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Ministry of Defence

PA Consulting Group

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mega

BMT Hi-Q Sigma
"Where will our knowledge take you?"

LOCKHEED MARTIN

GCHQ

SyntheSys

JCSys

ATKINS

SCJ SecurityClearedJobs.com

UKCeB

Taking SOSA forward within a Transformed Defence Enterprise

Dr Jonathan Cook
Engineering Group Head
DTech Principal Engineer

Presentation to Integrated EA Conference 5/6th Mar 2013

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Overview

- Defence Transformation
  - What are the key changes affecting SOSA
  - Where and how should SOSA fit in
- SOSA
  - SOSA Overview - What, Why, When & How
  - Progress with SOSA
 - Moving Forward with SOSA
- Questions

Defence Transformation

- All parts of the Defence organisation are undergoing transformational change following SDSR:
  - Defence Reform & Defence Operating Model (DOM)
  - MOD Information Strategy (MODIS), Government ICT Strategy & the Information Operating Model (IOM)
  - Fin Mil Cap and the Target Operating Model (TOM) for the four Single Service Commands (SSCs)
  - The DE&S Material Strategy Programme
- All of these are relevant to the organizational context within which SOSA needs to operate
- There is a need to understand and shape these – there is an opportunity to exploit them to give SOSA a 'harder edge' …

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The New Defence Operating Model…
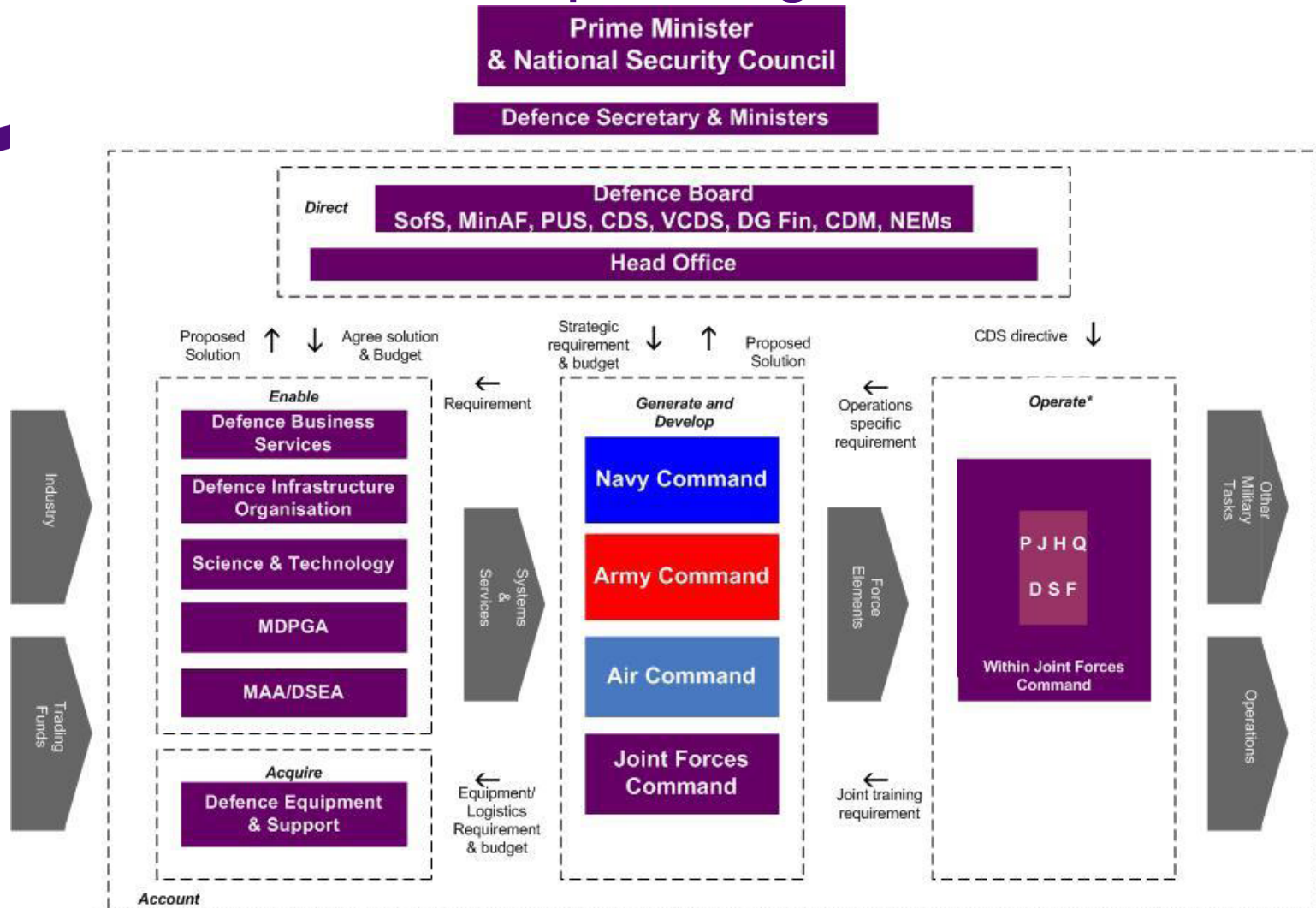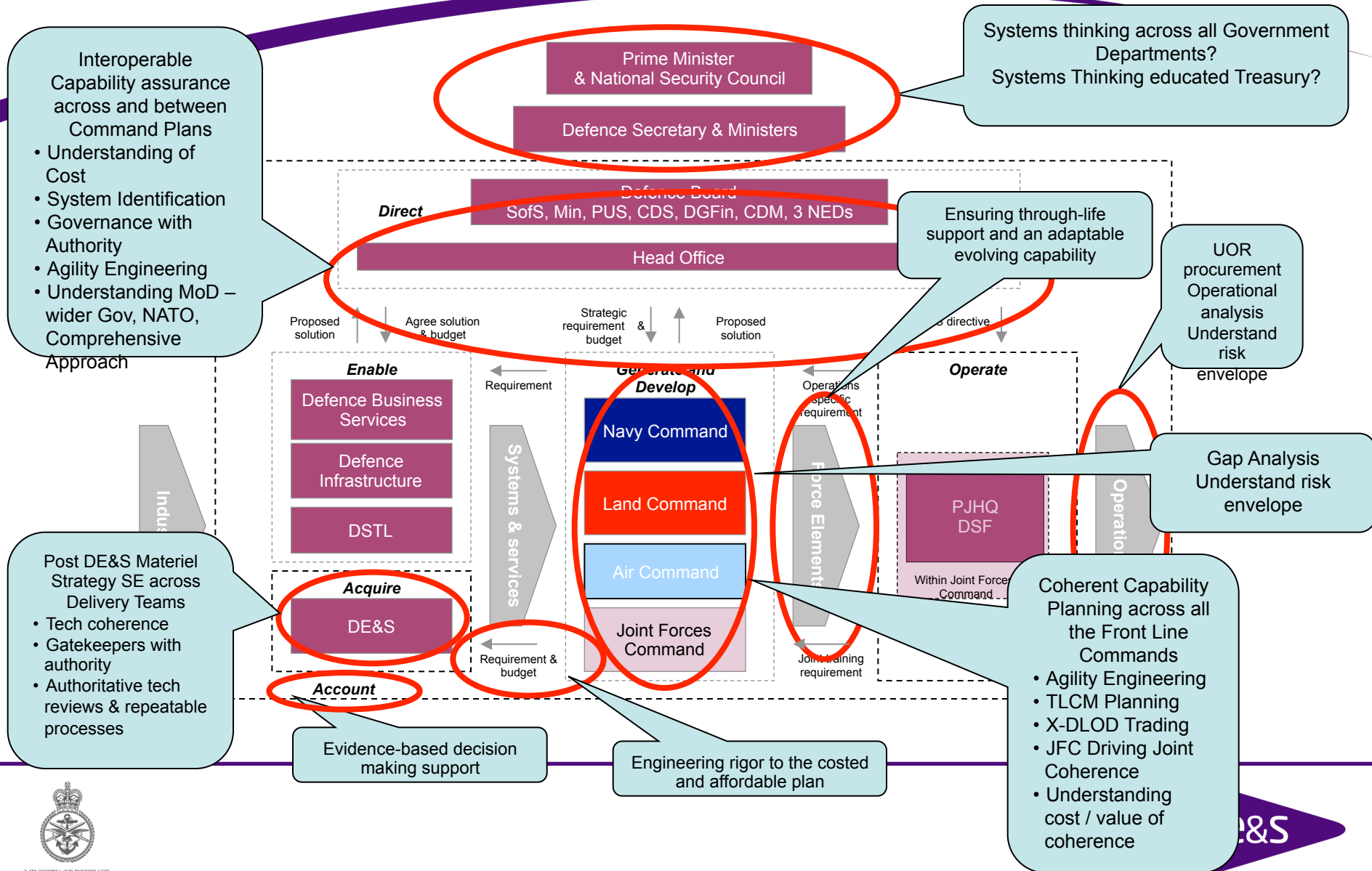

