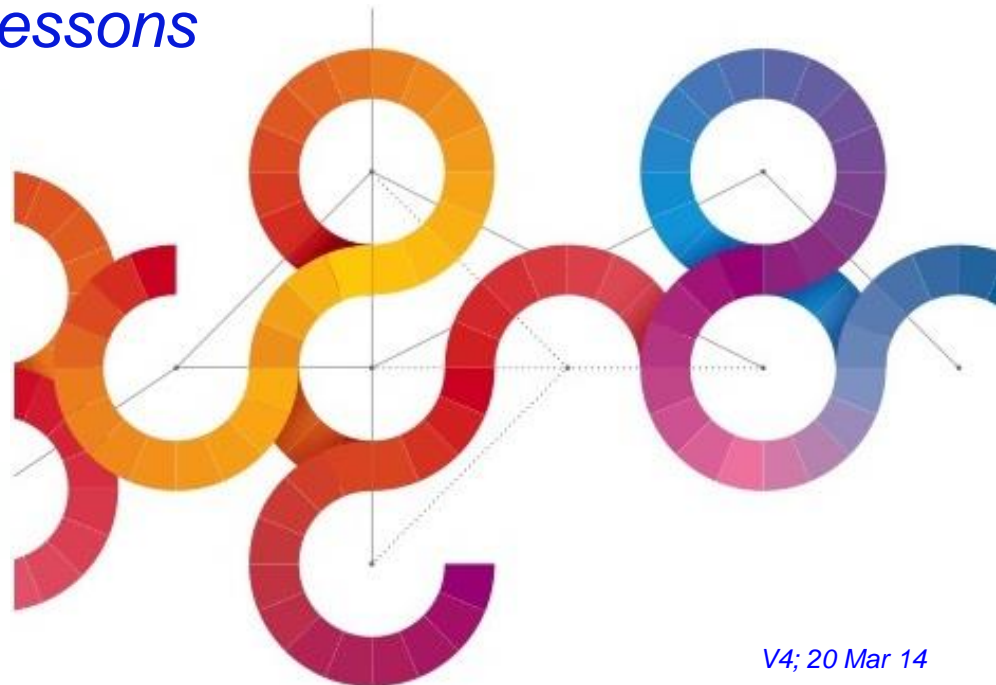# Federated Mission Networking

Learning & Applying the Lessons

John Palfreyman, IBM

Agenda

Future Mission Networking - Context

Effective Coalitions through OPEN Integration

Save money through Commercial Technology

Future Proof, Modular Missions

Context

FEDERATED

- services for exchanging and sharing information
- provisions for bilateral agreements

MISSION

- execution environment, enabling information sharing
  - trusted,
  - secured and
  - assured
- . . . between mission participants.

NETWORK**ING**

- Guides the establishment of all Mission Networks s for use in NATO operations
- (should be) Mandatory for NATO Response Force (NRF) operations.
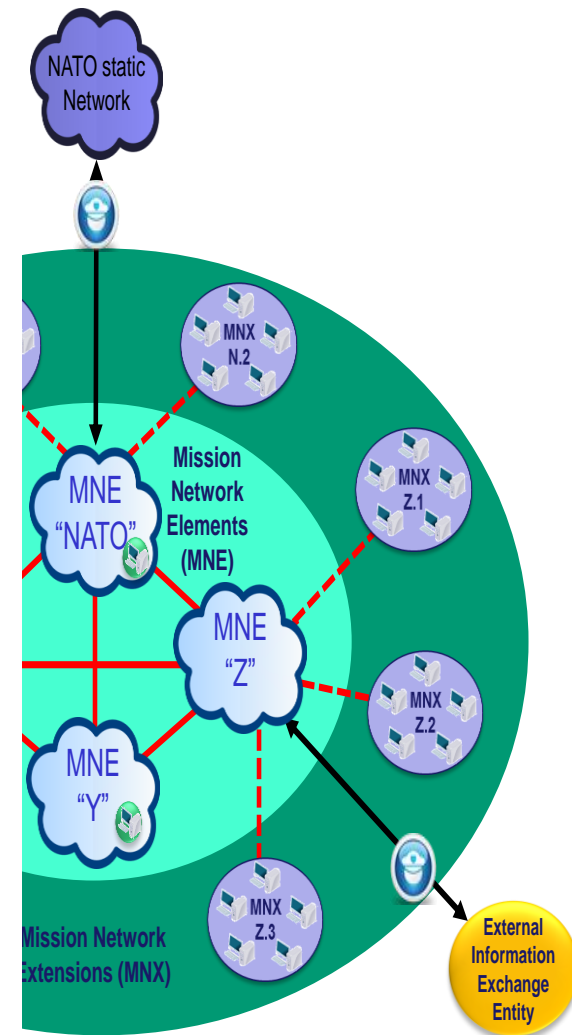
Future Mission Network Principles

