model futures
www.modelfutures.com

presents:

IntegratedEA

STRATEGY • OPERATIONS • TECHNOLOGY

www: http://www.integrated-ea.com
HashTag: #IEA12
Twitter: @IntegratedEA

VEGA
A Finmeccanica Company

NITEWORKS

Abatis

TEAM ENSURE

de&s

Generic
YOUNG SPIRIT | SENIOR MIND

MooD
SMARTER DECISIONS

Reply
glue

mega

BAE SYSTEMS

From today to tomorrow – an EA approach to managing Capability Transformations

Jennifer Mollett
Technical Lead – Capability Engineering
Minewarfare and Autonomy

Overview

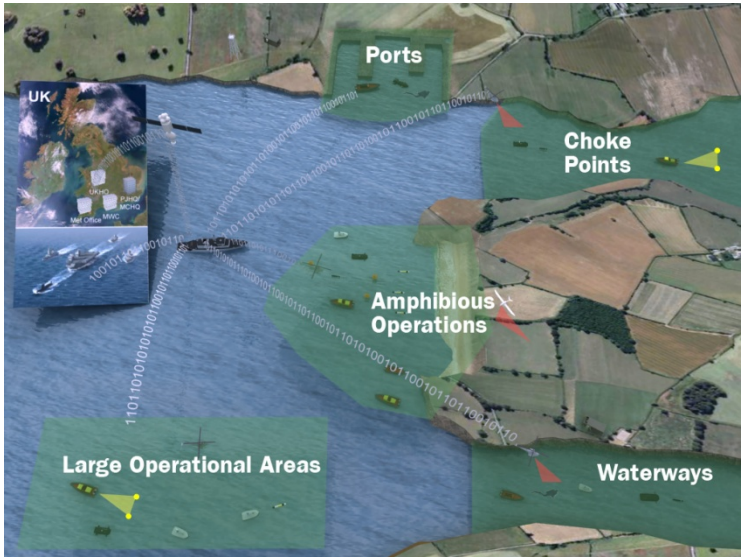
- Introduction to MHPC Programme
- The Transition Programme & Applicability of Eas
- Enterprise Analysis
  - Capability
  - Other Perspectives
- Benefits

Published with kind permission from MHPC Project Team

BAE SYSTEMS

Introduction to Future MCM Operations

- Multi-Role Platforms augmented by offboard systems
- Operating at safe limits from the minefield
- Potentially Over the Horizon (OTH)
- Options for forward deployment of offboard systems to extend strategic mobility



Will this be sufficient to meet the future Capability needs?

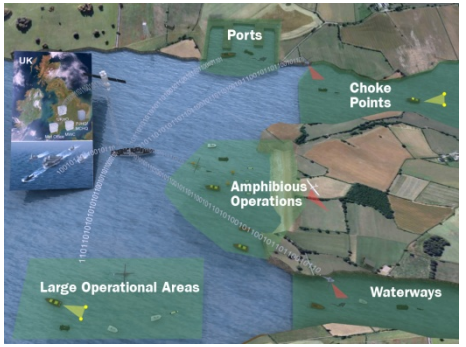
BAE SYSTEMS

The Transition Programme

- Definition of the Capability Acquisition Programme to:
  - Procure and integrate of future systems into existing capability baseline
  - Maintain acceptable levels of capability provision
  - Understand and mitigate the impact across the Lines of Development

- Programme needs to be scoped within the following bounds:
  - Through-Life Cost & Annual Budgets
  - Manpower Levels
  - Industrial Capacity and Capability

- Many different solution options to be viewed from many perspectives to address multiple stakeholder needs



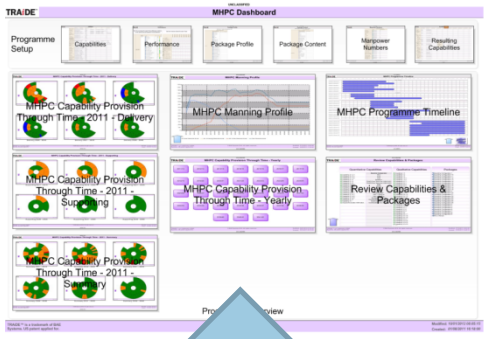
BAE SYSTEMS

The role of Enterprise Architectures

BAE SYSTEMS

Layered Architectural Analysis

Capability Management



Big Handfuls – "What if" type modelling.