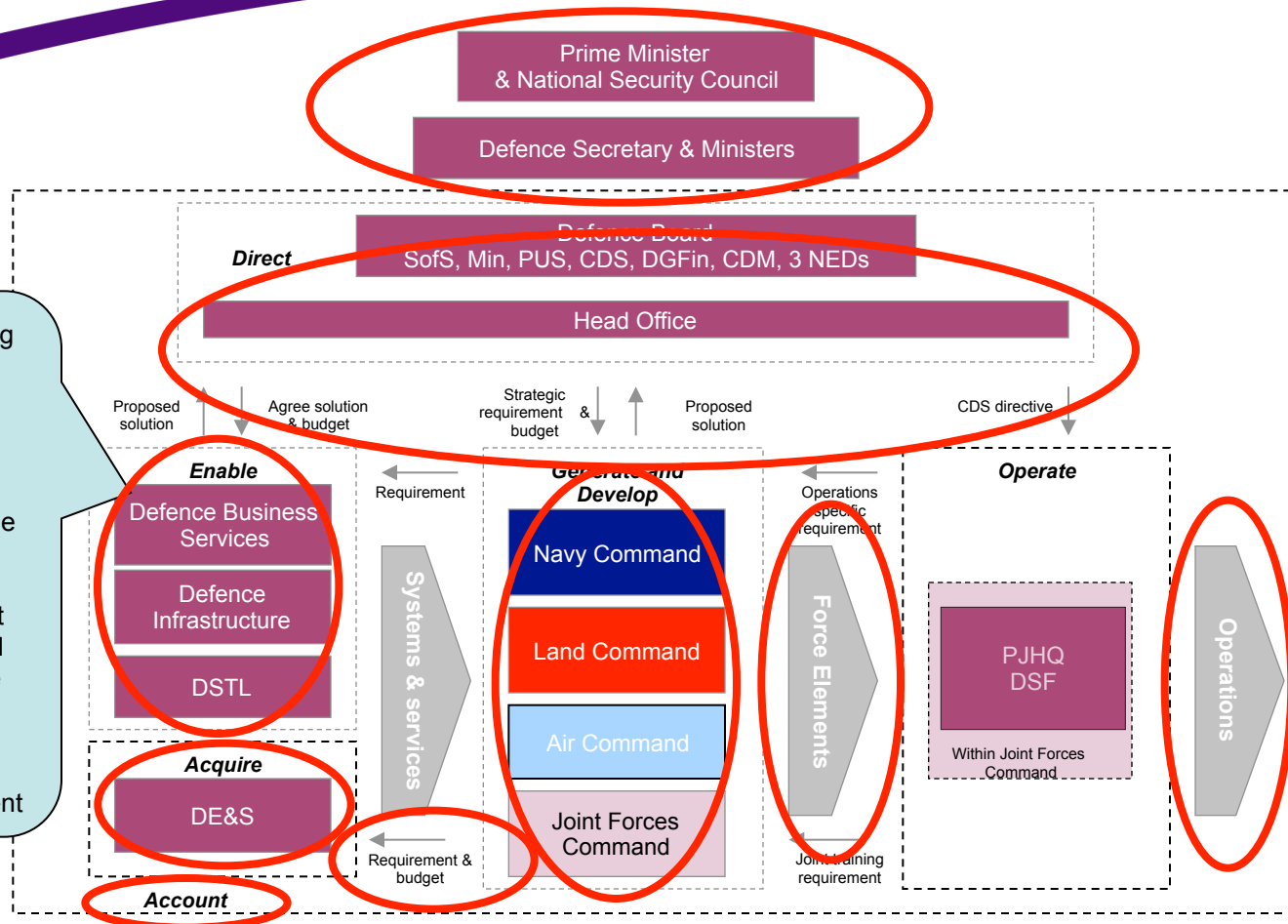*battle-winning Armed Forces; a smaller, more professional Ministry of Defence; and a hard-headed approach to what we can afford".*

Future of Systems Engineering in Defence

Prime Minister & National Security Council

Defence Secretary & Ministers

Systems thinking across all Government Departments?
Systems Thinking educated Treasury?

