The following presentation was given at:

Joint Workshop
"Affordability, Value for Money and Decision Making"

Tuesday 18th November 2014

BAWA, Filton, Bristol

MI Toolset to support evidence-based decisions for Defence Evaluation Capabilities

Steve Rowley, QinetiQ

SCAF & OR Society Joint Workshop

Affordability, Value for Money and Decision Making

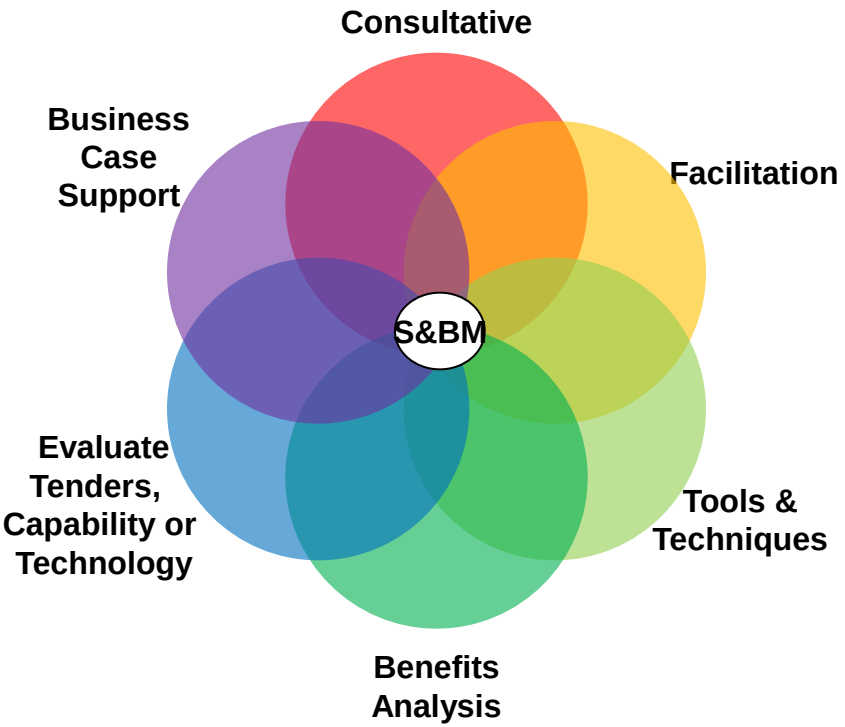
18 November 2014

SRROWLEY@qinetiq.com

QinetiQ Operational Research/Analysis Pedigree

Solution and Business Modelling Team

- QinetiQ's **lead OA/OR** capability
- Provide **independent, impartial advice** to MOD, UK Government and beyond
- Have supported **several £Bn** worth of MOD equipment programmes – pan domain
- **Over 200 years** experience in OA/consultancy
- **15+ individuals**, from different backgrounds and skillsets
- Based in Farnborough, Bristol and Winfrith



Steve Rowley

Principal Consultant
Solution and Business Modelling
Procurement Advisory Services
20 years

Career and OA Experience Highlights

- Principal Consultant
- Technical Manager
- Deputy Team Leader

Involvement and supervision of numerous projects inc. Land logistics, Weapons Integration (WIUK), Above and Underwater research, Test and Evaluation, Fire and Rescue Service.....

- CVF (QE Class) Sortie Generation Modelling
- FCBA (F-35 Lightning II) Assessment Phase
- Joined DRA – Operational Studies (Air)
- Aeronautical Engineer graduate – Zero OR/OA or Costing academic knowledge

1994 — 2014

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Abstract

"UK defence programmes spends upwards of £1Bn a year on test and evaluation activities and facilities. In a rapidly changing world where defence must remain affordable and flexible it is important that timely and effective decisions are made on having the necessary evaluation capabilities, whether owned or available to defence. The MOD is sponsoring an activity to develop a software toolset that will contain Management Information to inform decisions for future investment and support of defence evaluation capabilities. This presentation describes the challenges associated with the development of a simple but powerful toolset to conduct analysis of the evaluation requirements and capabilities in terms of potential gaps and future opportunities. The presentation examines how a very large input dataset can be reconciled using COTS software applications and how aspects such as data availability and data maturity can be represented in order to increase confidence to the decision maker."

