Australian Government
Department of Defence
Science and Technology

Improving Joint Force Integration by Design in the new Defence Capability Life Cycle

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INCOSE 2017

Levels of SE Intervention

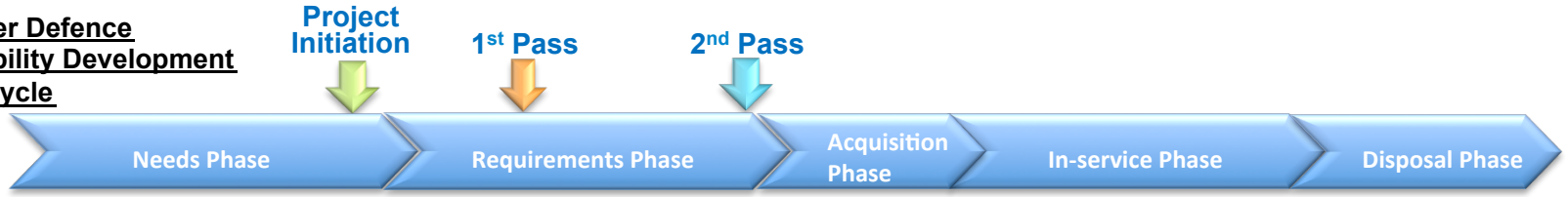
Top Level SE Decision Making	Senior Defence Decision Makers require representations of integration risks and issues in which to make joint force level decisions.
Middle Level SE Decision Support And Analysis	Defence Capability Developers support the Decision Makers. They require a consistent framework in which to identify and capture project and capability integration risks and issues.
Lower Level Model Based Systems Engineering	Architectures and models support the Defence Capability Developers identify, analyse and trace integration risks and issues.

Overview

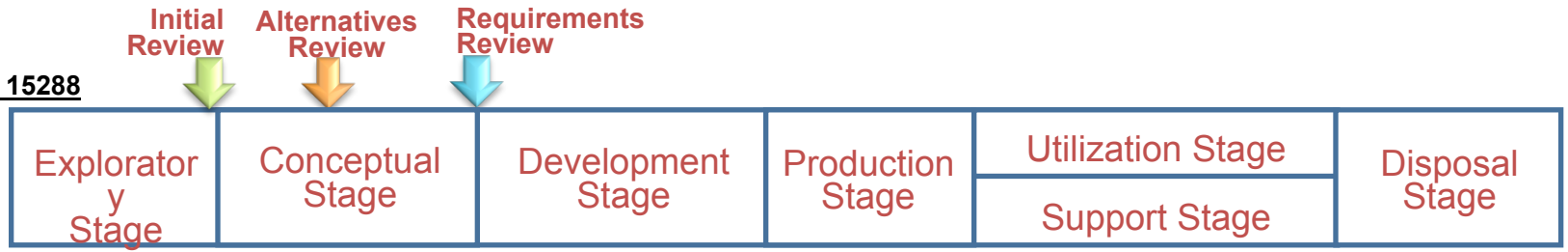
1. New Defence Capability Life Cycle
   - Changes, relationship to IOS 15288
2. Systems Engineering Intervention
   - 3 Levels and two views (Management and Capability views)
3. Parameters for Joint Force Integration by Design (JFIBD)
   - Driving requirements for JFIBD, Database to support JFIBD
4. Latest Work on Joint Force Integration by Design
   - Program and Product Dependencies using SCMILE

Comparing Capability Life Cycles

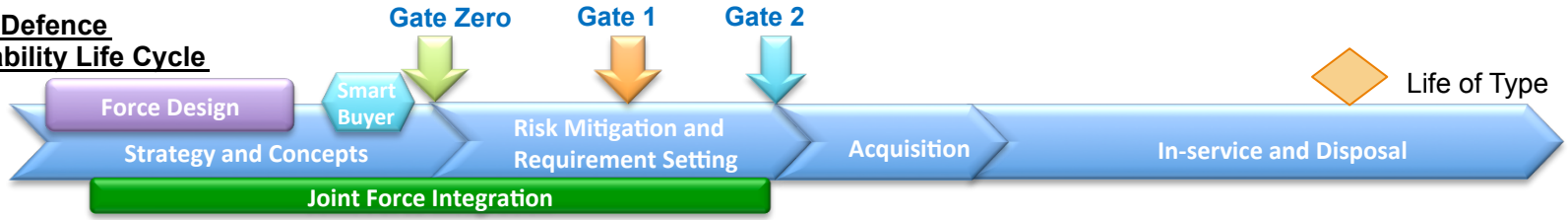
Former Defence Capability Development Life Cycle



