan
- Context Diagram
- Resourced Project Team
- Initial Document Library
- Mission Thread Repository
- Project Plan

Senior Managers /Sponsors

Subject Matter Experts

Mission & Capability Planners

Capability Developers

Testers

Project Managers

Architects, Modellers & Analysts

Phase 2 – High Level Analysis

Activities

1. Review the doctrine, tactics, techniques and procedures (TTP), existing Mission Threads and other documentation related to the mission activity
2. Review lessons identified/learned
3. Populate document library (including source references)
4. Develop initial process flow diagrams and information requirements
5. Identify gaps and problem areas in the doctrine

Inputs

- Tasking
- Existing documentation
    - Policy & Doctrine
    - TTPs
    - Existing Baselined Mission Threads
- Process Taxonomy

Outputs

- Populated document library
    - Context Diagram
    - Information Flow Diagram
    - Draft Swimlane Diagram
    - Draft Information Requirements
- Doctrine inconsistencies/problem areas with existing source documents

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Phase 3 – Engage SMEs

Activities

1. Review the doctrine, tactics, techniques and procedures (TTP), existing Mission Threads security policy and other documentation related to the mission activity
2. Review lessons identified/learned
3. Iteratively develop Process Flow Diagrams and Information Requirement Matrices
4. Identify gaps and problem areas in the doctrine
5. Identify technical services that can support the information exchanges
6. Establish the technical and security constraints
7. Populate document library & Mission Thread Repository (including source references)

Inputs

- Outputs of Phase 2
- Existing documentation
    - Policy & Doctrine
    - TTPs
    - Existing Baselined Mission Threads
- Process Taxonomy
- Information Product Taxonomy
- Roles Taxonomy

Outputs

- Populated document library
    - Context Diagram
    - Information Flow Diagrams
    - Swimlane Diagrams
    - Information Requirement Matrices
- Constraints to be applied to capability development and/or operational use
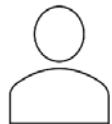
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Phase 4 – Validate & Publish Mission Thread

Activities

1. Review and refine MT documentation with the stakeholders
2. Identify gaps and limitations (Where MT documentation is deficient, return to Phase 3)
3. Baseline Mission Thread Documentation
4. Sponsor authorizes Baselined Mission Thread Documentation
5. Publish and communicate Mission Thread
6. Capture lessons identified

Inputs

- Outputs of Phase 3

Outputs

- Baselined Mission Threads
- Recommendations for future work

Senior Managers /Sponsors

Subject Matter Experts

Mission & Capability Planners

Capability Developers

Testers

Project Managers

Architects, Modellers & Analysts

Phase 5 – Maintain Baselined Mission Thread

Activities

1. Check if Policy or Doctrine has changed

   - Policy
   - Doctrine
   - Other Baselined Mission Threads
   - Feedback from Stakeholders

2. Update Document Library & Modelling Environment

Inputs

- Baselined Mission Threads
- Lessons Identified
- Doctrine and policy

Outputs

- Minor updates to Baselined Mission Threads
- Recommendations for future work

Senior Managers /Sponsors

Subject Matter Experts

Mission & Capability Planners

Capability Developers

Testers

Project Managers

Architects, Modellers & Analysts

Information Products

Product	Description	Produced in
Context Diagram	Required to frame the operational concept of the Mission Thread and highlight the main interactions with the environment other external systems, key information flows, nodes and sometimes the importance of the overall performance metrics.	Phase 1
Information Flow Diagrams	Roles and information flows between them	Phase 2
Process Flow Diagrams	Used to capture flow of the activities normally conducted in the course of achieving a mission or an operational objective. These will be produced at various levels of detail.	Phase 2,3
Stakeholder Map	Used to identify the key players/organizations/roles that normally conduct a mission or to achieve an operational objective.	Phase 2,3
Swimlane Diagram	Describes the process steps and associated information flows ordered by time and by organizational nodes	Phase 3
Information Exchange Tables	Describes the characteristics of an information exchange (Information Products, Periodicity etc) between organizational nodes.	Phase 3
Service List	Used to summarize the enabling (technical) services that are normally required to conduct a Mission Thread.	Phase 3,4
Scoping Document	Used to define the subset of enterprise taxonomies, lexicons, dictionaries that are relevant to the mission thread work	Phase 1,2
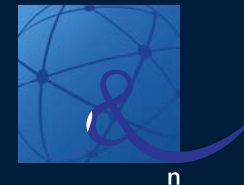
Presenter Contact Info:

Kevin Galvin
kevin.galvin@uk.thalesgroup.com

Contact us

E-MAIL   NMSG@cso.nato.int

WEB   www.sto.nato.int