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Abstract

"UK defence programmes spends upwards of £1Bn a year on test and evaluation activities and facilities. In a rapidly changing world where defence must remain affordable and flexible it is important that **timely and effective decisions** are made on having the necessary evaluation capabilities, whether owned or available to defence. The MOD is sponsoring an activity to **develop a software toolset** that will contain Management Information to **inform decisions** for future investment and support of defence evaluation capabilities. This presentation describes the challenges associated with the development of a **simple but powerful toolset** to conduct analysis of the evaluation requirements and capabilities in terms of potential gaps and future opportunities. The presentation examines how a very large input dataset can be reconciled using COTS software applications and how aspects such as **data availability and data maturity** can be represented in order to **increase confidence to the decision maker**."

NB: This project has not completed – this presentation will not discuss the particulars of T&E capabilities, rather will focus on the toolset and analysis approach.

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Client and Project Overview

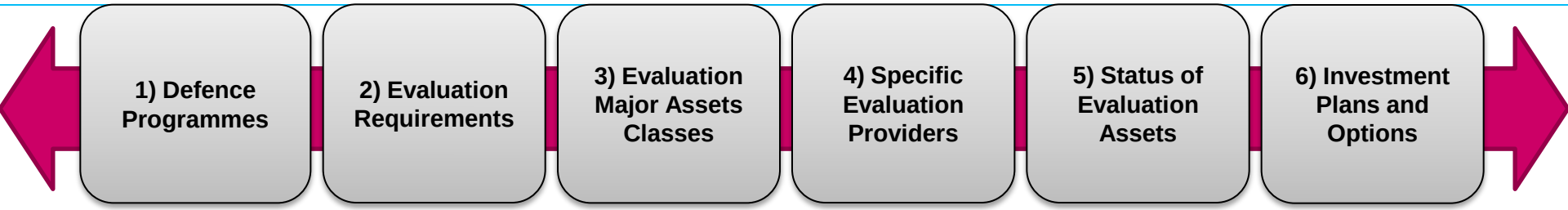
Dstl and FMC WECA

- (Test &) Evaluation Capabilities
- Future Evaluation Requirements
- Status of Evaluation Capabilities
- Strategic investments and opportunities
- Pan defence programmes

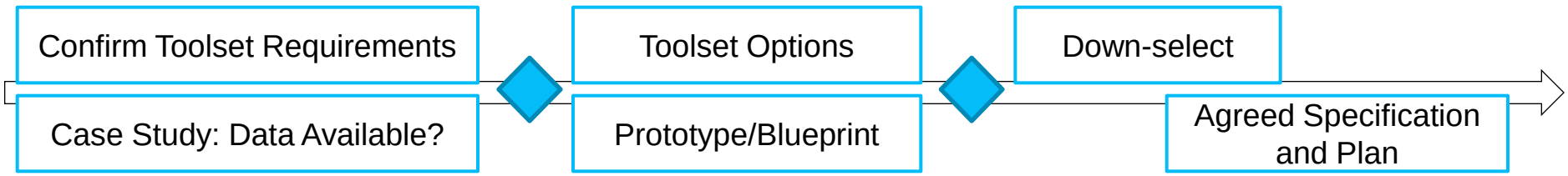
Scope of Work

- Design and develop a Management Information Toolset to support Decision Makers
- Host and use by MOD (FMC WECA)
- Populate with data
- Highlight confidence
- Support ongoing reviews