Direct

Defence Board
SofS, Min, PUS, CDS, DGFin, CDM, 3 NEDs

Head Office

Interoperable Capability assurance across and between Command Plans
• Understanding of Cost
• System Identification
• Governance with Authority
• Agility Engineering
• Understanding MoD – wider Gov, NATO, Comprehensive Approach

Ensuring through-life support and an adaptable evolving capability

UOR procurement Operational analysis Understand risk envelope

Proposed solution | Agree solution & budget | Strategic requirement & budget | Proposed solution | directive

Requirement

Operations specific requirement

Enable

Defence Business Services

Defence Infrastructure

DSTL

Generate and Develop

Operate

Navy Command

Land Command

Air Command

Joint Forces Command

Industry

Systems & services

Force Elements

PJHQ DSF

Operation

Within Joint Force Command

Gap Analysis Understand risk envelope

Acquire

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Post DE&S Materiel Strategy SE across Delivery Teams
• Tech coherence
• Gatekeepers with authority
• Authoritative tech reviews & repeatable processes

Requirement & budget

Joint training requirement

Account

Evidence-based decision making support

Engineering rigor to the costed and affordable plan

Coherent Capability Planning across all the Front Line Commands
• Agility Engineering
• TLCM Planning
• X-DLOD Trading
• JFC Driving Joint Coherence
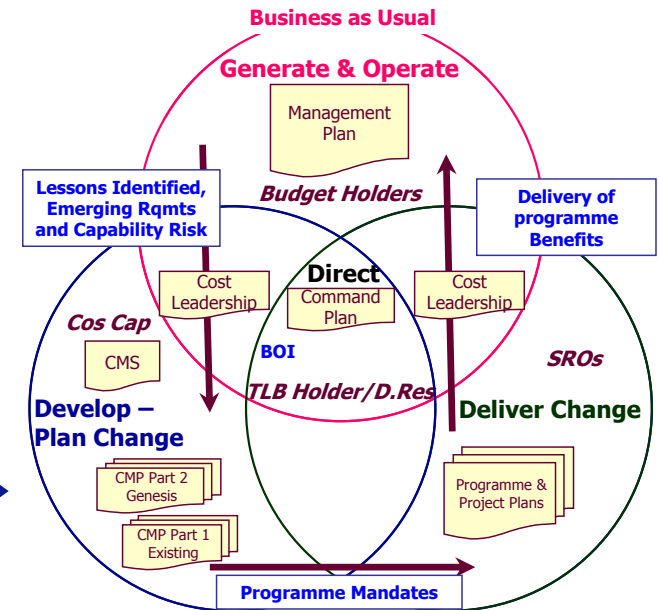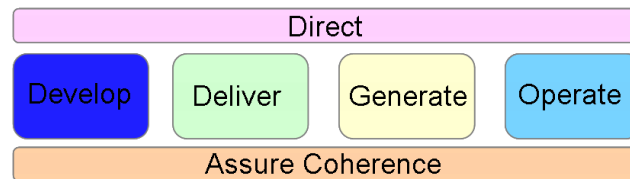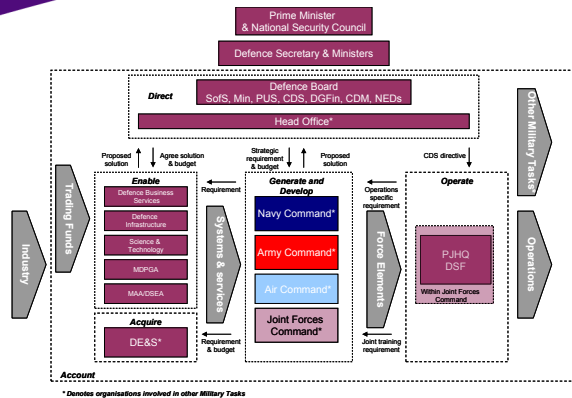• Understanding cost / value of coherence

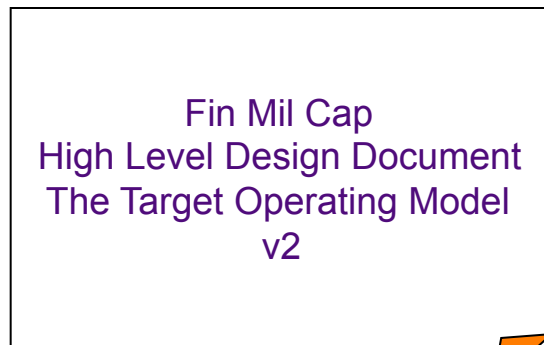MINISTRY OF DEFENCE

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Future of Systems Engineering in Defence

Systems Engineering
- Enable Exports
- Boundary Understanding
- Assumption Dependency Mgt
- Coherent Knowledge Base
- Risk – elicitation
- Risk – management
- Understanding VFM
- Shared Architecture Ownership
- Market / COTS Understanding
- Change Management

Prime Minister & National Security Council

Defence Secretary & Ministers

Direct

Defence Board
SofS, Min, PUS, CDS, DGFin, CDM, 3 NEDs

Head Office

Proposed solution

Agree solution & budget

Strategic requirement & budget

Proposed solution

CDS directive

Requirement

Operations specific requirement

Enable

Defence Business Services

Defence Infrastructure

DSTL

Generate and Develop

Navy Command

Land Command

Air Command

Joint Forces Command

Operate

PJHQ DSF

Within Joint Forces Command

Systems & services

Force Elements

Operations

Acquire

DE&S

Requirement & budget

Account

Joint training requirement

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DOM to Fin Mil Cap Transformation (FMCT)

Detailed Design and Guidance Documents

**Fin Mil Cap
High Level Design Document
The Target Operating Model
v2**

FMCT Target
Operating Model
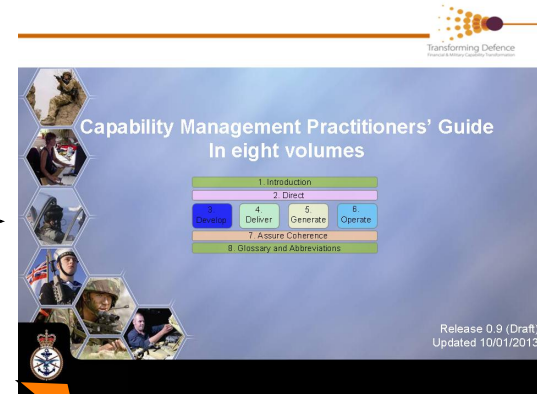
Capability Management
Practitioners' Guide