Decision Support across multiple perspectives

SoS Engineering

Concept Feasibility & Interoperability

SoS Integration

Systems Engineering

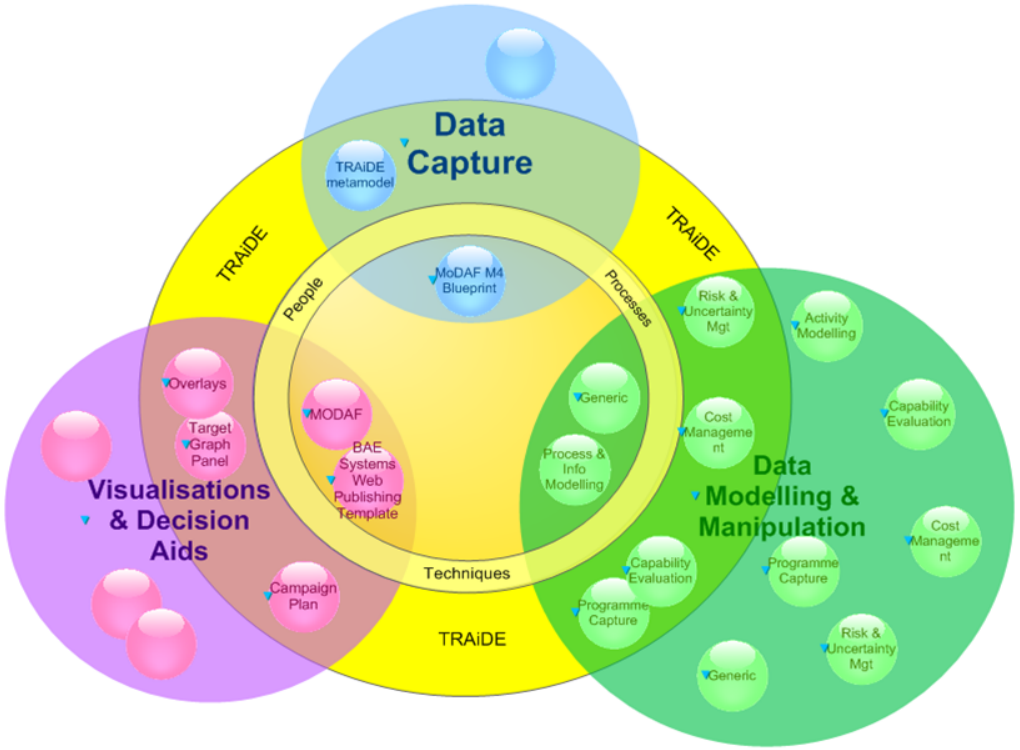
System Feasibility (pan-DLoD)

System Integration

Developed Using TRAiDE*

Principles of the TRAiDE environment

- Open approach – enabling utilisation of disparate sources of data
- Information flows through a single information manager, regardless of source/ destination
- Inclusivity - designed to utilise new and extant mechanisms, tools and their providers
- Intuitive visualisations – enabling simpler interpretation of results
- Evolutionary – incremental and pragmatic development based on user feedback
- Scalable – enabling aggregation and disaggregation of information at all levels
- Timeliness and quality – appropriate outputs, matched to customer need and decisions



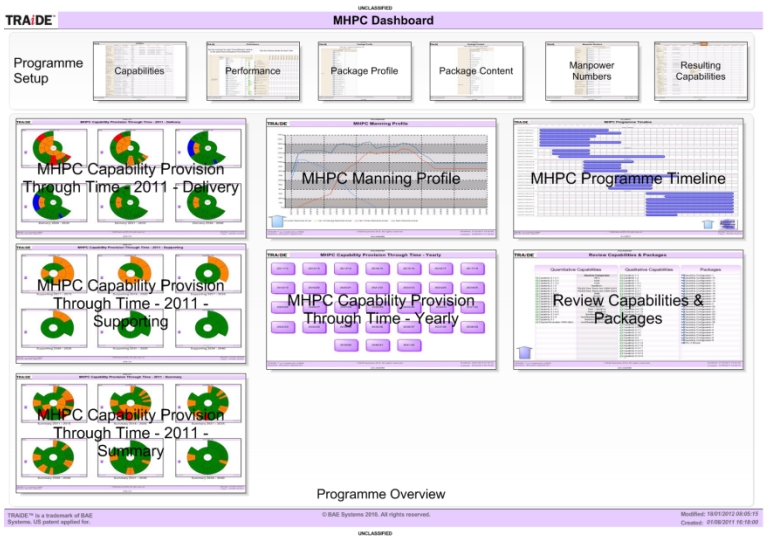
*TLCM Robust Acquisition Inclusive Decision Environment