Toolset Construct



QinetiQ approach to the project: Phase 1: Design



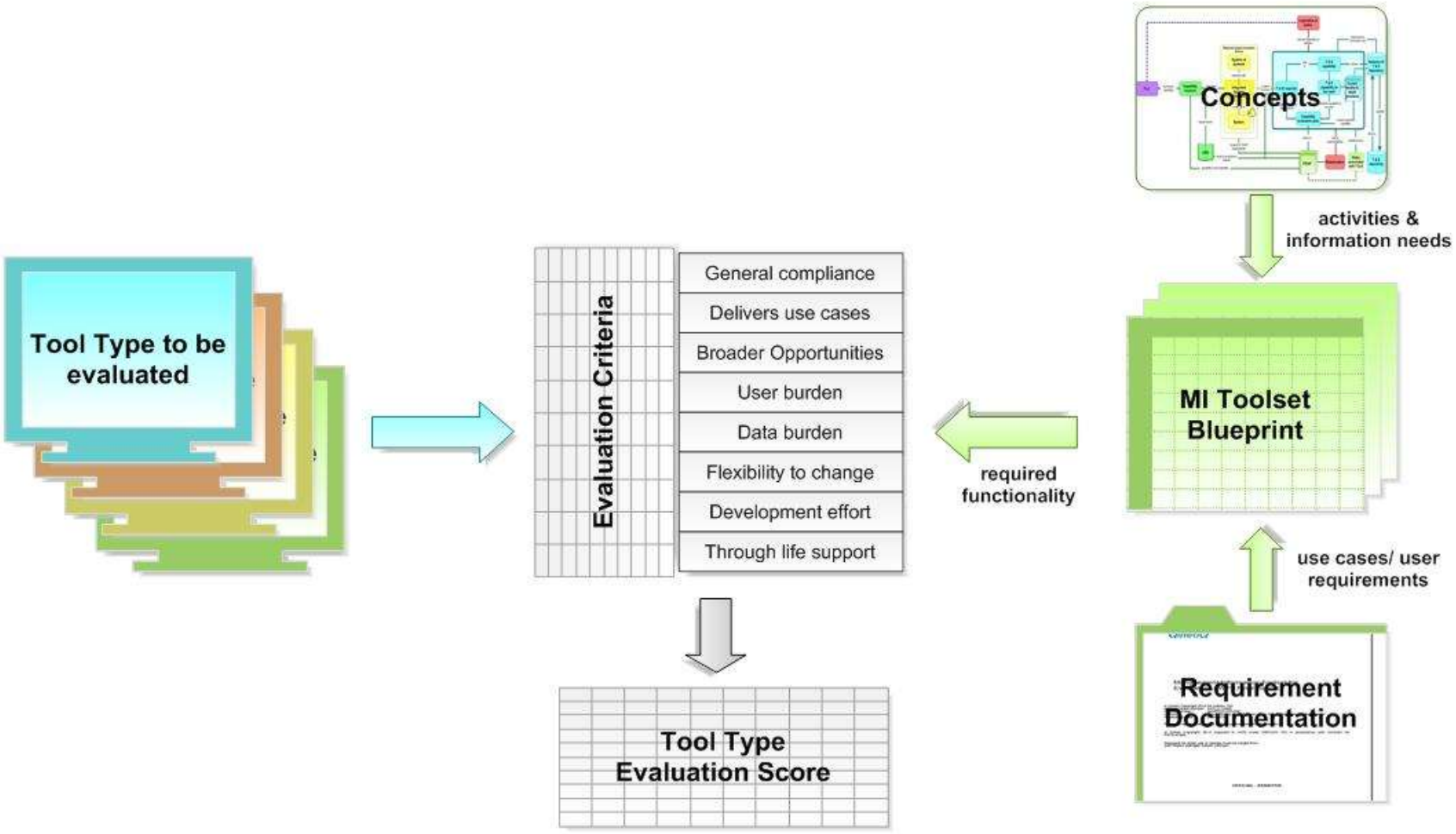
Toolset Requirements

- Bounding Assumptions
- Analytical Use Cases
- IT Requirements
- # End Users
- Classification
- Others….