Generic Capability
Management Model

The Materiel Strategy seeks to take forward GOCO and DE&S +

Jun 2012		End 2012		Early 2014	

New Model

Common Analysis

DE&S+

GOCO

Governance
Business Model
Cost Benefit Analysis
Functional Working Groups

Investment Decision

DE&S+

OR

GOCO

Definition of Options

Transition improvements

Defence Board consideration

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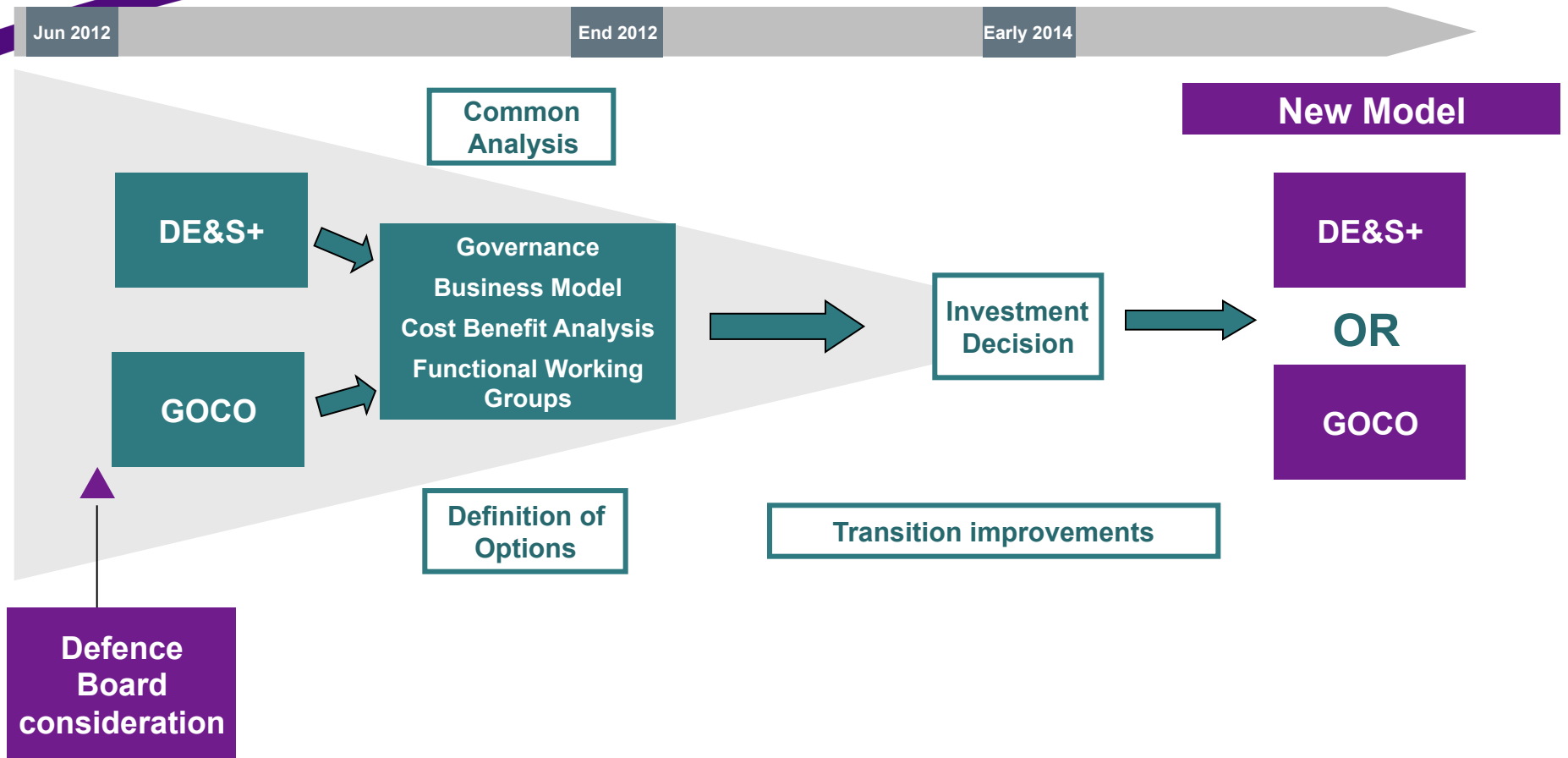
The System of Systems Approach

What is SOSA?

I don't understand what SOSA is!

Isn't it just Systems Engineering?

Why do Engineers always make things so complicated!

It's all about architectures

It's just common sense

It's just DE&S business

What is the SoS?

- **A set or arrangement of systems that results when independent and useful systems are integrated into a larger system that delivers unique capabilities. Types of SoS:**
  - *Virtual.*
    - *Accidental*
  - *Collaborative.*
    - Voluntary
  - *Acknowledged.*
    - Federated
  - *Directed.*
    - Top-down.

These types of SoS reflect differing levels of centralised management and control

- **Engineering and architecting a SoS can be different than engineering and architecting a single system, because of the unique attributes of a SoS…..**

The System Hierarchy
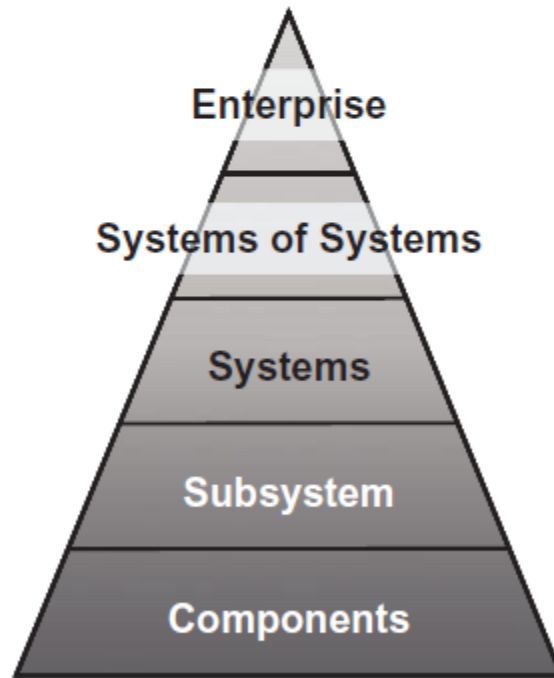
Why & When to Adopt a SoS Approach