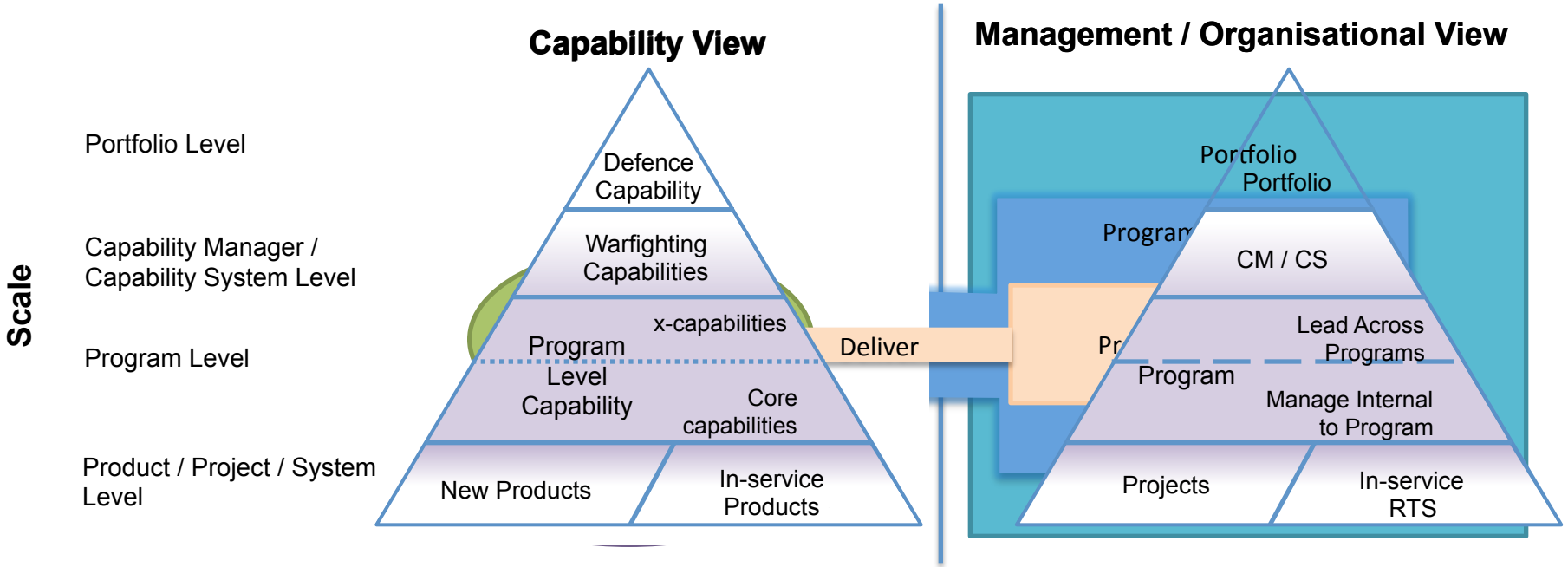
ISO 15288



New Defence Capability Life Cycle



Capability and Management Views



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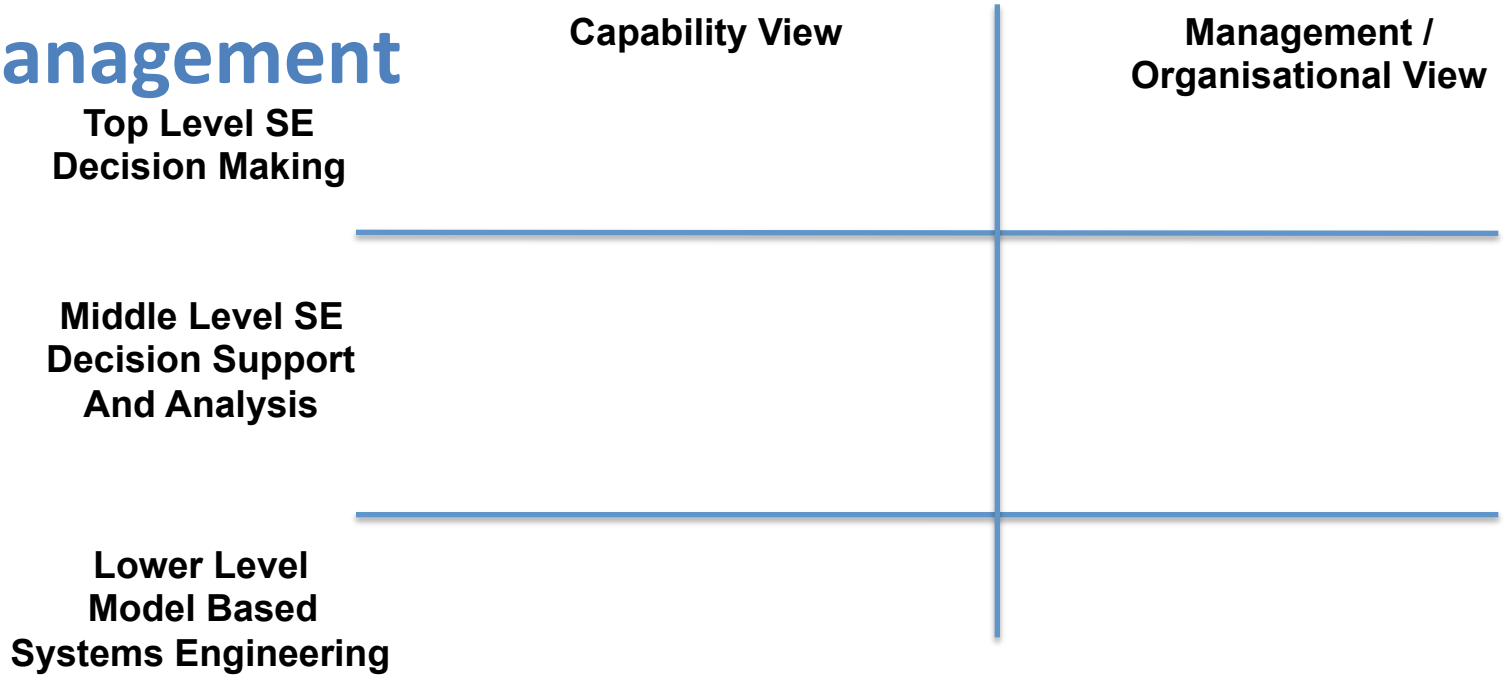
Three Levels of SE supporting Capability and Management



1. Beasley, R., A. O'Neil. 2016

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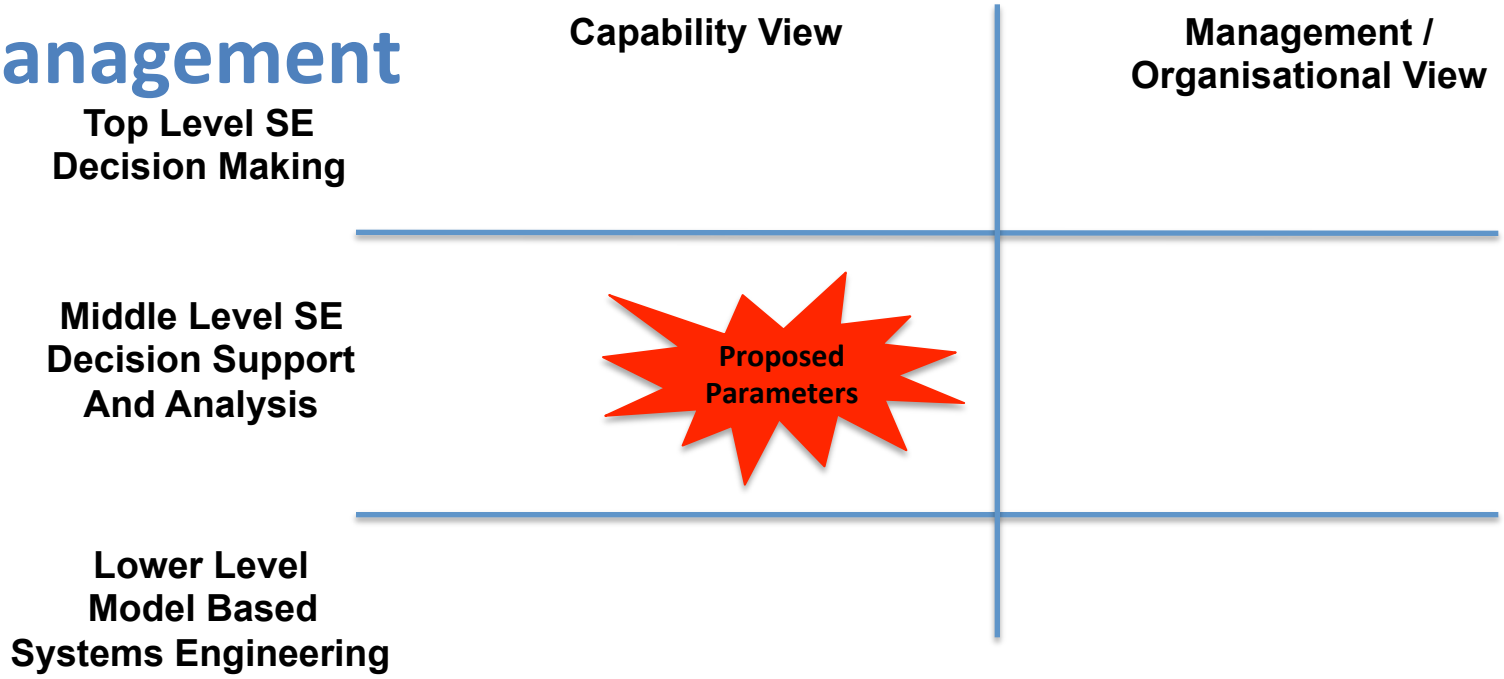