Model Overview

- Capability Management Model to support:
  - Capture of High Level Transition Programme
  - Capability, Cost, Manpower Profiling
  - “What if” Modelling in support of Capability Trading

- Multiple Perspectives of Transition Programme
  - Capability
  - Cost
  - Manpower
  - Programme (Industrial)

- Iterative Development to meet the needs of the Programme Team



BAE SYSTEMS

The Capability Conundrum

Capability Realisation

- Capability "Need" is captured in Strategic Views as a Capability Taxonomy
  - Capability Requirement
  - Baseline Comparators
- Capability Realisation is captured as one or more Capability Configurations
  - Combination of People and Physical Systems
  - Integration & Other DLoDs not included in this comparison
- "How Good" is Captured as weightings on the Data Relationships

Detection & Classification of Mines in Shallow Water

The SoS to Realise…

Assessment
Performance?
Capacity?

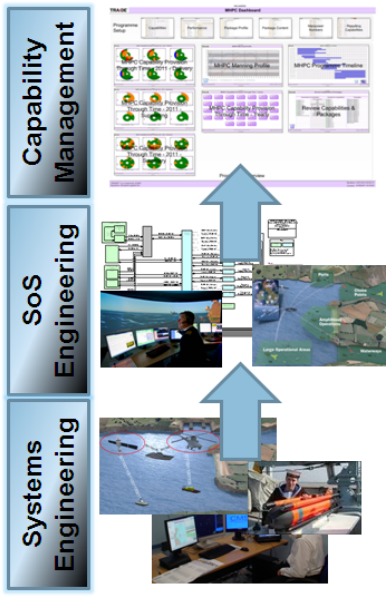
Capability Assessment

- Qualitative and Quantitative Assessments of the performance of the Configuration against the Capability Measures of Effectiveness (MoE)

- Underpinned by more detailed Analysis at SoS and System Level tailored to:
  - Level of Confidence
  - Programme Priorities
  - Acquisition Timelines

- Capability Assessment can be refreshed at any point in programme lifecycle
  - Changing Requirements
  - ITEA Results and Operational Feedback

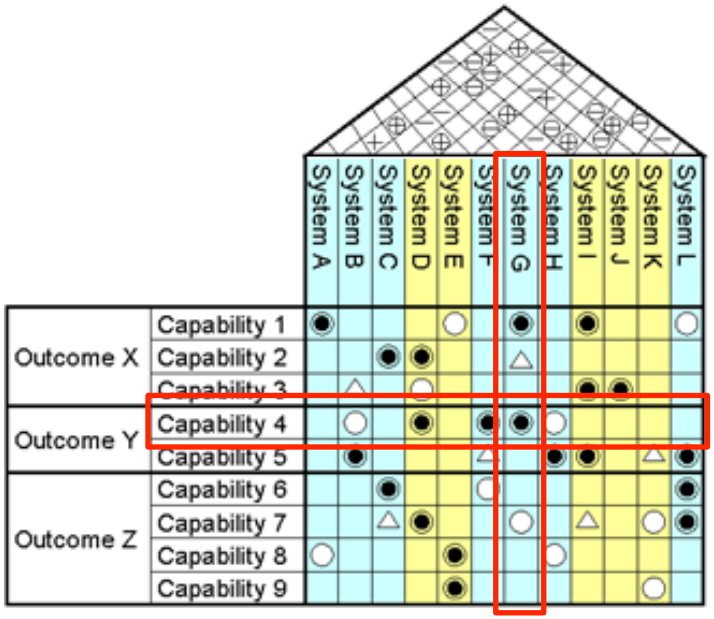
To provide a platform deployed capability to detect mine like objects **<a set of>** at a range of **b** from ship with a **c** probability of detection in the following **<d set of>** operational environments.