- Why:
  - To deliver desirable and unique capabilities that can only be delivered at the SoS level; eg:
    - Enhanced Capability
    - Interoperation
    - Adaptation and Responsiveness
    - Efficiency
  - To eliminate undesirable effects that can result at the SoS level, eg:
    - Duplication/Waste
    - Interference
    - Complexity
    - Incoherence
    - Inflexibility
- When:
  - Whenever there is sufficient business or operational justification either to deliver the desirable attributes at the SoS level or eliminate the undesirable attributes (or both). **I'll return to this later.**
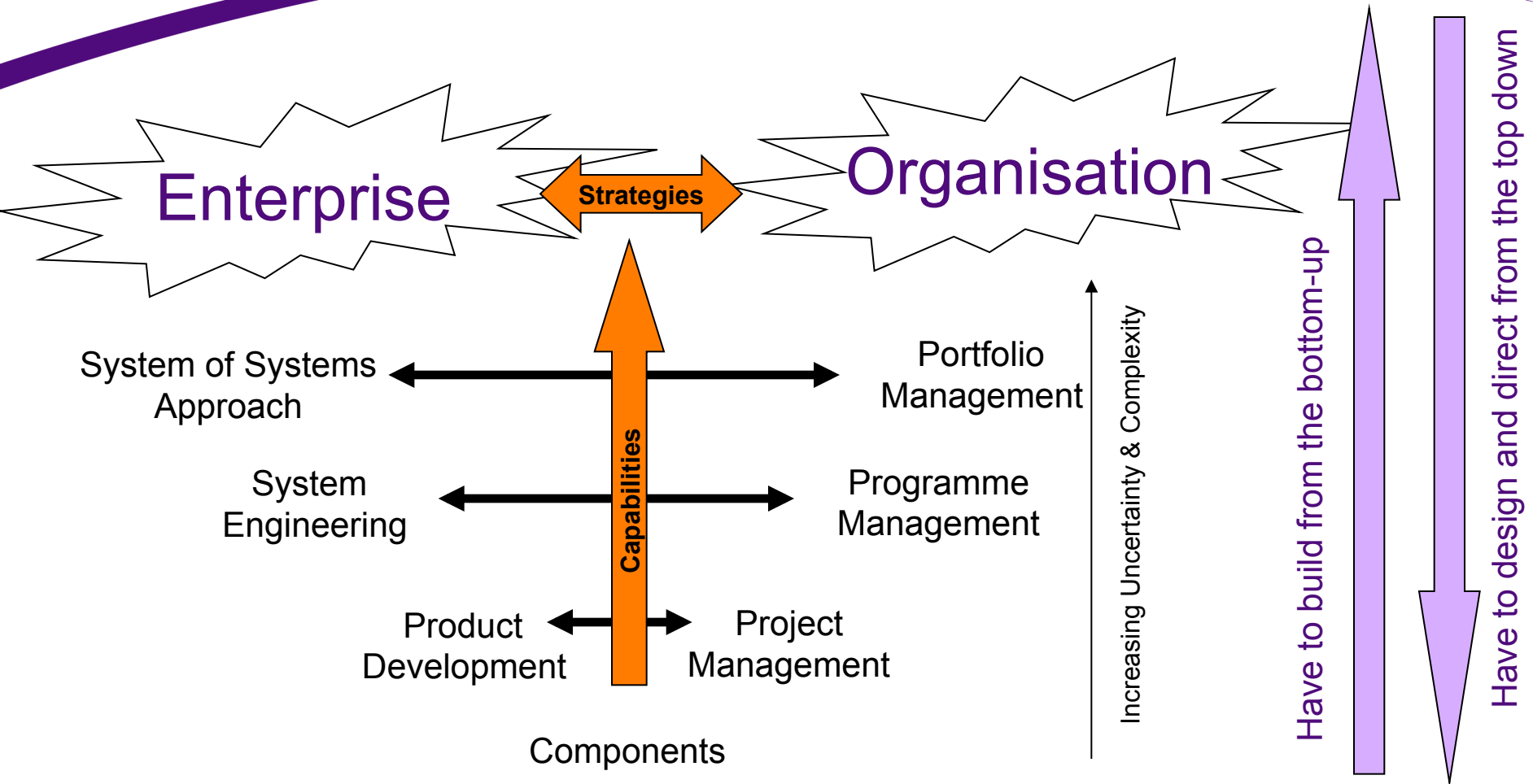
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What is a SoS Approach?

- It is 'How' the SoS is managed to <u>control the emergent properties at the SoS level</u>

- It is the <u>additional</u> methods, tools, and practices to enable [the engineer] to develop the complex (SoS) structures.

- <u>It is not Systems Engineering</u>, but is enabled if effective Systems Engineering practices are deployed for the individual systems that comprise the SoS

- <u>It is not Enterprise (Systems) Engineering</u>, but must connect the SoS attributes to the goals of the Enterprise

"Delivering enhanced capability through achieving commonality, re-use and the interoperability of independently procured systems."

Analogies with P3M

Enterprise ↔ **Strategies** ↔ Organisation

Capabilities

Enterprise side		Organisation side
System of Systems Approach	← →	Portfolio Management
System Engineering	← →	Programme Management
Product Development	← →	Project Management
	Components	

Increasing Uncertainty & Complexity

Have to build from the bottom-up

Have to design and direct from the top down

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SOSA Vs Portfolio Management

SOSA

- Enterprise Strategy
- Combinations of Systems and Equipments deliver Enterprise capabilities
- Enterprise level architectures
- Risk is strategic
- Deals with integrity of entire Enterprise transformation
- Enterprise Benefits
- Stakeholders are Strategic & External
- Governance achieved via Policies & Standards
- Quality is about SoS alignment and effectiveness
- Issues span System and Equipment boundaries
- Planning is about Dependencies & conflict resolution between systems