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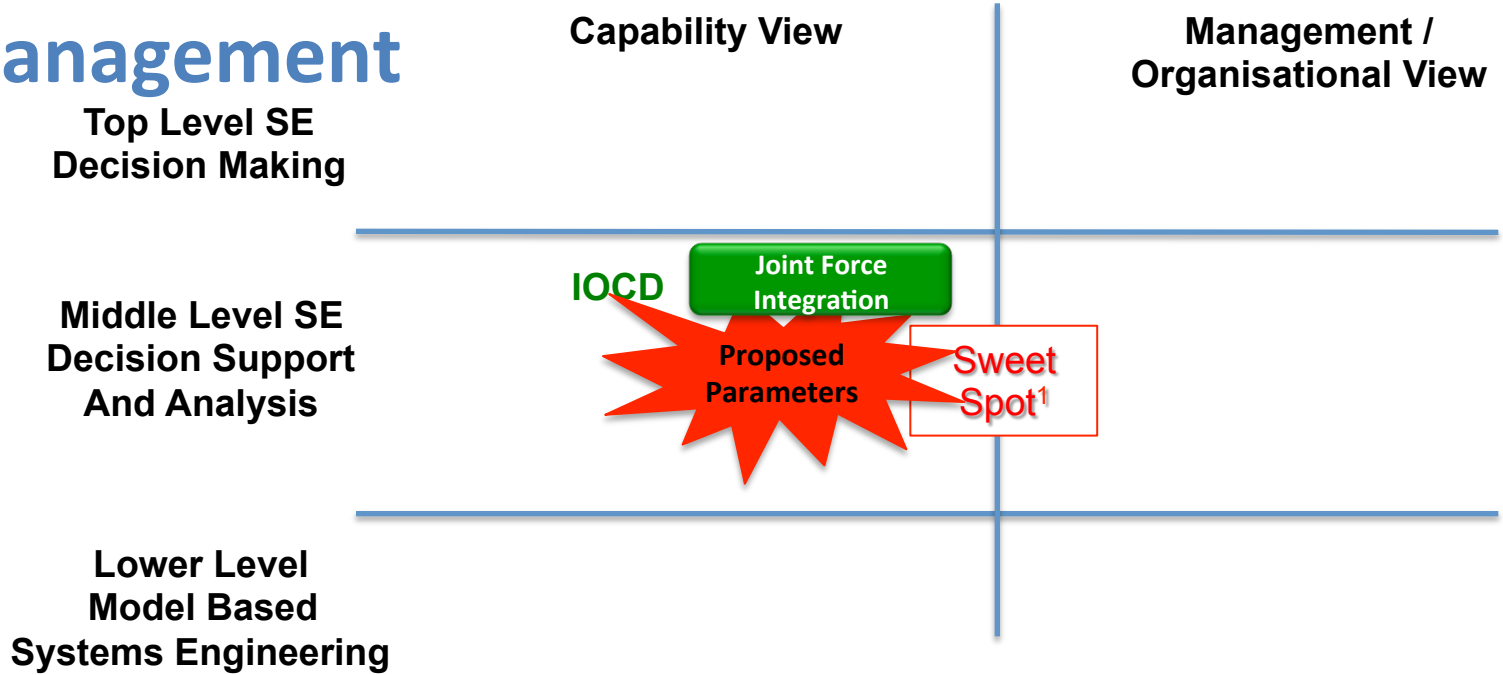

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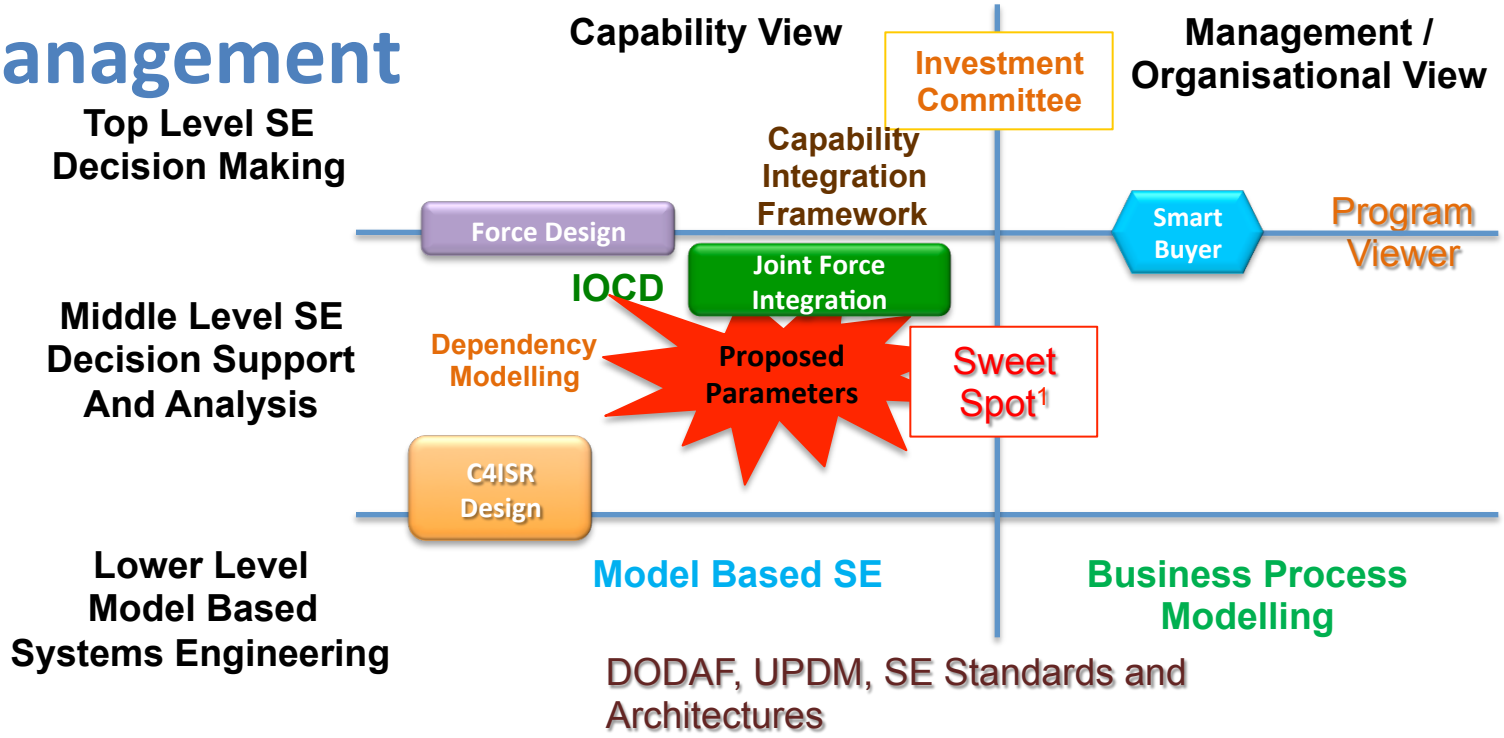

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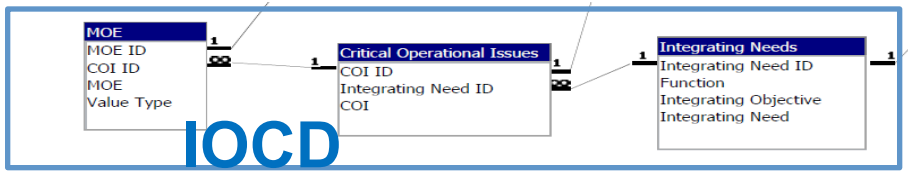
Doing Integration by Design

