Interoperability at the tactical edge: Lessons learned from Enterprise Challenge 2016

Susan Toth

William Hughes

Damon Conover

Jesse Kovach

Tien Pham

Jeff H0user

The Nation's Premier Laboratory for Land Forces

- **Enterprise Challenge is a USD(I) directed annual experiment**

- **ICoE at FT Huachuca has the lead for Army Experiments under EC**

- **Relevant "Priority Touch Points" include:**
  - **Identity and Access management**
  - **Data Tagging**
  - **Content Discovery and Retrieval**
  - **Collaboration Tools**
  - **Visualization Capabilities**
  - **Service Discovery**

- **Infrared Motion Detection (IrMD)**
  - **Multi-purposes soda-straw sensors to provide WAAS/GMTI**
    - Uses automated processing to detect and track targets not visible to the human eye in raw FMV over a wide area
    - Provides increased analyst and sensor effectiveness
  - **Small onboard processor on airborne platform which multi-purposes existing, widely deployed EO/IR sensors**

- **Roll-on Roll-Off (Ro-Ro) Deployable PED**
  - **High performance network backbone, storage and virtual machine environment**
  - **Supports versatile, modular configuration with easy deployment of different software stacks as virtual machines.**
  - **Provides a system that can function as either a robust deployable asset or a flexible testbed environment**

- **3D Sensor COP Concept:**
  - **Real time interface for multiple sensors**
  - **Users have instant awareness of available assets**

- **Open Standards for Unattended Sensors**
 - **Coalition ISR Assets Interoperability**

- **Perform live-fly IRMD validation test and distribute through the enterprise**

- **Improve sensor awareness through more robust 3D Sensor COP**
  - **Validate framework developed in previous EC exercises**
  - **Opportunity to develop immersive approach**
  - **Incorporate disparate sensor data into a common data store**
    - **Allow "sensor to mission" management**
    - **Improve collection management**
    - **Incorporate coalition data**

- **Ro-Ro as a deployable PED system**
  - **DCGS-A Emulator on Ro-Ro**

- **Successfully demonstrate OSUS on US and Coalition Sensors**

During the execution of EC 16, Army Research Laboratory (ARL) personnel executed seven (7) vignettes designed to stimulate various Unattended Ground Sensors and provide movement for an aerial sensor that offered Infrared Motion Detection.

The seven vignettes provided scenarios that are representative of activity in current theaters of operation, easily repeatable, required a minimum of support resources and offered the maximum integration of disparate sensor types. The seven vignettes are:

1) Border Surveillance
2) Improvised Explosive Device (IED) Emplacement
3) Point of Origin (POO)
4) Weapons Cache Surveillance
5) Border Surveillance and IED Emplacement
6) Mortar Launch in an Urban Environment and Dismounted Exfiltration
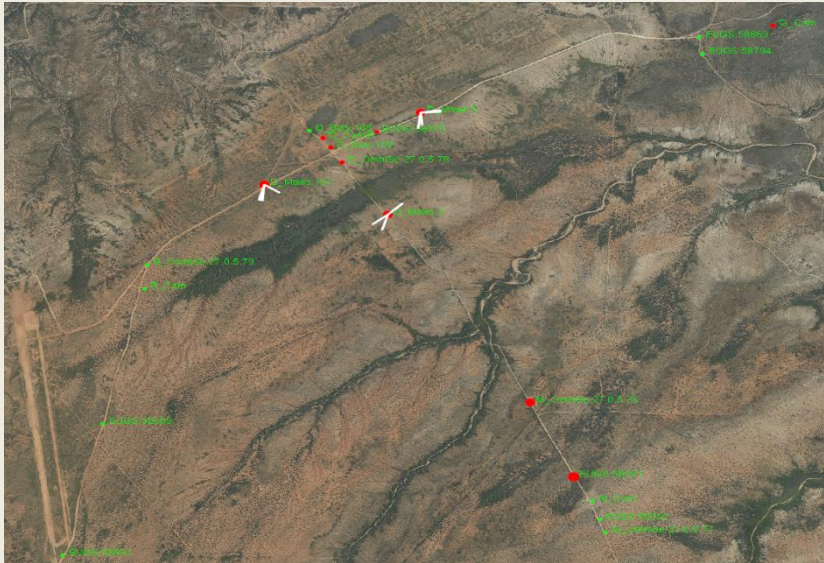7) Landing Zone (LZ) Surveillance