Name	Description
Cost Effectiveness	The total cost of ownership and life cycle costs must reflect NATO's and the Nations' resource constraints.
Incremental Approach	The FMN embraces an incremental approach to adjust to changes in operational requirements and makes optimal use of commonly used technology for MNs.
Maximum reuse	Maximum use must be made of existing NATO agreed standards, capabilities, Nation's contributions, collaborative acquisitions, service level agreements and organizational structures.
Reflect C3 Taxonomy	The FMN services organization will follow the C3 Classification Taxonomy.
Reflect NNEC Tenets	The FMN will embrace the NNEC tenets and principles.
Support an Uncertain Future	The FMN provides the agility, flexibility and scalability needed to manage emerging requirements of any mission environment in future NATO operations. Different MNs may be necessary based on operational needs (operations, training & exercises).
Support Dynamic Federations	Each MN incorporates the necessary security processes, organization, architectures, governance, and Tactics, Techniques, and Procedures (TTPs) to effectively accommodate the dynamic nature of the federation composition between the partners.
The Network Standard	The FMN Framework guides the establishment of all MNs for use in NATO operations and should be mandatory for NATO Response Force (NRF) operations.

Implementation Plan, Annex Q – "Reference Architecture"

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Effective coalitions through Open Standards-based Integration

- All Missions will be coalition based
    - other nations military & security forces,
    - Non-government organisations (e.g. aid agency), and / or
    - Other government departments (e.g. emergency services)

- Coalition member's systems need to exchange information
    - often across different levels of trust.

- Only possible through open standards based integration of coalition member systems

- CENTRAL to coalition efficiency . . .

- . . . and hence Mission SUCCESS!

# . . . but OPEN is Confusing (and Confused!)

Open STANDARDS

- promote interoperability and information integration

- by use of open, published specifications interfaces, protocols, data and file formats