To do *Integration by Design*, we stipulate that the following must be true:

- Driving Requirement(s) exist for integration
- These requirements have been analysed
- Integration design options have been generated
- Deliberate and evidence based design decisions have been made and recorded
- The consequence of the design decisions have been assessed

Product Integration Need Parameters



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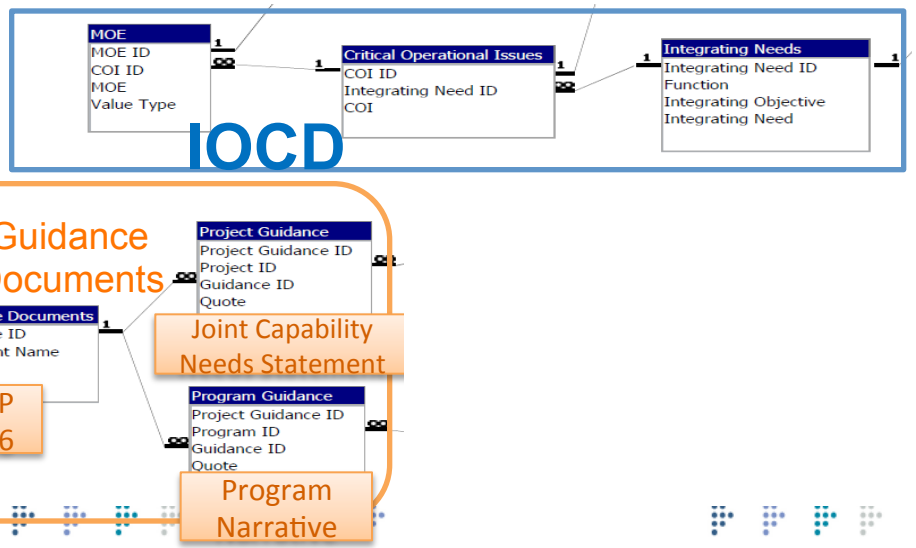

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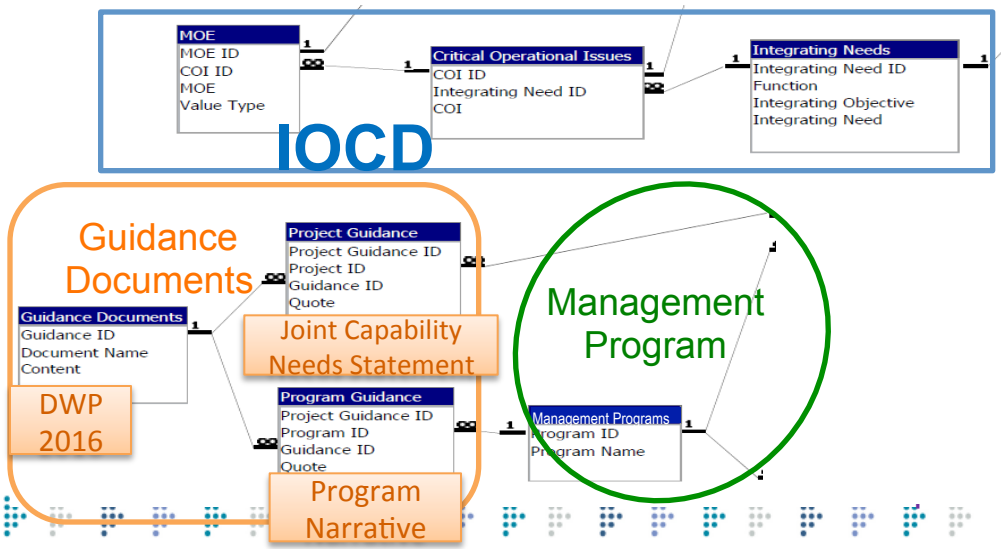

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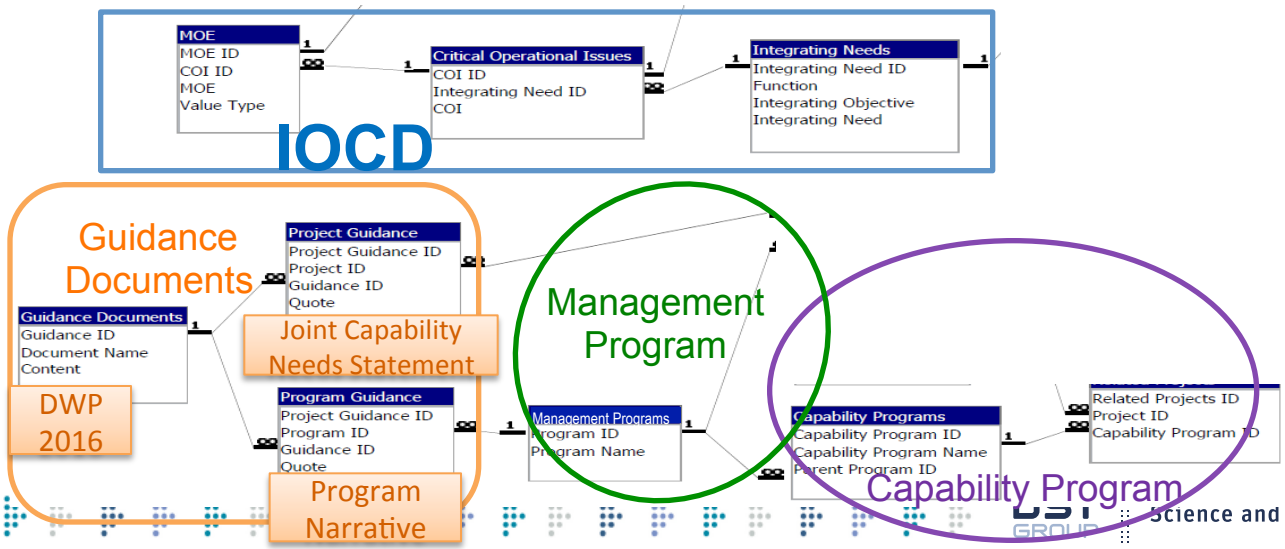

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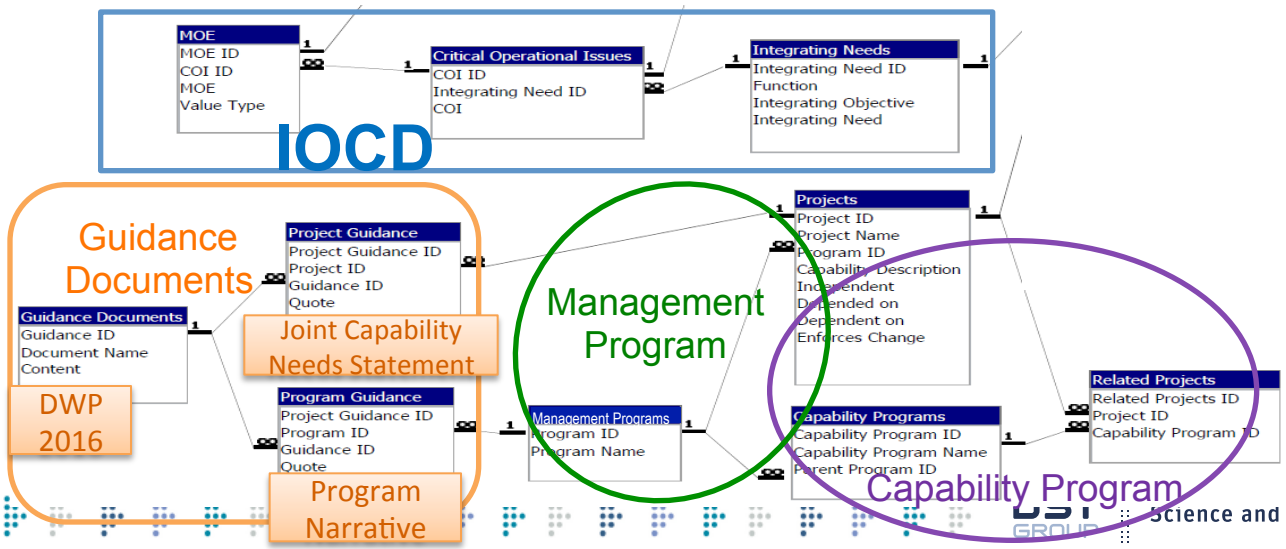