BAE SYSTEMS

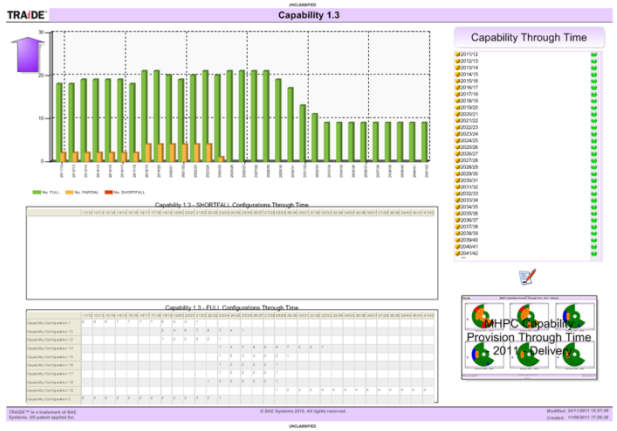
Solution Optimisation

- Solution can be optimised by examining the relationships between Capabilities and the Systems/Resources that realise them
- Optimisation “within” Capabilities
  - Optimisation across multiple capability configurations to meet the Capability need
- Optimisation “across” Capabilities
  - Optimisation of Capability Configurations to meet multiple Capability Needs
- Supports Systems : Capability Trading Analysis

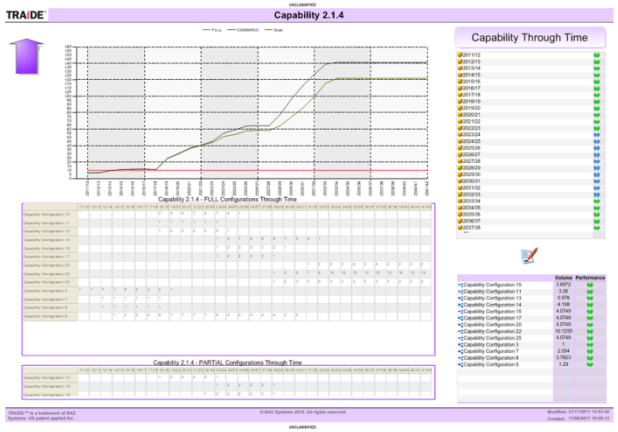


Intra-Capability Analysis

- Capability Provision through time is captured in graphical form:
  - *Qualitative* – Number of Configurations through time
  - *Quantitative* – Relative Contribution of Configurations through time against baseline



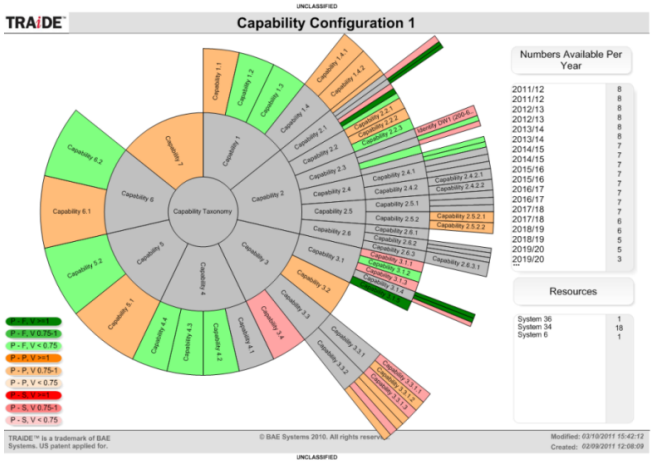
- Enables the Decision Maker to assess:
  - Tolerable Risk Levels
  - Opportunities for Capability optimisation where one or more Capability configurations meet the operational need



- Sets the bounds for Capability Trading

Inter-Capability Analysis

- Relative Contribution of Configurations to the entire set of Capabilities is represented in a “Bullseye” visualisation
- Enables the Decision Maker to assess:
  - Priority Areas (and hence priority requirements) for Capability Configuration and its contributing systems
  - Acquisition Requirements for procurable systems
  - Impact “areas” if Capability Configuration cannot be delivered in required timescales
- Highlights the impacts of Capability Trading



Capability Aggregation

- Summary Views provide insight into the relative levels of Capability that are provided at specific points in time
  - Weighted by operational priorities
  - Time “slices” dependent on level of detail required for decision making

- Visualisations support:
  - Assessment of over/under provision of Capability for specific Capability Areas
  - “Average” view for acquisition epochs
  - Supply vs Demand for concurrency options