- to simplify sharing between different systems

Open SOURCE

1. Licensing approach which prioritizes user rights

2. A way of developing software

3. Community with open participation

Open ARCHITECTURES

- built of loosely coupled, reconfigurable elements

- independence to isolate and distribute

- integrate activities into workflows to increase collaboration

Open Standards
Open Data
Community Innovation
Open Source
Open Architecture

7
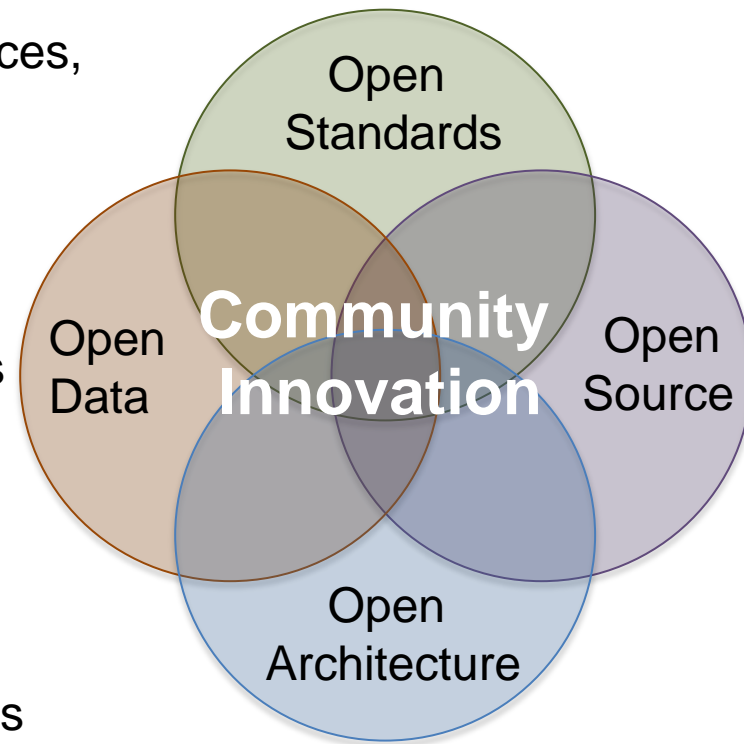
How? Lessons from MAJIIC

IBM's Role

- Facilitated usage of Service Oriented Architecture

- Applied Service Orientation & Event Based Architectures to Mission Need

Example Activities

- Modelling of missions as business processes using standard tools

- Provision of Publish / Subscribe Services based on WS Notification

Key Lessons

- Process Modelling > Lots of Discussion on how things (should) work

- Service Orientation and Legacy Systems can co-exist

How? Lessons from MAJEX

IBM's Role

- Service Oriented / Event Driven Architecture Software Provision:
    - Concept Development & Test Environment
    - MAJEX Exercise

- Web Service (WS-) Notification for Publish / Subscribe

- Novel JISR Status Reporting using Event Monitoring

Example Activities

- Operation & Support of Publish / Subscribe Services through Exercise

- Support to Industry Partners on Interfacing to WS-Notification standard

Key Lessons

- Architecture can handle the load generated by MAJIIC

- Benefits of Services Oriented Architectures clear to partners

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Cash Starved, Commercial Technology Rich Procurement

1. Appetite for mega defence project spend killed by austerity, will not return

2. Commercial technology investments continue at a pace

3. Commercial technologies can address HARD military problems

UK Air Defence System

Why?

- Monitor UK Airspace for terrorist or enemy incursions & initiative intercept

What?

- IBM implemented state-of-the-art air surveillance and interceptor command & control system

- Developed software applications, integrating multi-radar tracking and voice systems and refurbishing entire computer facilities at two RAF bases

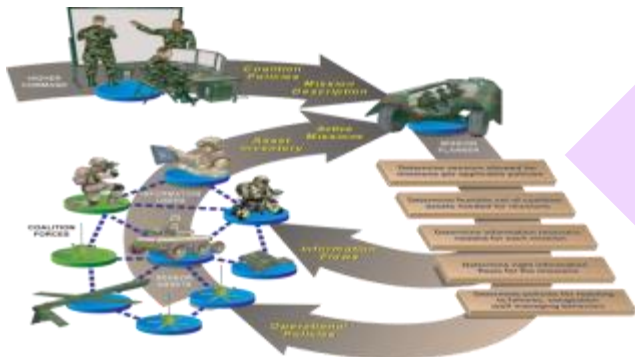- Extensive technology refresh through life

Benefits?

- Reduced Cost (by using Commercial Software)

- Intuitive Human Computer Interface boosts controller performance & reduces training

- New levels of availability & maintainability

Indicative Locations

International Technology Alliance – Technical Ares, 2011 to 2015

Distributed Coalition Information Processing for Decision Making (TA6)

Exploiting and managing an agile network of information sources for effective understanding & decision making across the coalition for dynamic complex problems

- Shared Understanding and Information Exploitation

- Service management in Distributed Networks

- Exploitation of Distributed, Uncertain, and Obfuscated Information

Coalition Interoperable Secure & Hybrid Networks (TA5)