Portfolio Management

- Corporate Strategy
- Combinations of programmes and projects deliver organizational objectives
- Vision & Blueprint for the entire Organisation
- Risk is Strategic and Business Continuity
- Deals with integrity of entire Business Transformation
- Organizational Benefits
- Stakeholders are Strategic & External
- Governance achieved via Policies & Standards
- Quality is about portfolio alignment and effectiveness
- Issues span project & programme boundaries
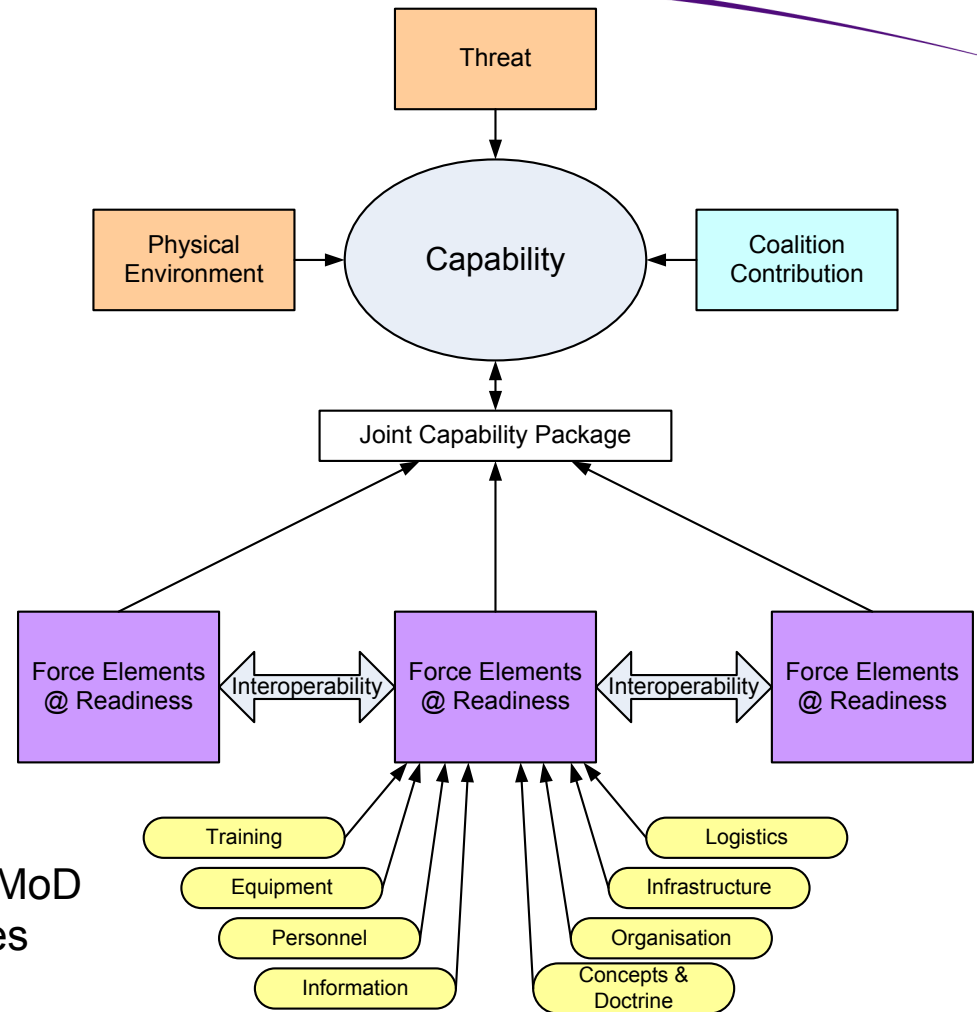- Planning is about Dependencies & conflict resolution

SoS Contribution to Capability

Min(ISS) -18th June
SofS's 5 principles

Equip … properly with a reform of procurement … based on capability, affordability, adaptability, interoperability and exportability.

- Complexity challenge increasing
- SoS Technical & Business risk belongs to MoD
- Cost of late project requirements & changes
- Residual problems faced on front line

Single systems do not deliver the full capability
Some capability is only delivered at the SoS level

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How do we achieve a SoS Approach?

SOSA Enablers

Current Situation

- Lack of common context
- Lack of common vision
- Culture of buying new
- Bespoke solutions
- Non-agile/upgradeable solutions
- Shortage of export opportunity
- 'Big-bang' acquisition
- Incoherent strategies & policy
- Equipment non-interoperable
- Solution diversity & duplication
- Red-card assurance

Principles →

Operating Model →

Policy, Rules & Guidance →

Desired Situation

- Shared Enterprise goals & context
- Coherent equipment portfolio
- Reuse
- Increased VFM
- Interoperability 'designed-in'
- Informed trades
- Better TLCM decisions
- Maximised information exploitation
- Agile acquisition and deployment
- Repeatable approaches
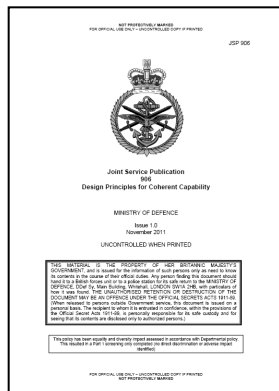- Risk-based delivery based on ensurance principles

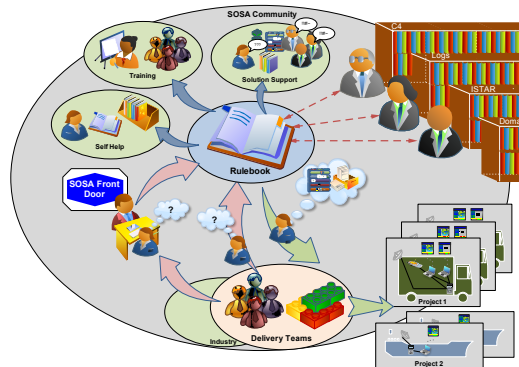## SOSA - Enabling the Culture Change

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The SOSA Enablers

"Enabling enhanced capability through achieving commonality, reuse and the interoperability of independently procured systems"
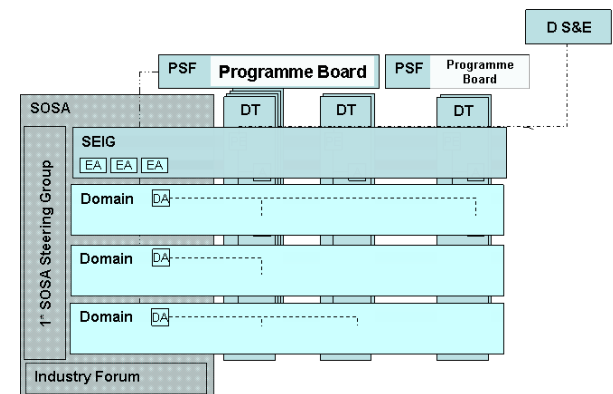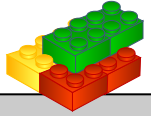
Principles

Policy, Rules & Guidance

Operating Model

The SOSA Principles (JSP 906)

Business Drivers

P1. Unifying the Business: The organisation will achieve unified business and Operational goals that will be delivered through a governance framework to assign authority and guide dedicated delivery units, who will be responsible for ensuring collaboration, in the delivery of coherent solutions and their successful in-service acceptance.

P2. Driving Improvements in Business & Operational Effectiveness: Solutions will be developed to deliver business and operational effectiveness that is informed by use. Solution requirements will include the through-life dimensions of development, use and support, across all DLoDs. Dimensions include financial, exportability, performance, assurance, dependability, safety and supportability.

P3. Minimising Diversity: Solutions will be delivered to ensure that the total cost of managing and supporting a portfolio of systems, components, tools, facilities, Infrastructure and suppliers is minimised across all Defence Lines of Development.