The Nation's Premier Laboratory for Land Forces
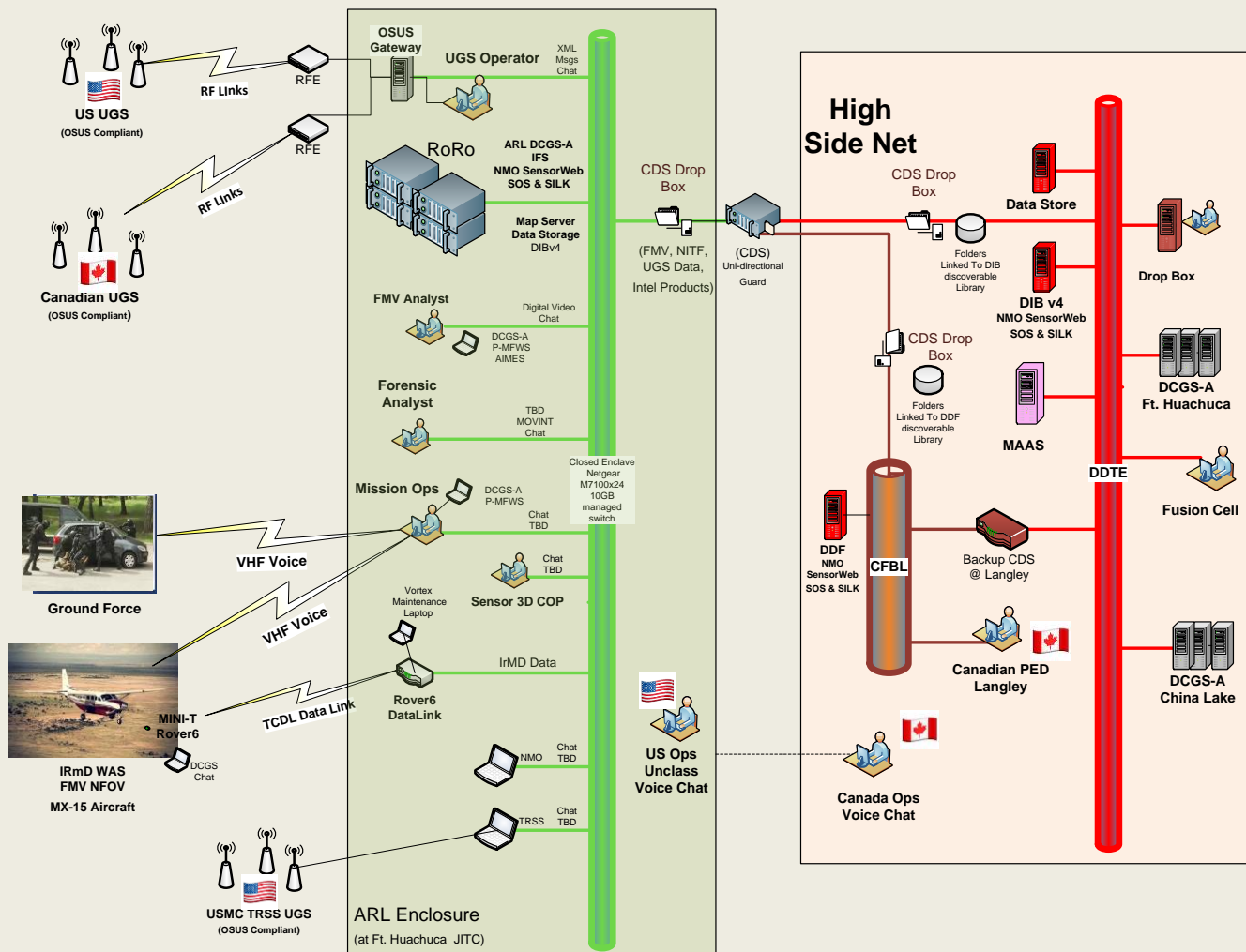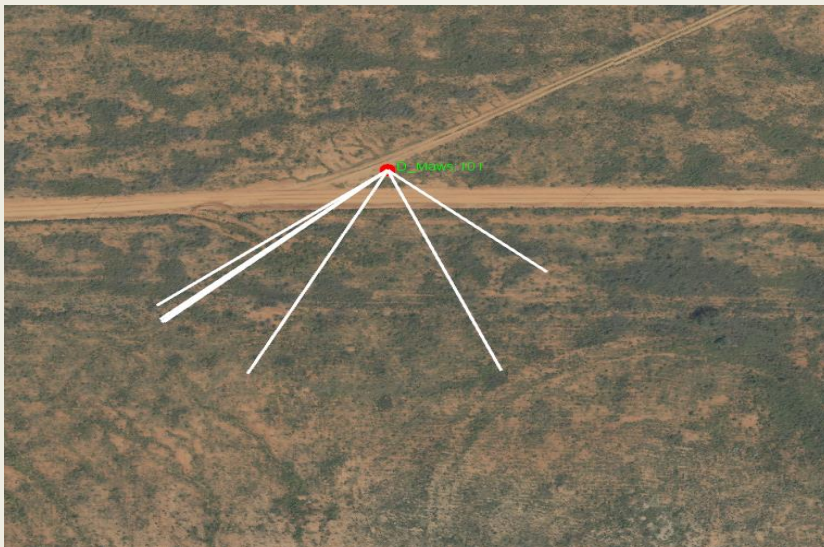