BAE SYSTEMS

The Other Perspectives…

The Balancing Act

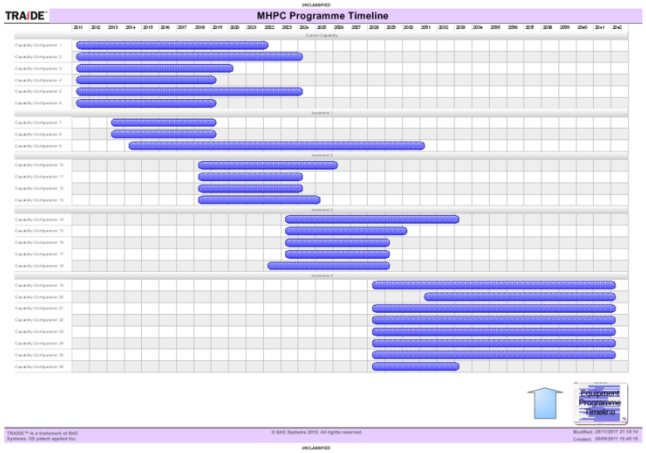
- Selection of Configurations to meet the Capability need drives:
  - Cost Profile for Programme
  - Manpower Demands
  - Industrial Timelines for System Procurement

- Multiple Solution options need to be compared against these perspectives to find the optimal solution

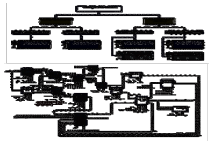
- Model supports “What if” Analysis by automatically updating linked views based on changes to underpinning dataset

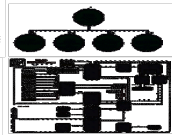
Industrial Perspective

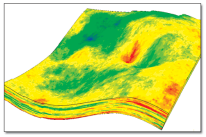
- Capability Analysis defines “what” is required “when”
  - System of System (SoS) Increments through Time
  - Procurement “Timelines” for individual Systems

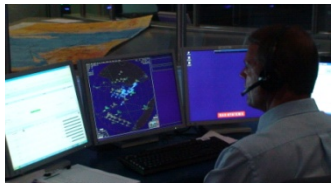


- Systems of Systems Analysis is required to:
  - Confirm the performance of each SoS against the requirement
  - Confirm the feasibility of Systems Integration in the required timescales
  - Define the Procurement and ITEA programme to assure the delivery of the Capability Need
  - Pan-DLoD Implications