Reuse

P4. Design for Reuse: All Defence Lines of Development will deliver solutions by exploiting legacy and ensuring that new solutions and their constituent parts are designed so as not to preclude their reuse across the Enterprise.

P5. Building with Proven Solutions: Solutions will be Off the Shelf component based. Only when this is proven to be ineffective, in terms of cost and time, will tailored Off the Shelf or bespoke components be procured.

P6. Ensuring Commonality of Services Across the Enterprise: Common services will be provided by the same solution irrespective of organisational and operational situ, security domain and infrastructure.

Interoperability

P7. Designing for Flexible Interoperability: Interoperability will be achieved by full electronic integration whilst supporting the need for flexibility in the end to end business process and solution, during acquisition and deployment, by ensuring that solutions are of modular design that is aligned to business process.

P8. Conforming to Open Standards: Solutions will be designed with Open Standards in a manner that is not detrimental to innovation and Operational superiority.

P9. Treating Planning, Delivery & Configuration Information as an Asset: Solutions will be developed by ensuring that Information is managed across the Enterprise, maximising accessibility without comprising security.

The SOSA Operating Model

Domain services describe what Domains do to achieve coherence across projects

Project Project

SOSA Domain

The process framework describes work flow in the TLCM axis

The information framework describes the "currency" traded between the two axis

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SOSA Operating Model and TLCM

TLCM
Embedding the Systems Approach

Direct

Operate

Develop

Generate

Acquire

Capability Authority

Operating Authority

Technical Authority

Cap Tech Op Eng Domain

Domain Blueprint

Cap Tech Op Eng Domain

Cap Tech Op Eng Domain

system

system

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Domain Justification

SoS I, R & Os exist across and between Capabilities

Logical Grouping of IROs for Domain

Risks Opportunities Risks

Risks

Opportunities

Risks Issues

Issues

Issues

Risks

Risks

Opportunities

Risks Risks
Opportunities Opportunities Issues
Risks
Risks Issues

SoS IRO Register

The 'Business Case' for SOSA

SOSA Domain

SOSA Domain

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Progress with SOSA

- SOSA Services development
- SOSA Domains development
- Strategic Milestone achievement
  – CMMI Maturity Level 2
- Supported by numerous 'Do SOSA' Tasks
  – 'Doing' SOSA informs design and build of SOSA Principles, Operating Model and underpinning rule set

Benefits - T26 (URD Coherency Check)

Defence Policy/Doctrine HLOC etc

Maritime Outcomes

Maritime Core Capabilities

Generic Activity Set (OV-5)

EG Outputs

Generic Scenario (OV1)

URD Coherency Check

Related CONEMPs

Coherency Check Forward Pass

Related CONEMPs

Project CONEMP → Project URD

Related CONEMPs

Coherency Check Backward Pass

OV1

Compare

OV2

OV5

Derived Views Eg OV3

Project Specific OV-5

Compare

Coherency GAP Analysis

Stakeholder Map

IERs Etc

Coherency GAP Analysis

Benefits - CEPP Programme (Assumptions & Dependencies Review)
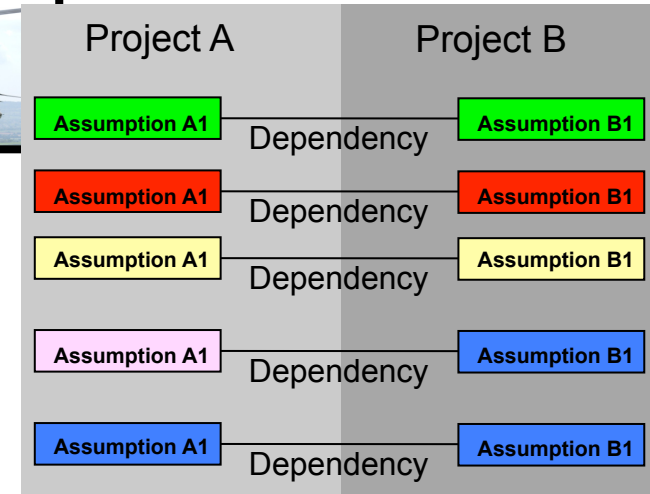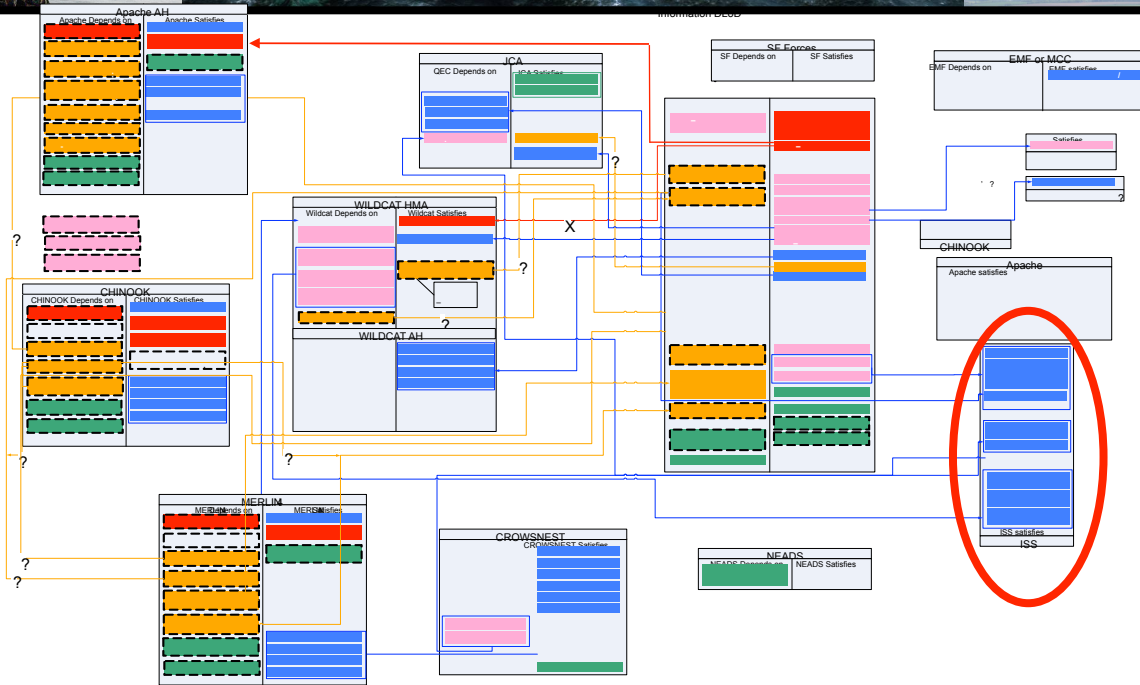
Moving Forward with SOSA