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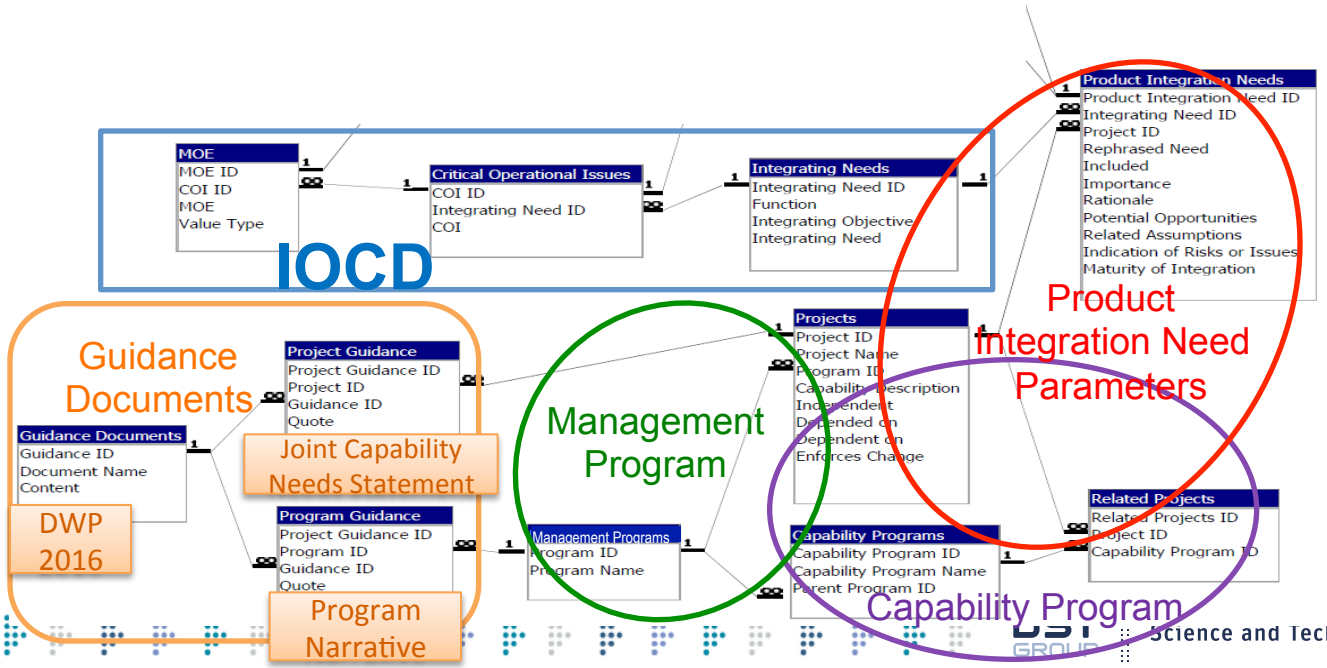

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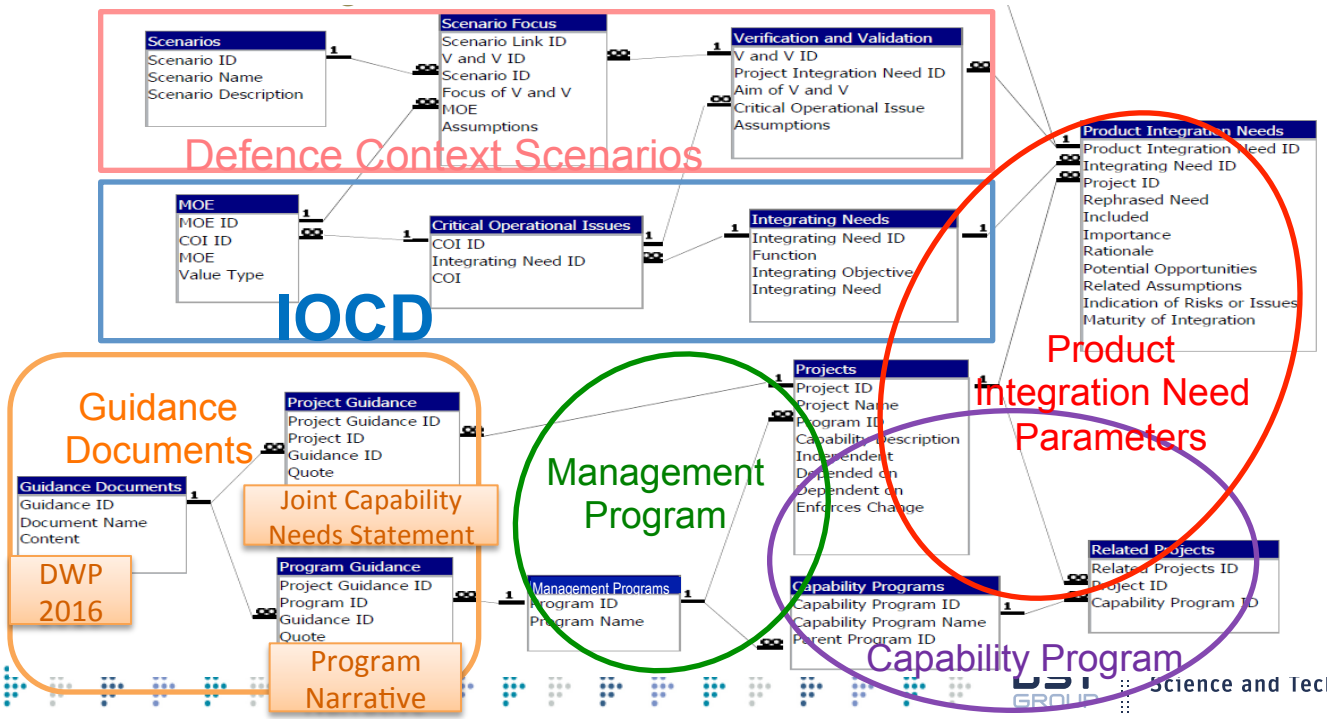