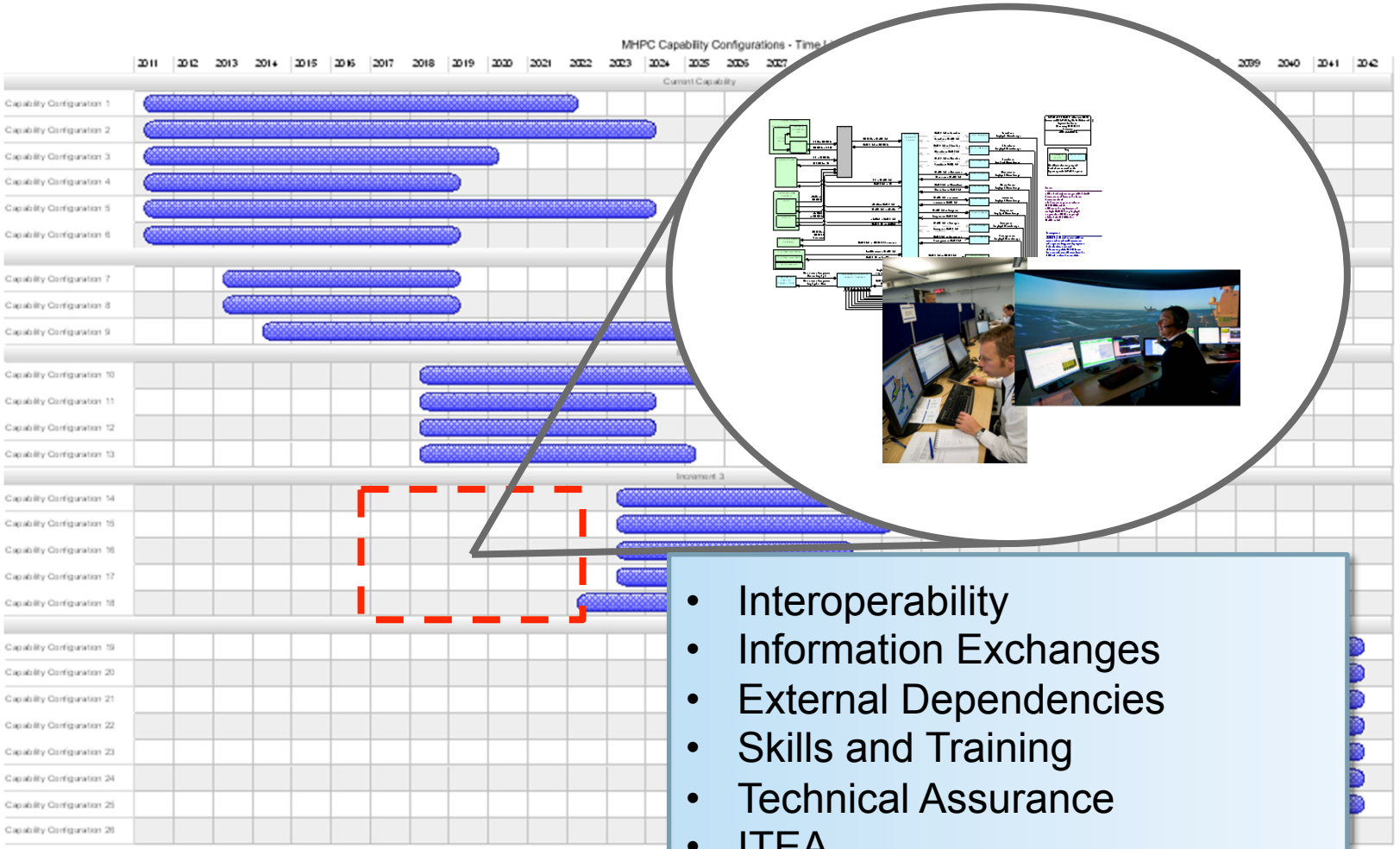






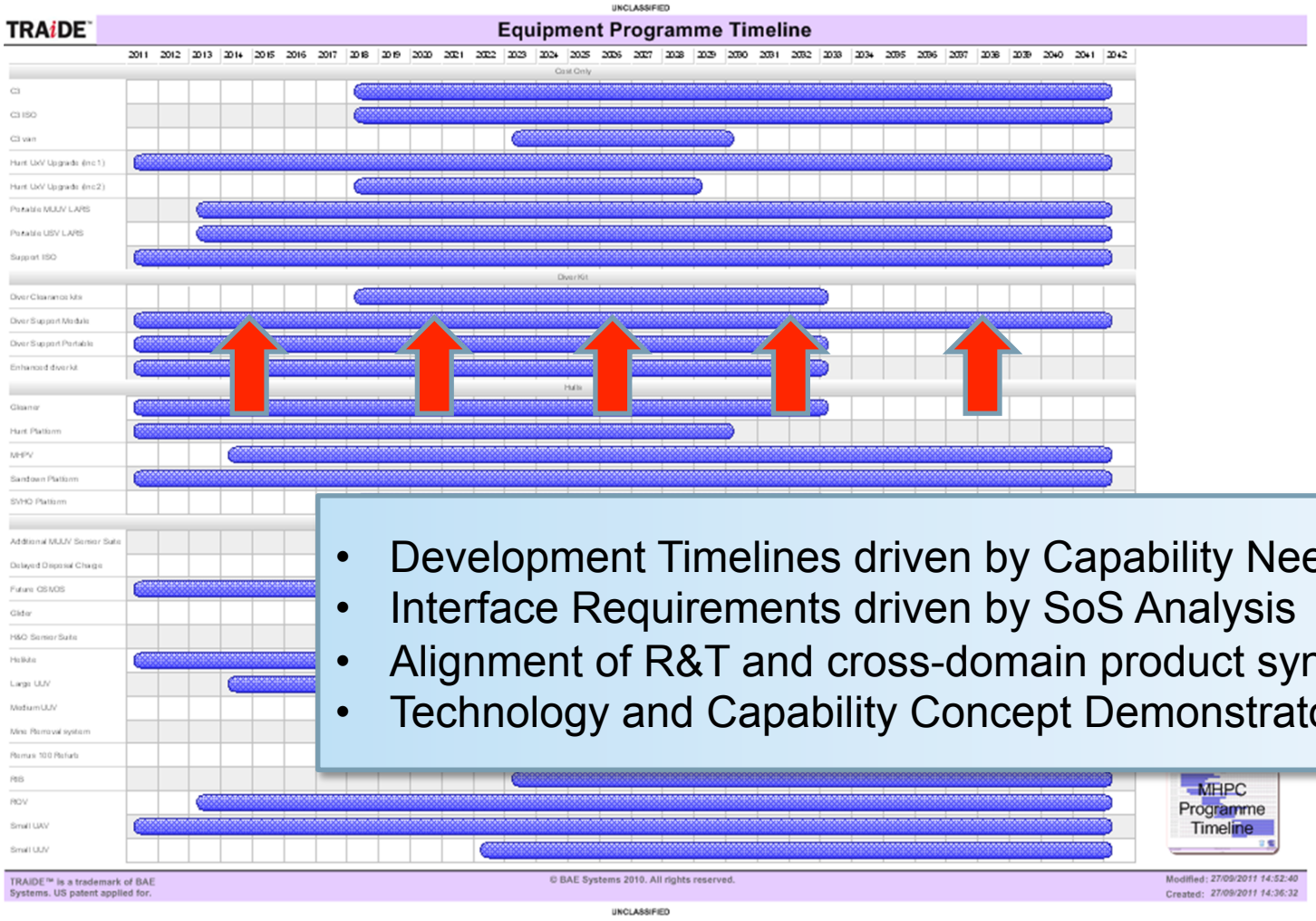
BAE SYSTEMS

Systems of Systems Integration Analysis



- Interoperability
- Information Exchanges
- External Dependencies
- Skills and Training
- Technical Assurance
- ITEA

Product Development Strategies

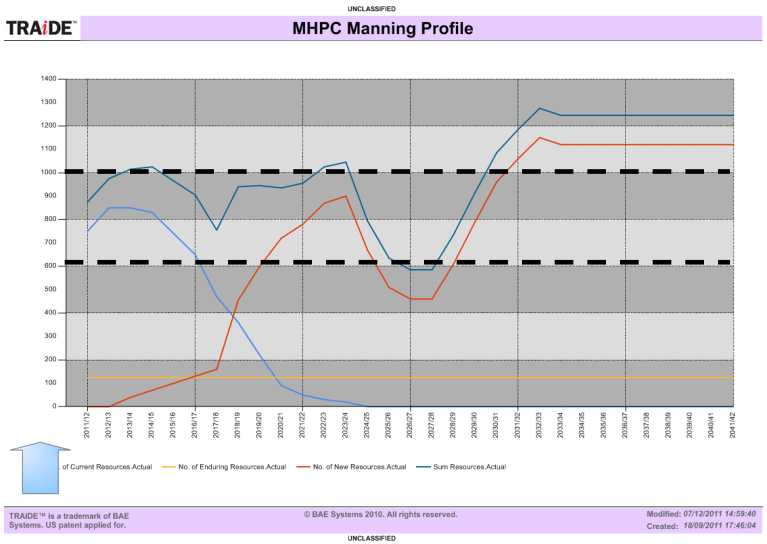


- Development Timelines driven by Capability Needs