- Defence Transformation provides the context and acts as an opportunity to provide a 'Harder' Edge to SOSA going forward. We need to:

  - Shape & Influence the developing Organizational & Operating Models

  - Ensure SOSA is 'hard wired' into the generic and specific Capability Management Models being used across the Single Service Commands

  - Take Stock of SOSA to date and consolidate what we have learned and developed to act as a firm baseline from which to develop further

  - Put some programme management rigour around SOSA and define the objectives, success factors, benefits and plans for the next Tranche

  - Put in place/revise appropriate governance

  - Mount a campaign plan and develop and deliver some clear messages about what SOSA is and why it is needed
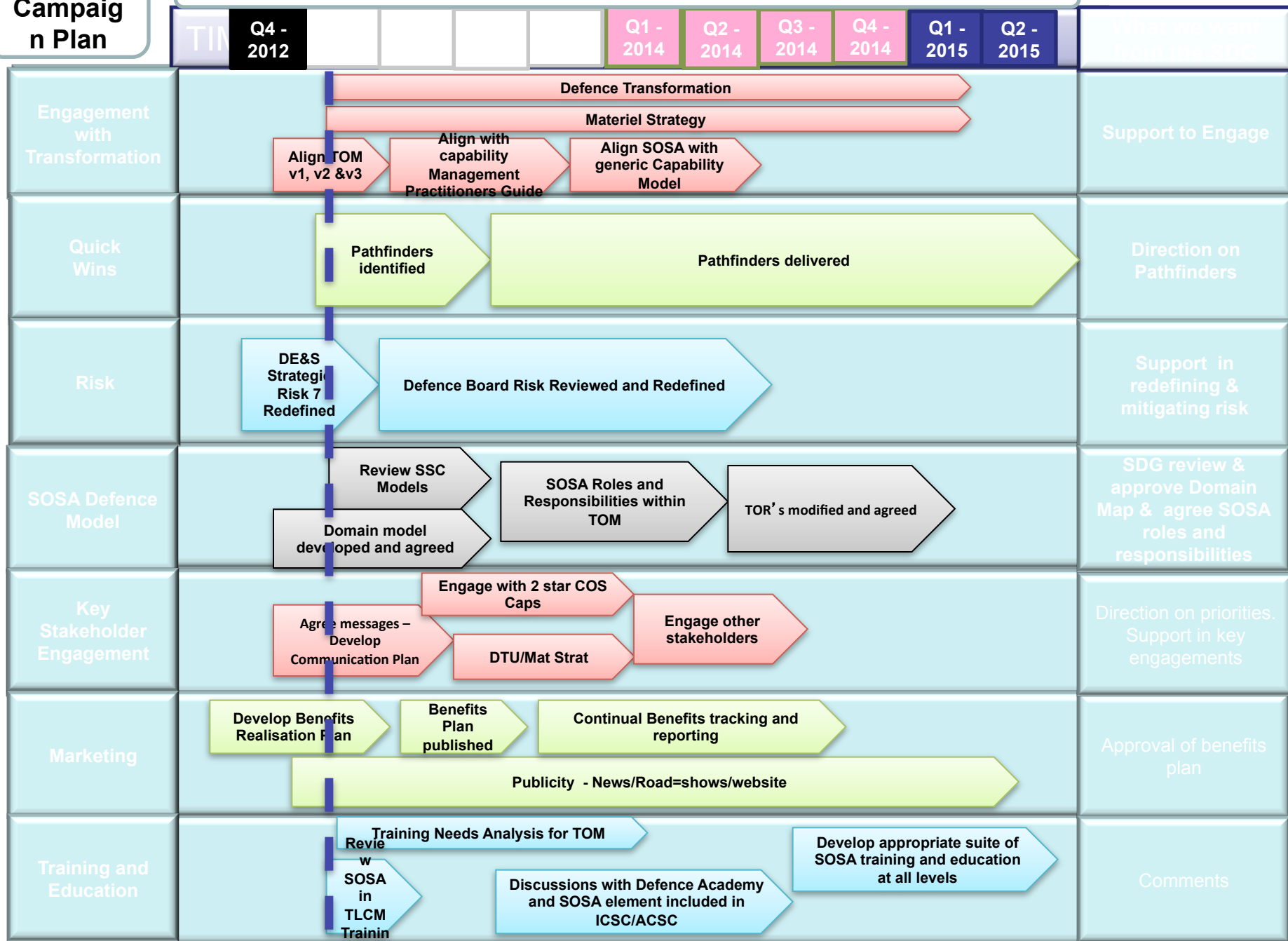
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SOSA Campaign Plan

Top-down tasks driven by need to ensure SOSA is embedded into Defence Capability Management as 'BAU'

SOSA Campaign Plan: Managed changed programme to deliver defined Blueprint and Benefits

Bottom-up tasks driven by business need based on Issues, Risks and Opportunities in the Domains

SOSA Campaign Plan

Indicative Tasks and Timescales

TIMESCALE	Q4 - 2012					Q1 - 2014	Q2 - 2014	Q3 - 2014	Q4 - 2014	Q1 - 2015	Q2 - 2015	MILESTONES

Engagement with Transformation

- Defence Transformation
- Materiel Strategy
- Align TOM v1, v2 &v3
- Align with capability Management Practitioners Guide
- Align SOSA with generic Capability Model

Support to Engage

Quick Wins

- Pathfinders identified
- Pathfinders delivered

Direction on Pathfinders

Risk

- DE&S Strategic Risk 7 Redefined
- Defence Board Risk Reviewed and Redefined

Support in redefining & mitigating risk

SOSA Defence Model

- Review SSC Models
- Domain model developed and agreed
- SOSA Roles and Responsibilities within TOM
- TOR's modified and agreed

SDG review & approve Domain Map & agree SOSA roles and responsibilities

Key Stakeholder Engagement

- Agree messages – Develop Communication Plan
- Engage with 2 star COS Caps
- DTU/Mat Strat
- Engage other stakeholders

Direction on priorities. Support in key engagements

Marketing

- Develop Benefits Realisation Plan
- Benefits Plan published
- Continual Benefits tracking and reporting
- Publicity - News/Road=shows/website

Approval of benefits plan

Training and Education

- Training Needs Analysis for TOM
- Review SOSA in TLCM Training
- Discussions with Defence Academy and SOSA element included in ICSC/ACSC
- Develop appropriate suite of SOSA training and education at all levels

Comments

Questions