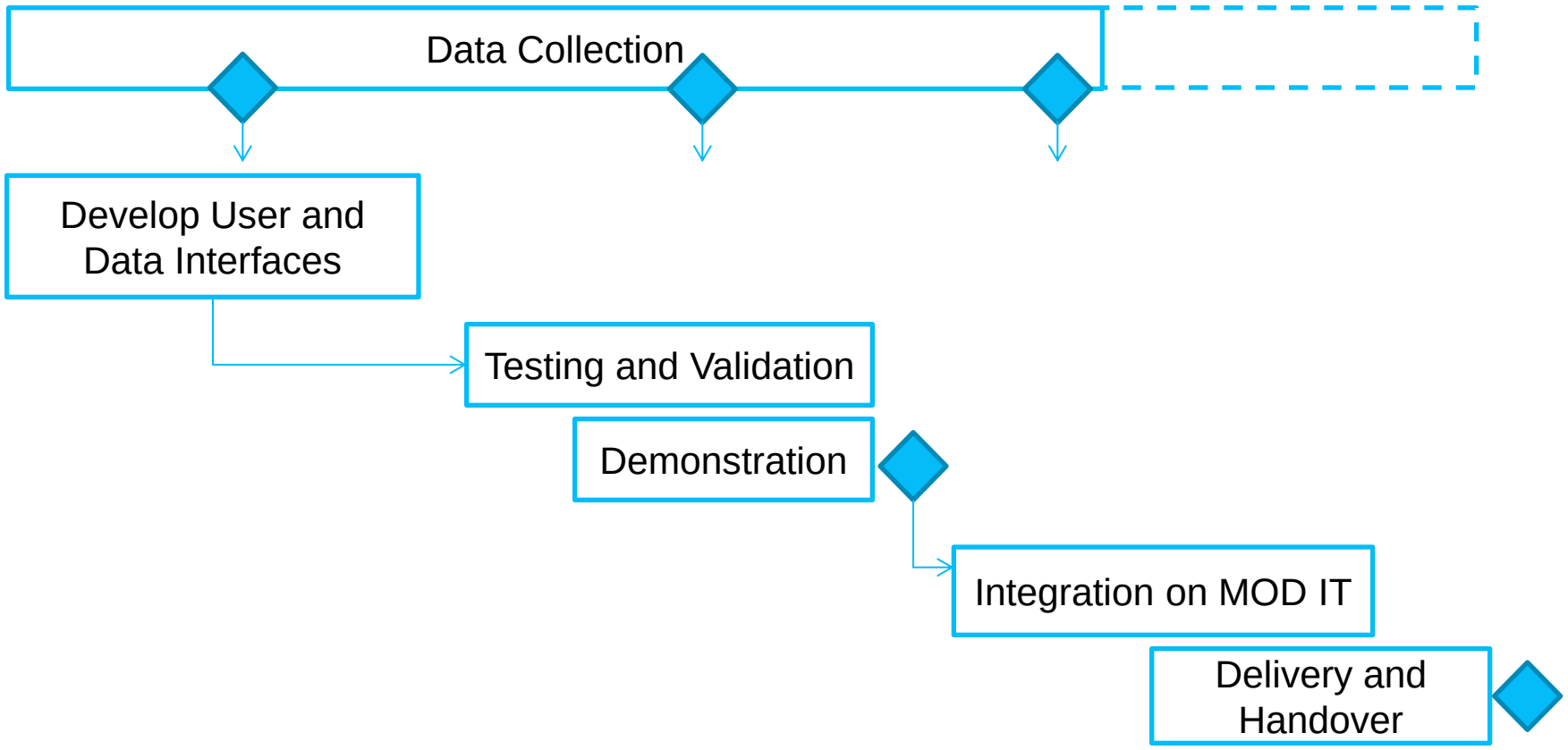
Toolset Options

1. Datasheet (Excel)
2. Desktop Relational Database (Access)
3. Relational Database Management System (SQL Server)
4. Enterprise Business Development Tool (MooD 15)
5. Enterprise Architecting Tool (MEGA, Rational System Architect)
6. Enterprise Context Management Tool (SharePoint)
7. Bespoke (ASP.NET, C#)