- Interface Requirements driven by SoS Analysis
- Alignment of R&T and cross-domain product synergies
- Technology and Capability Concept Demonstrators

Manpower Analysis

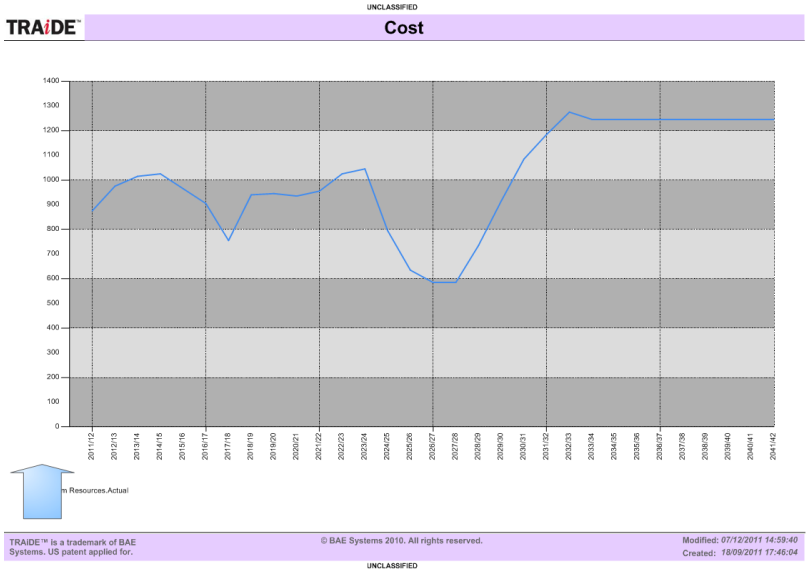
- Impacts on Operational Personnel need to be considered throughout transition
  - Migration of skillsets
  - Development of user confidence
  - Maintenance of Manpower Levels

