Modelling and Assessing Air-Surface Integration

Dr John O’Neill
LtCol Bede Galvin
Ms Lydia Byrne
Ms Cherylne Fleming
Mr Duncan Byrne

Joint Operations Division
DSTO, Department of Defence, Canberra
Outline of Presentation

What is Air Surface Integration (ASI)?
What did we do?
What did we find?

Our systems analysis approach to ASI in an Australian context...
• ASI models that describe the structure, function, and behaviour of the ASI system.

■ Key issues are:
  - Cross boundary
  - Response to Events (R2E) activities
  - Operational specific ASI organisations
  - Islands of automation
  - How to monitor airspace
    (what is a RASP – Recognised Air Surface Picture)
UNCLASSIFIED

Bases, Ground & Sea Units

Tactical Transport

Air-air refuelling

JFECC – Ground Effects

SACC – Ground & Surface Effects

COORDINATING ALTITUDE

TACTICAL TRANSPORT

CASEVAC

FAIP

GBAD

Artillery

JFT

JFT

CAS

TARGET (near blue)

Target (no blue)

Deliberate Targeting

Hydro / Mine Warfare

LHD

AMF

Deliberate Targeting

Dynamic / Time-Sensitive Targeting

TARGET (near blue)

JFO

Air-refuelling

FARP

SF JTAC

JTAC / JFT

CAS

SACC – Ground & Surface Effects

Air-refuelling

JFECC – Ground Effects

SACC – Ground & Surface Effects

Deliberate Targeting

Hydro / Mine Warfare

LHD

AMF

Deliberate Targeting

Dynamic / Time-Sensitive Targeting

TARGET (near blue)
Airspace Control Measures

Tactical Transport

Coordinating Altitude

CASEVAC

Air-air refuelling

Cas

Deliberate Targeting

Target (near blue)

Target (no blue)

Hydro / Mine Warfare

Deliberate Targeting

LHD

AMO

JFO

Air-Sea Battle

JFECC – Ground Effects

SACC – Ground & Surface Effects

JFTAC – Time-Sensitive Targeting
**What is ASI?**

- ASI *...all the processes and mechanisms used to plan, coordinate, control and deconflict the use of airspace ...* 

- Effective ASI allows intelligence collection, air defence and the execution of the Joint Scheme of Manouevre in the same battlespace without fratricide, or physical or electromagnetic interference.

- Adaptive ASI views the battlespace as having both physical and information dimensions and enables the use of real-time information flows to facilitate dynamic event-based activities concurrently with other activities in the battlespace.
Cross Boundary issues

Some of the cross-boundary aspects include:

• assets transiting across multiple ACMs (air space control measures)
• assets transiting across multiple ACMs owned by different roles
• assets transiting across multiple ACMs owned by roles from different Services (Navy, Army, Air Force, Special Forces) and civilian agencies (civilian air traffic control)
ALI C2 structure – depends upon Operation
ASI Activity Model

Three sets of activities

- Deliberate Battle space Effects
- Response to Events
- Immediate Battle space Effects
What is RASP or Islands of Automation?

- **ASI** ...all the processes and mechanisms used to plan, coordinate, control and deconflict the use of airspace
Modeling and Assessing ASI

- **ASI C2 organisational structure** is generated for operational specific configurations (i.e. it changes)

- **Response to events** (mid layer of the activity model) people bringing together information sets from organic sources not functional sources

- **Cross boundary issues** have C2 implications as discussed with the ALI visualisation model

- **Islands of automation** shown in the C2 structure and components models

- **RASP** – also shown in the components model & brings together different organic information for different mission types [e.g. TST CASEVAC].
Summary

What did we do:
• A systems analysis approach to ASI in an Australian context,
• ASI models for structure, function, and behaviour

What did we find:
The key issues that emerge are primarily at the cross-boundary system integration level from a socio-technical perspective.
- Cross boundary
- R2E
- How to assemble an operational specific ASI organisation
- Islands of automation
- How to monitor airspace (what is a RASP)

Next Steps:
Future work will apply the ASI models to evaluate future socio-technical options.
The options will be examined in terms of:
• roles performing activities from the ASI systems inventory remains valid (a simple substitution)
• reallocation of activities between roles
• some roles are no longer required or additional roles need to be created
Air Surface Integration... Any Questions?