QinetiQ approach to the project: Phase 1: Down-select



QinetiQ approach to the project: Phase 2: Develop and deliver



Toolset: Decision Maker Confidence

Use of data maturity metrics

Toolset is NOT a black box optimiser

- User conducts analysis and appoints “scores” or “risks” as judgement
- Toolset displays status of requirements and capabilities and helps prompt where off-line data capture or analysis required

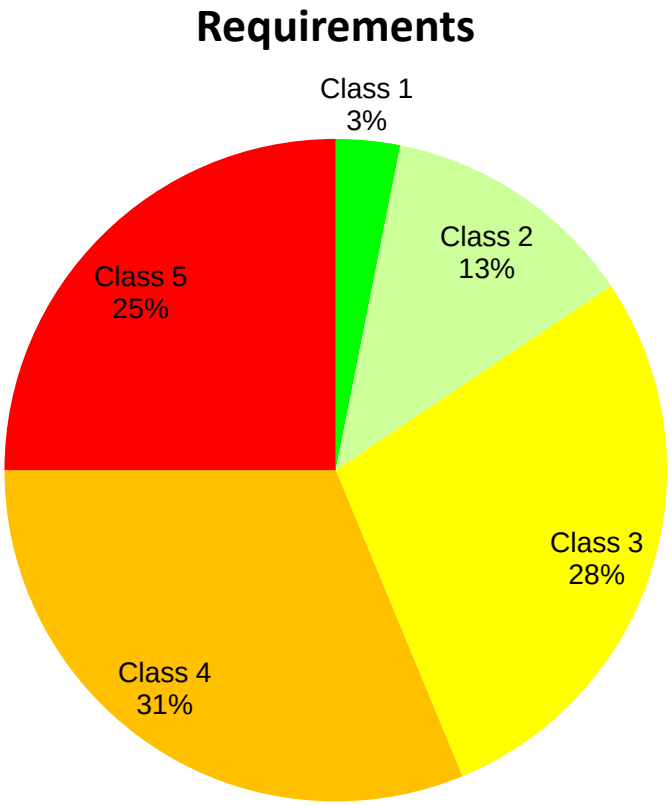
Tool data set will mature in time

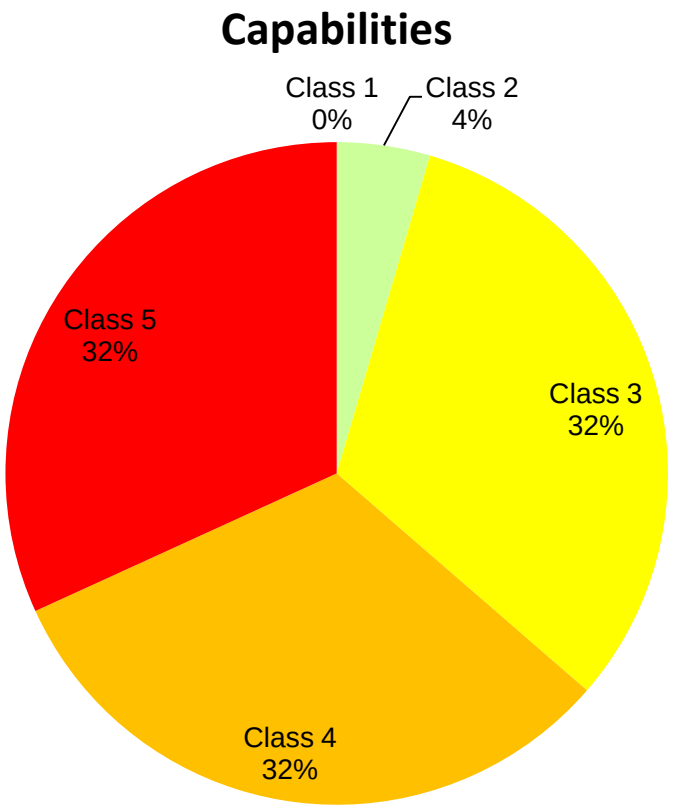
- Initial population – broad (represent all programmes)
- Use Case analysis will populate and increase confidence during use