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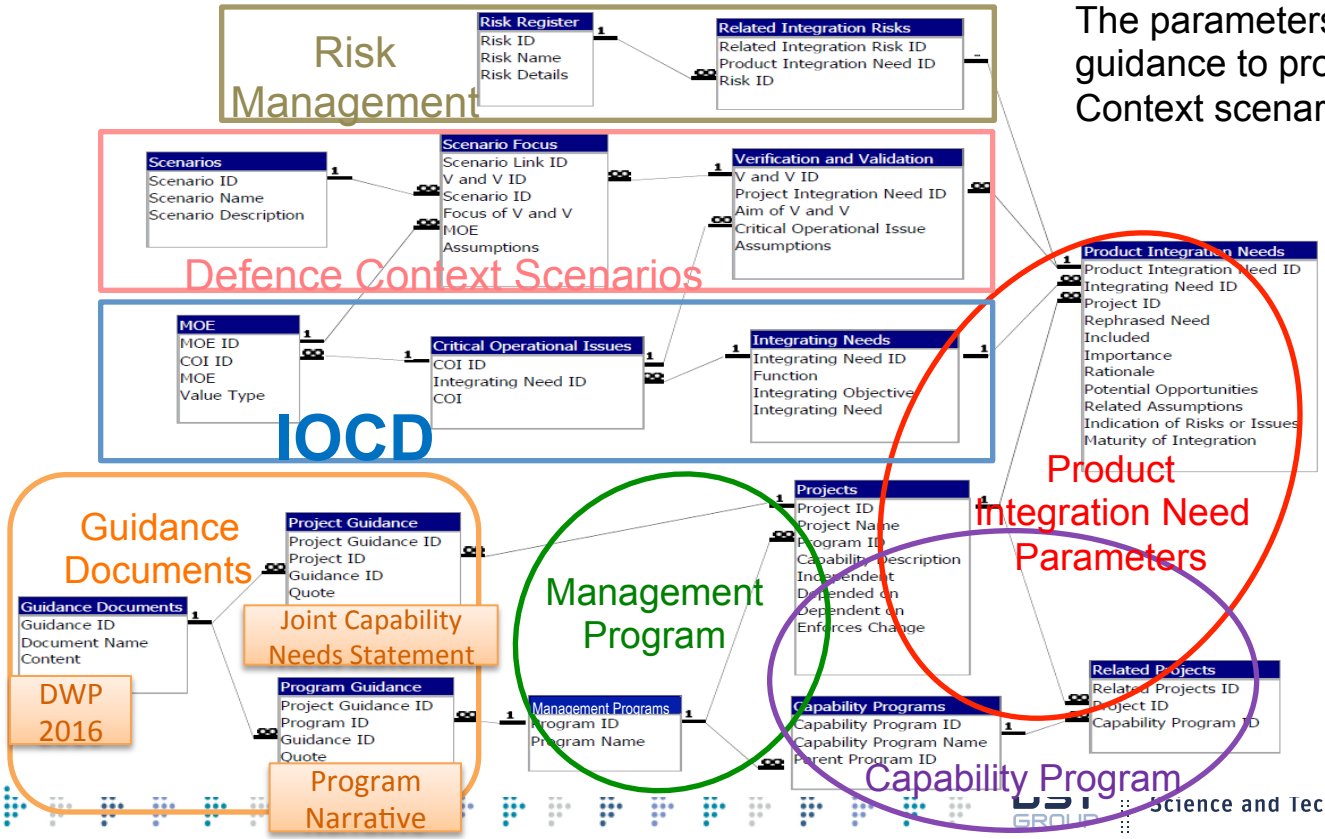
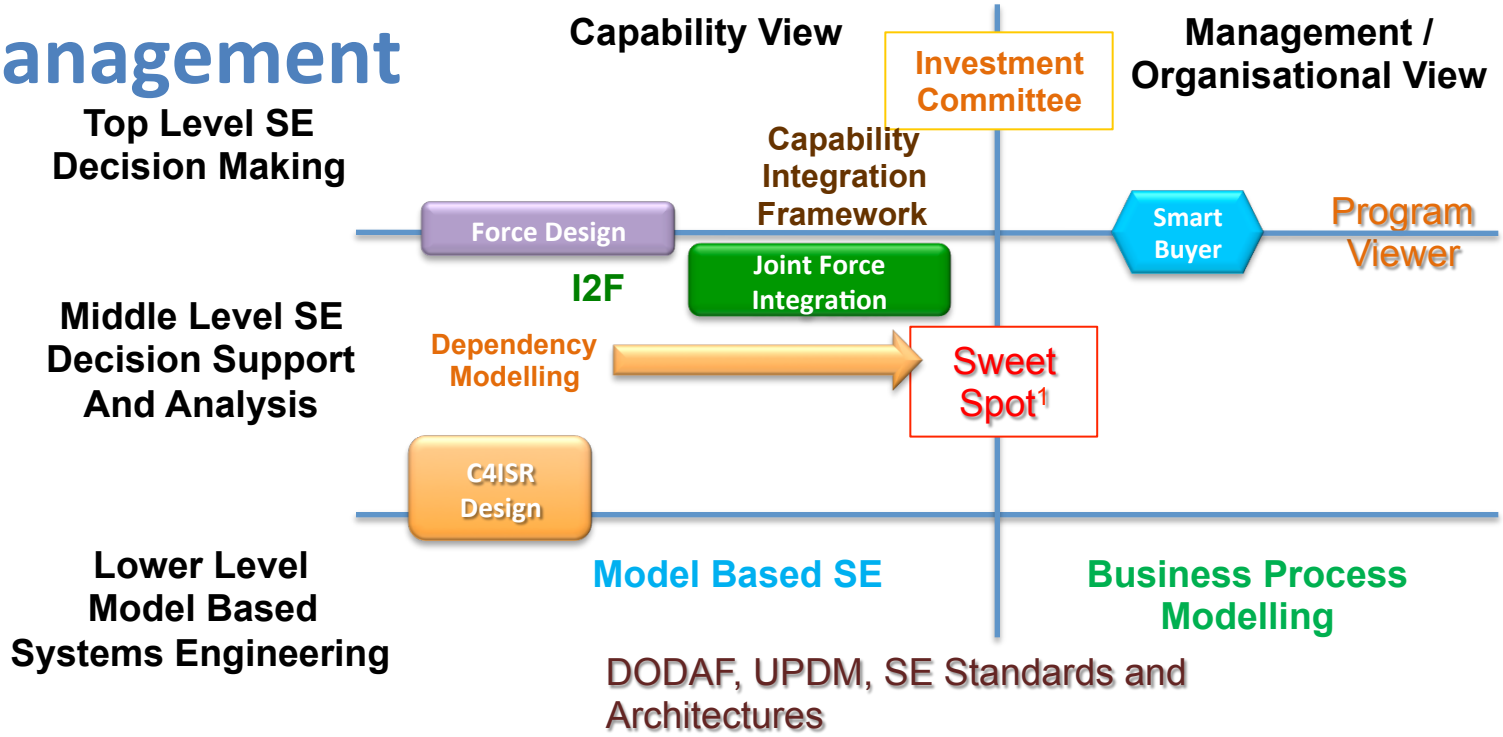


The parameters link integration guidance to projects, programs, Context scenarios and risk tracking.

Summary

- **Earlier SE Intervention** in the new Defence Capability Life Cycle.
- SE and SOSE **intervention in the middle level has been improving** and continues to realise benefits for Defence Capability.
- The parameters, presented in this paper, capture the assumptions and rationale behind joint force integration design decisions - **supporting high level decision making and guiding low level architectures**.
- Work in this area is continuing. Particular emphasis is currently on representing **dependencies between products within a program** capability.