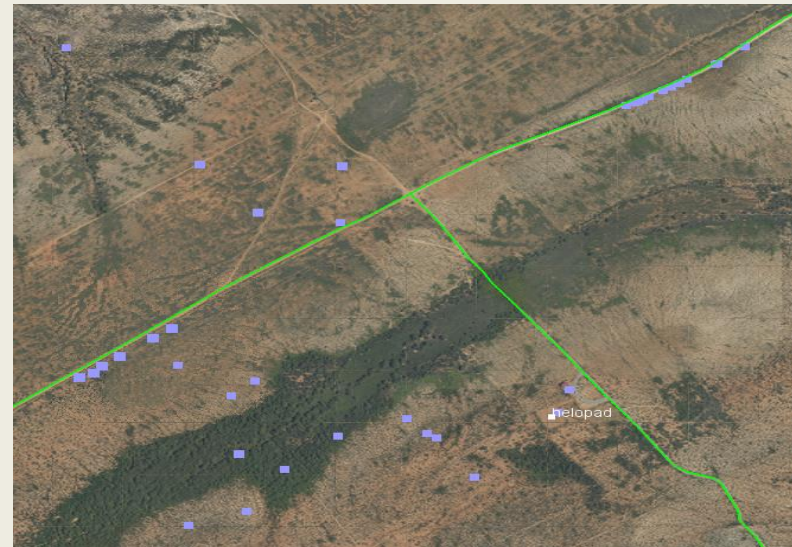
ARL EC16 Network Architecture
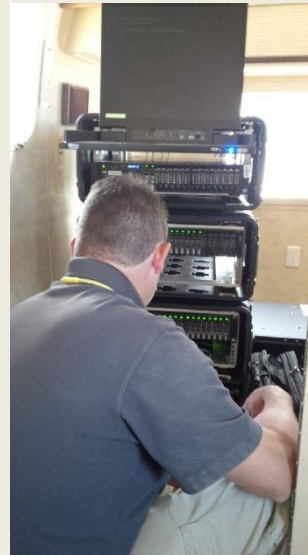
Displayed Sensor Location and Activity