Data Maturity

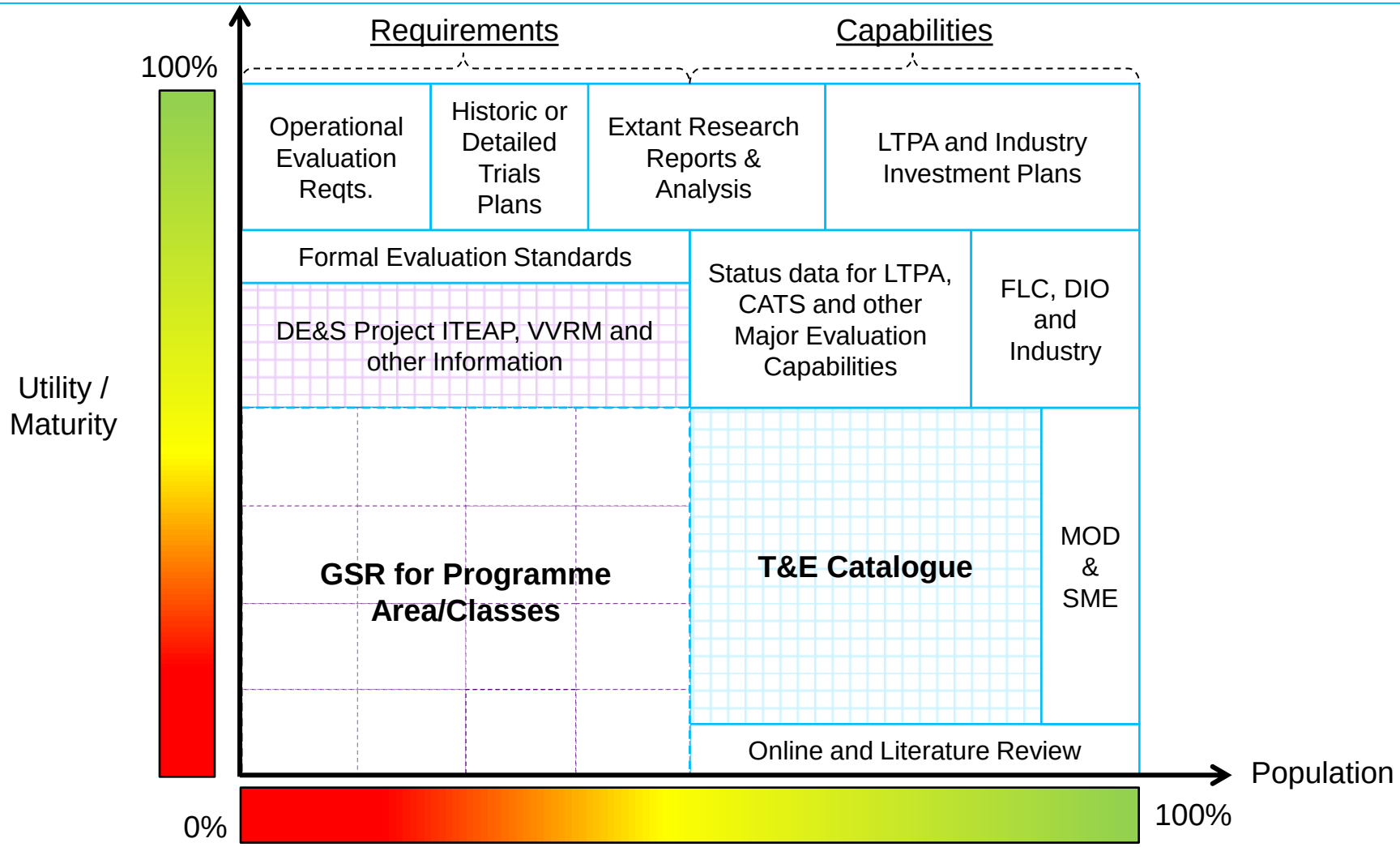
		Assessment criteria - Evaluation Requirements				
		Requirements Definition Method	**Current – is the requirement set up to date?**	**Link to Evaluation Strategy**	**Confidence (Link to Capability)**	**Completeness (Through Life)**
Maturity class	Class 5	Rough order of magnitude (ROM) estimate or judgement from subject matter expert (SME)	Not reviewed and/or endorsed in the last 5 years	No demonstrable link to any evaluation strategy	Requirements do not mention confidence	Data gives no insight to link the activity with overarching programme evaluation requirements
	Class 4	Analogy (e.g. to similar/historic programme)	Reviewed and endorsed in the last 5 years	Evaluation requirements make passing reference to compliance with strategy, but not clearly shown.	Some articulation of confidence associated with evaluation outputs. Project Team assurance only	Data makes passing reference to other evaluation activities involved in the programme
	Class 3	Relevant ITEAP or similar, but lacking deep detail in evaluation requirements	Reviewed and endorsed in the last 2 years	Evaluation requirements are matched to 1 or 2 tenets of MOD T&E Strategy	Requirements broadly identify the level of confidence required from the evaluation. Has DEA or CPG buy-in	Data shows a link between evaluation requirements in the programme, but has gaps in completeness
	Class 2	Detailed ITEAP, High Level Trials and Evaluation Plan(s)	Reviewed and endorsed in the last 12 months	Evaluation requirements are matched to 3x tenets of MOD T&E Strategy	Requirements have been developed and endorsed with MOD and Industry support to own programme schedules	Data shows a clear transparency of the evaluation requirements across several phases of the programme
	Class 1	Detailed Trials and Evaluation Plan(s)	Reviewed and endorsed in the last 6 months	Evaluation requirements are clearly matched to 3x tenets of MOD T&E Strategy AND Industry own evaluation needs	Requirements clearly articulate the level of confidence needed from the evaluation and link to decision making/programme gates and buy-in from all stakeholders (MOD & Industry)	Data shows a clear transparency of the evaluation requirements across the whole life of programme, identifying dependencies and alternative evaluation options