Three Levels of SE supporting Capability and Management



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Questions

Acknowledgements:
- Defence Systems Integration, JOAD, DST Group

- Joint Integration Concepts and Assurance, JCMID, VCDF Group

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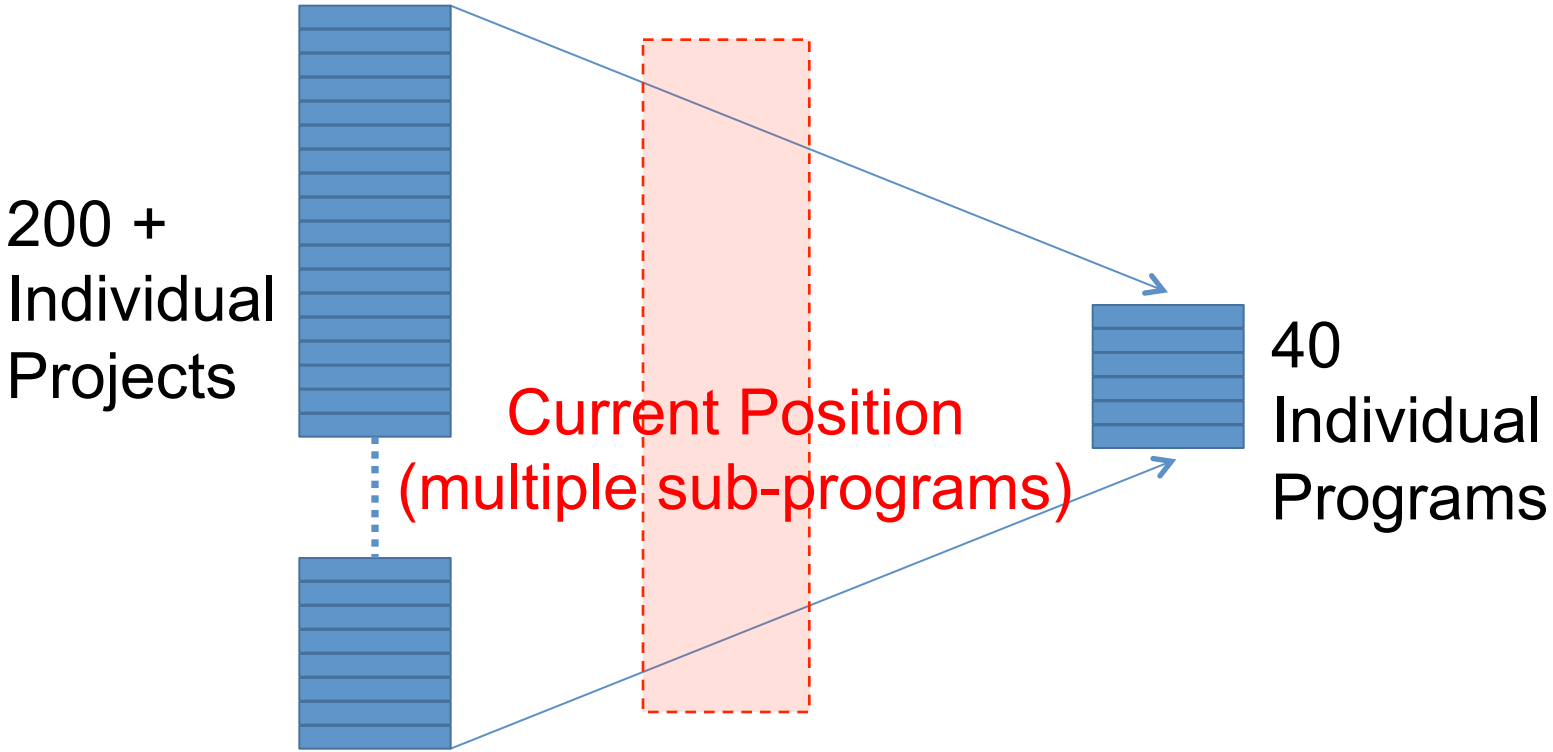
Moving to a Program Management Approach



IOCD

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Australian Government
Department of Defence