Secure hybrid wireless networking that enables adaptable and interoperable communication and information services for military coalition environments

- Hybrid Networks: Performance and Metrics

- Security/Network Management and Control

- Security for Distributed Services
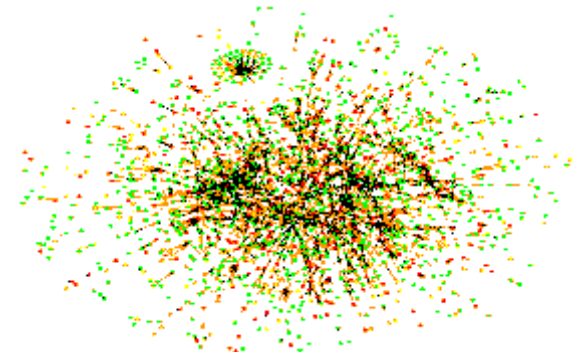
# IBM Research – Long Range Signalling & Control

Why?

- Connection of small, low power devices into communications network

- Designed for Internet of Things, several possible military applications

What?

- LoRa, modulation technology for wireless communication over 15 km

- Data rates 300bps to 100kbps, dynamically trading range for data rate

- IBM Mote Runner: platform for resource constrained devices

Benefits?

- wireless range for dense urban environments

- cost-effective - initial investment & running costs

- reliable & secure – encryption & spread spectrum

- Fine localization of mobile devices (<2m)
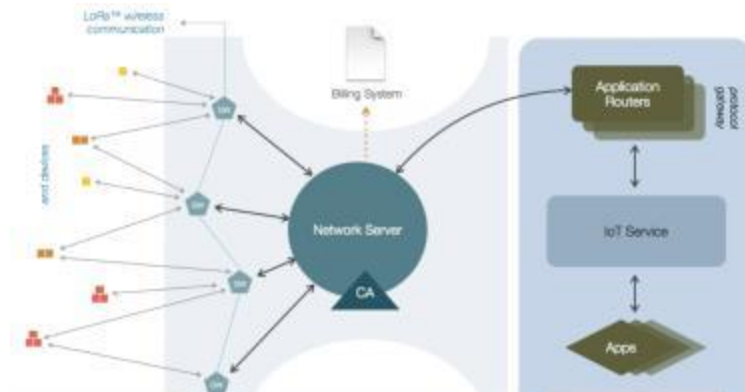
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Preparing for an Uncertain Future . .

"The Future Mission Network provides the agility, flexibility and scalability needed to manage emerging requirements of any mission environment in future NATO operations. Different Mission Networks may be necessary based on operational needs (e.g. operations, training and exercises)"

"Each Mission Network incorporates the necessary security processes, organization, architectures, governance, and Tactics, Techniques, and Procedures to effectively accommodate the dynamic nature of the federation composition between the partners."