- Ensuring the Personnel Numbers remain within tolerable limits will be a key constraint on the transition options
  - Personnel loss through retirement of existing systems
  - Additional Personnel requirements through introduction of new systems



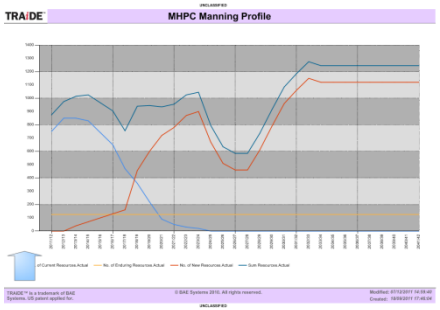
Cost

- Cost profile derived from input Cost Model
  - Excel Model calculating the procurement costs for individual Systems
  - Driven by Number and level of Integration required
- Supports Cost Analysis for:
  - Through-Life Cost
  - Yearly Spend
- Enables the user to perform Cost : Capability Trades

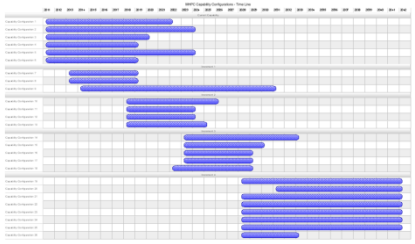


Combined View

- At the highest level we can summarise the different solution options against the multiple perspectives



- Rationalises the broad set of solution options to a more “manageable” set for further analysis



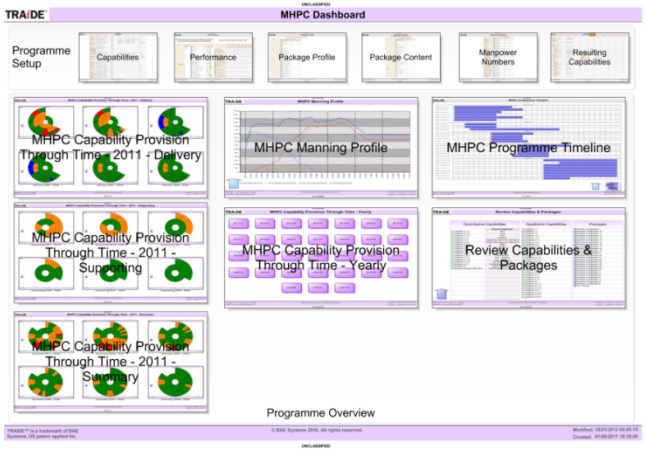
- Assumptions can be evaluated throughout the programme lifecycle
  - Changing Requirements
  - Operational Realism

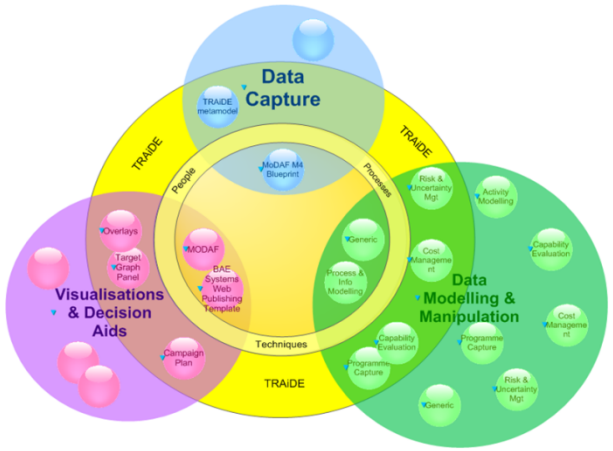
Benefits

- The Structural Benefits of Architecting combined with Intuitive Visualisations to support Capability Management decision-making

- Single-source of Truth
  - Data is captured once and visualised from different perspectives and levels of aggregation
  - Change to underpinning data results in changes to dependent data and visualisations

- “What if” Modelling
  - Ability to “play tunes” on different solution options and visualise the impact





BAE SYSTEMS

Questions