Capability Development Group

INTEGRATING OPERATIONAL CONCEPT DOCUMENT

Version – 2.0

21 November 2014

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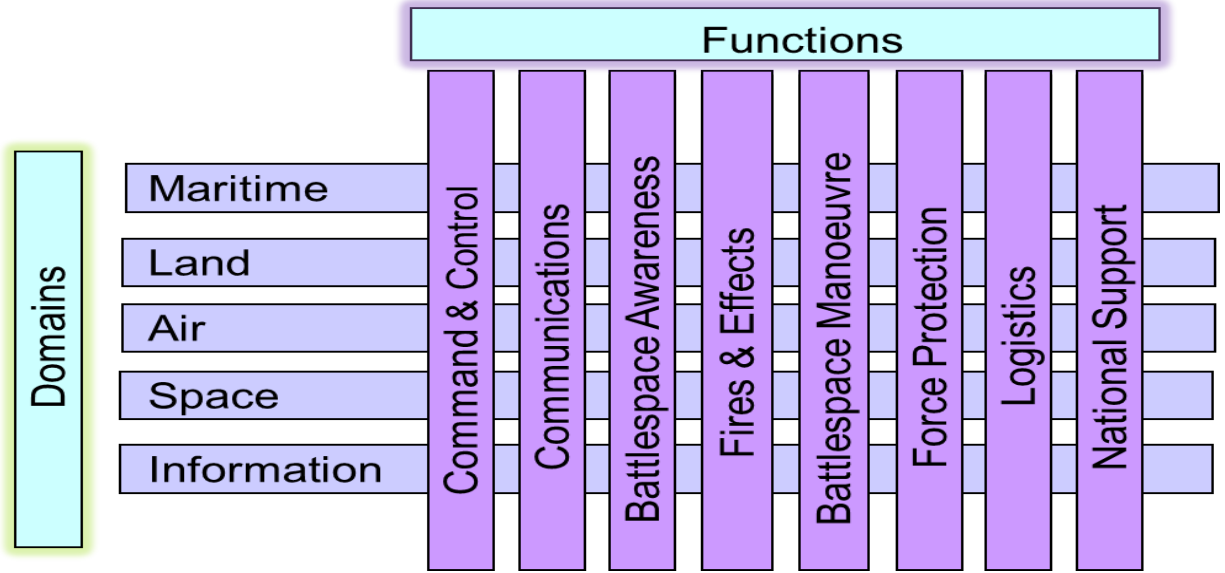
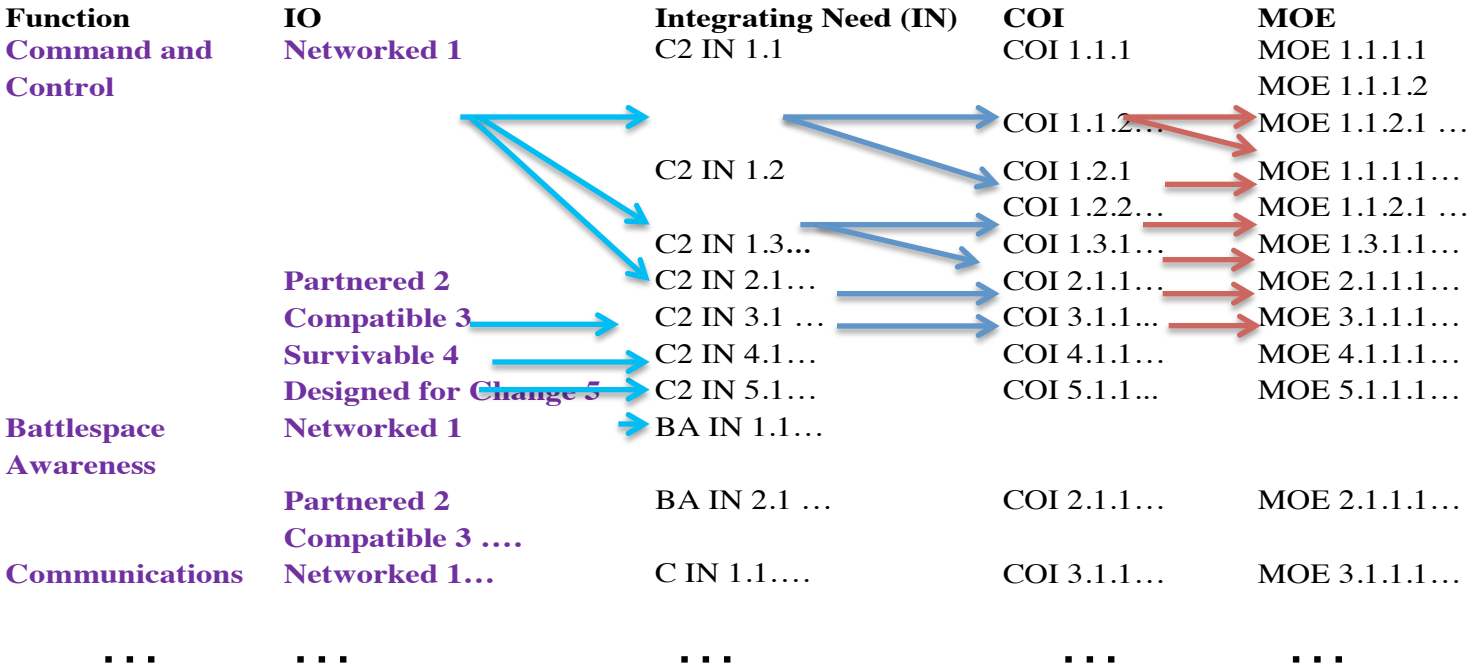
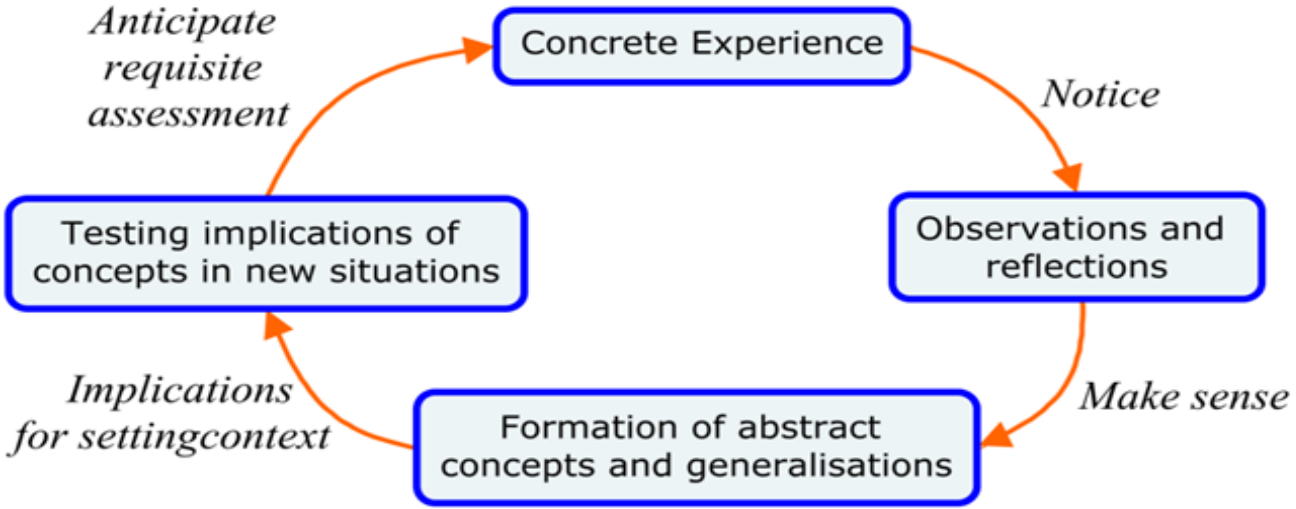
Capability Integration Framework (IOCD V2.1).



The IOs and CIF



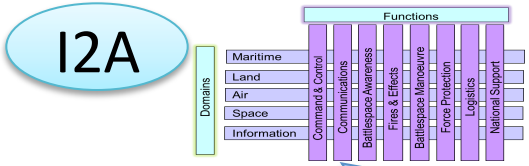
Co-learning and collaboration



The Path of Learning adapted from (Kolb, 1984).
D.A. Kolb, "Experiential learning: experience as the source of learning and development", 1984

Parameters for IOCD Implementation

Committee Level



Project Integration representations (summaries of integration risks and issues)

Intermediate Level

IOCD parameters

Architecture Level

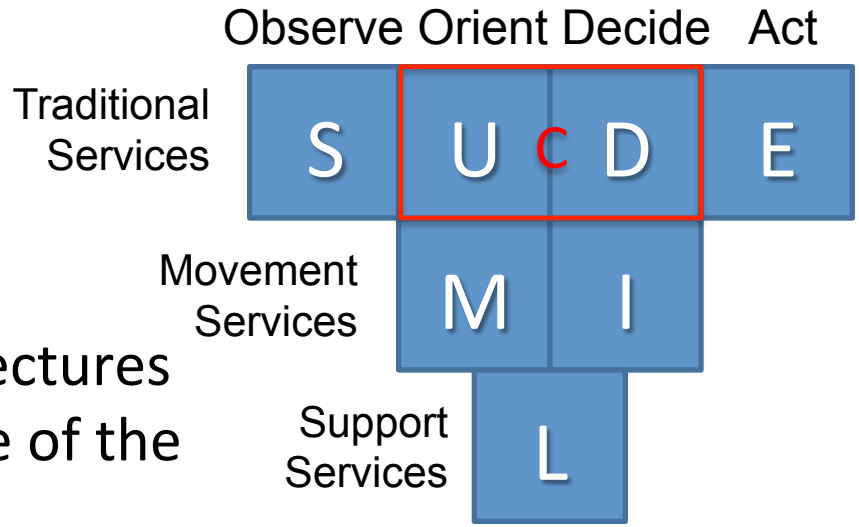
Parameters linked to DODAF, UPDM, SE Standards and Architectures

Application of these parameters

- Used by several “Pilot” projects that were in the early phases of the CLC.
- One particular Project took about 5 People 27 hours over about 10 sessions, over a couple of months.
- Not all parameters were used. Assessment of IOCD Integration Needs centred on a few key parameters.

Latest Work

- Continue to develop middle level support tools
  - SUDEMIL/SCMILE
- Mature the underlying architectures to capture the detailed nature of the relationships.
- Continue to develop SUDEMIL with the client
- Start applying SUDEMIL to a number of Pilot Projects and Programs.



Future work: More Middle Level Support Tools and Guidance