FMN Implementation Plan – Annex Q – General FMN Principles

Smarter Application Development Method
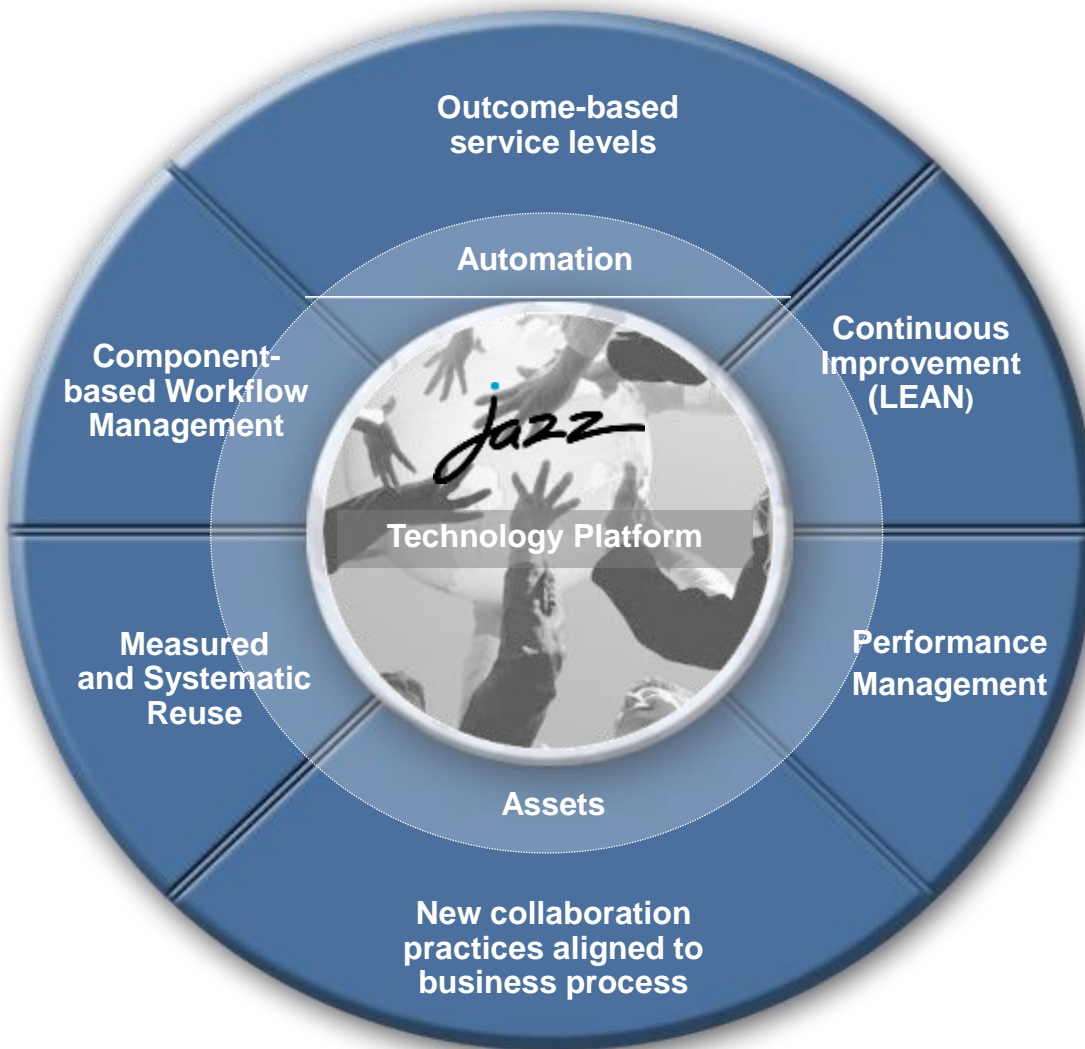
Why?

- Time to Value = key metric
- Distributed development the norm

What?

- Combines tools based methods with . . .
- . .Social Business Platform

Benefits?

- Cycle-time reductions
- Asset Re-use
- Defect reductions
- Component cost reductions

Lessons from MAJIIC / MAJEX

1. Service & information Modelling can be used to define operational processes and procedures

2. Business Process Modelling
   – Drives CLARITY through DISCUSSION
   – Leads to a traceable, reconfigurable model of Mission

3. Modern, Open Architectures & Legacy System Co-exist

Modular Mission Development

- **Use Software Tooling + Social Business Technologies**
  - Controlled, collaborative system specification
  - Multi-party system development
  - Integration, Test, Lifecycle Management

- **Use Business Process Modelling to design & document mission types**
  - NATO owns & manages mission threads
  - Adjust standard mission threads to (specific) mission

- **Fast mission build for Future Mission Network instances**
  - Pre-existing building blocks
  - Configurable assembly for each mission
  - Federated preparation of the mission

Future Mission Networking - Summary

1. Effective Networking (=Coalitions) through Open Standards-based Integration

2. Future Procurements whilst Cash Poor can be Commercial Technology Rich

3. Uncertain Future demands Modular Mission Design & Development

Thanks!

John Palfreyman

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