View Sensor Data

Lines of Bearing

4607 Compliant GMTI Tracks

Anatomy of an OSUS Controller

| Sensor A | Camera A | Camera B |

| Sensor B | Radio A |

OSUS Bundles (SW from Plug-in OEMs)

OSUS Core

Other Services	OSGi Framework
	JRE	JNI
Embedded O/S	Drivers
General Purpose Processor	I/O

| Image Processor | GPS |
| Signal Processor | Radio B |

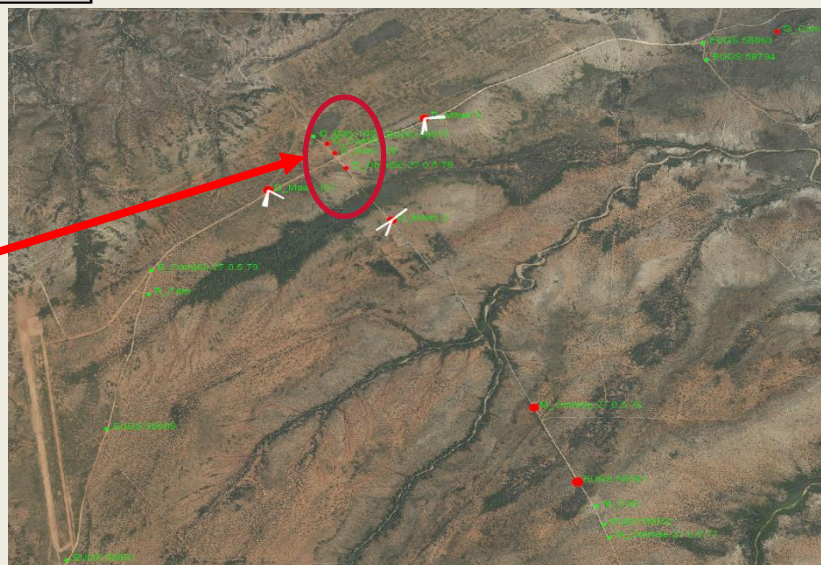| Power Source | Test/User Interface |
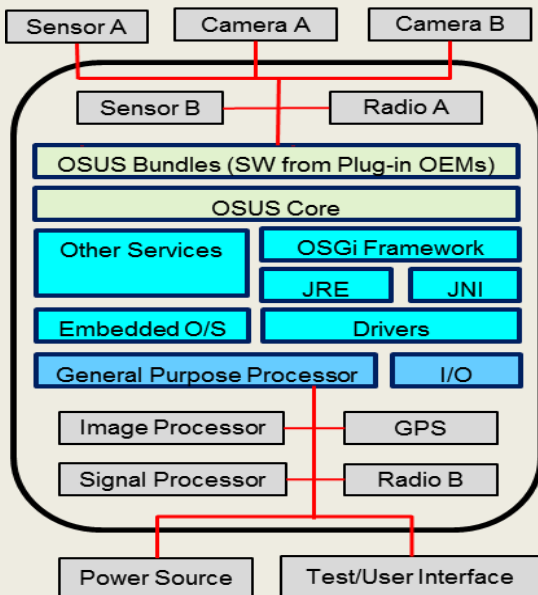
Canadian Sensor

Canadian Sensor location and alert

US COP

- **Exercise conducted July – August 2016**

- **ARL met almost all goals set with respect to:**
  - **Coalition Integration**
  - **IrMD**
  - **Sensor 3D COP**
  - **RoRo PED**

- **Highlights:**
  - **Successfully integrated Canadian sensors into our architecture using OSUS**
    - **Conducted autonomous cross cueing**
    - **Controlled US assets with the Canadian controller and vice versa**
  - **Flight tested IrMD**
    - **Successfully generated 4607 compliant tracks**
  - **Partnering with National MASINT Office, OSUS schema modified to meet guard requirements**
    - **UGS data passed through the guard into the exercise domain**
      - **Enabled data federation using DCGS-A DIB v3 and DIB v4 with DIB v4 supporting the SensorML services that were CDS accredited and DIB v3 supporting the standard DCGS-A PMFWS toolset**
    - **Schema is the foundation for the proposed NATO STANAG 4789 Sensor Integration Standard for NATO ISR Operations**
  - **Developed 3D Sensor COP which showed sensor activity live**
  - **RoRo expeditionary PED system worked with zero down time**

The Nation's Premier Laboratory for Land Forces

- ARL validated novel technologies

- ARL validated concepts of employment

- There needs to be ongoing work, particular in the coalition environment, to push the envelope on:

  - Interoperability

  - Sensor display and management

  - Coalition integration

  - Repurposing existing sensors

The Nation's Premier Laboratory for Land Forces