Data Maturity Example





Toolset Data



Toolset Construct

	1) Defence Programmes	2) Evaluation Requirements	3) Evaluation Major Assets Classes	4) Specific Evaluation Providers	5) Status of Evaluation Assets	6) Investment Plans and Options
Type of Data	Current Committed And Future	Integrated System and S of S activities (Safety, Compliant, Fit for Purpose)	List of the main assets needed for evaluation - "performance metrics"	Capture main providers of evaluation assets	Status report, metrics, availability, obsolescence, risks etc.	Set of investment opportunities per each asset
Sources of Data	DE&S and Command Plans – Genesis Options, R&T etc.	GSR + augmented or unique elements, Standards etc.	GSR, ITEAP and SME guidance on elements used in evaluation	Filtered T&E Catalogue, LTPA, CATS, MSCA, NCSISS and other major contracts	Routine programme reports or specific investigation	Routine programme reports or specific investigation
Simple Example	Air to Surface Weapon	Environmental evaluation, JSP "999"	Environmental Test Chamber (ETC) -50 to +50 deg c	LTPA (Boscombe Down)	Status Report	Investment Plan

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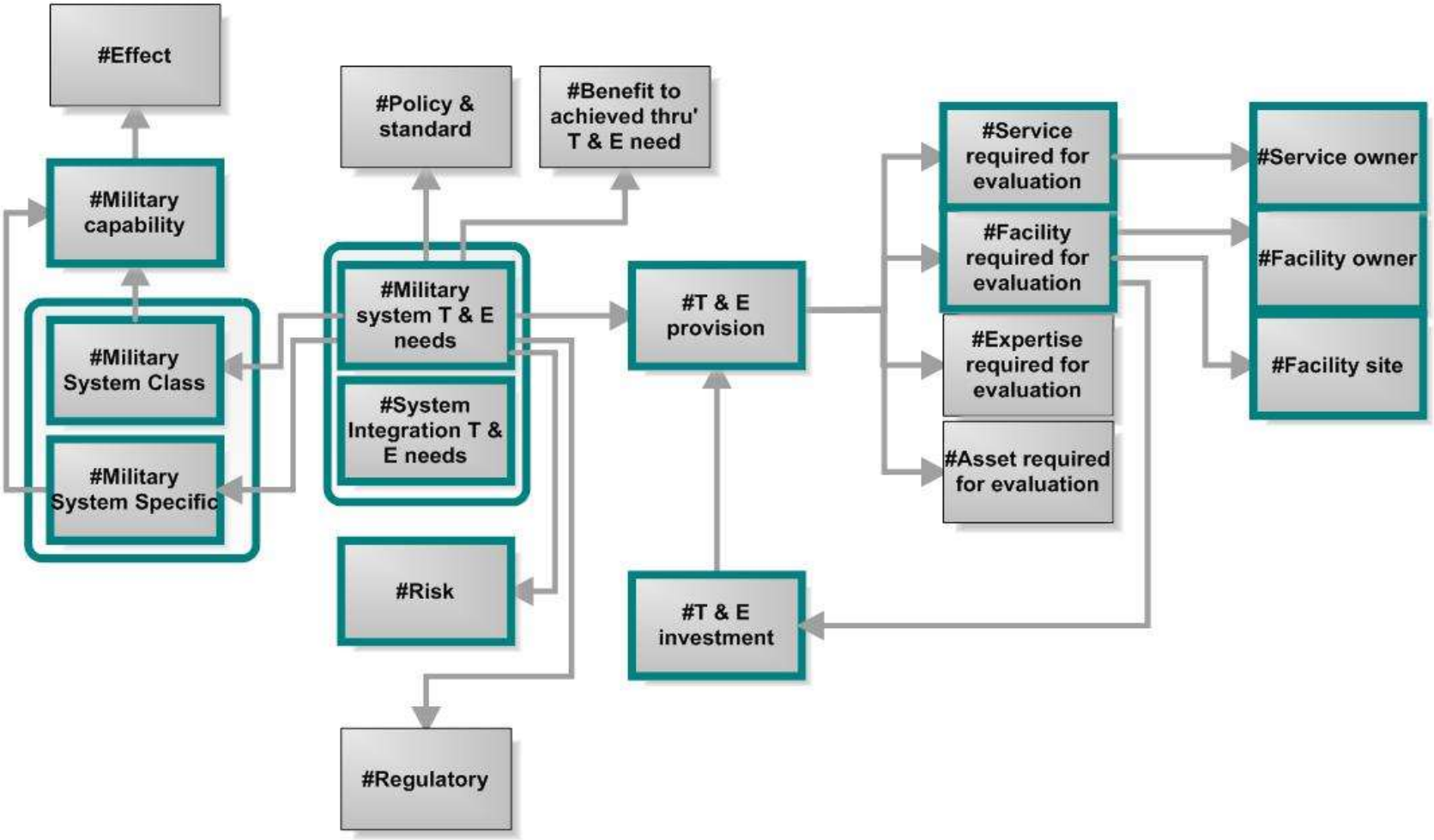
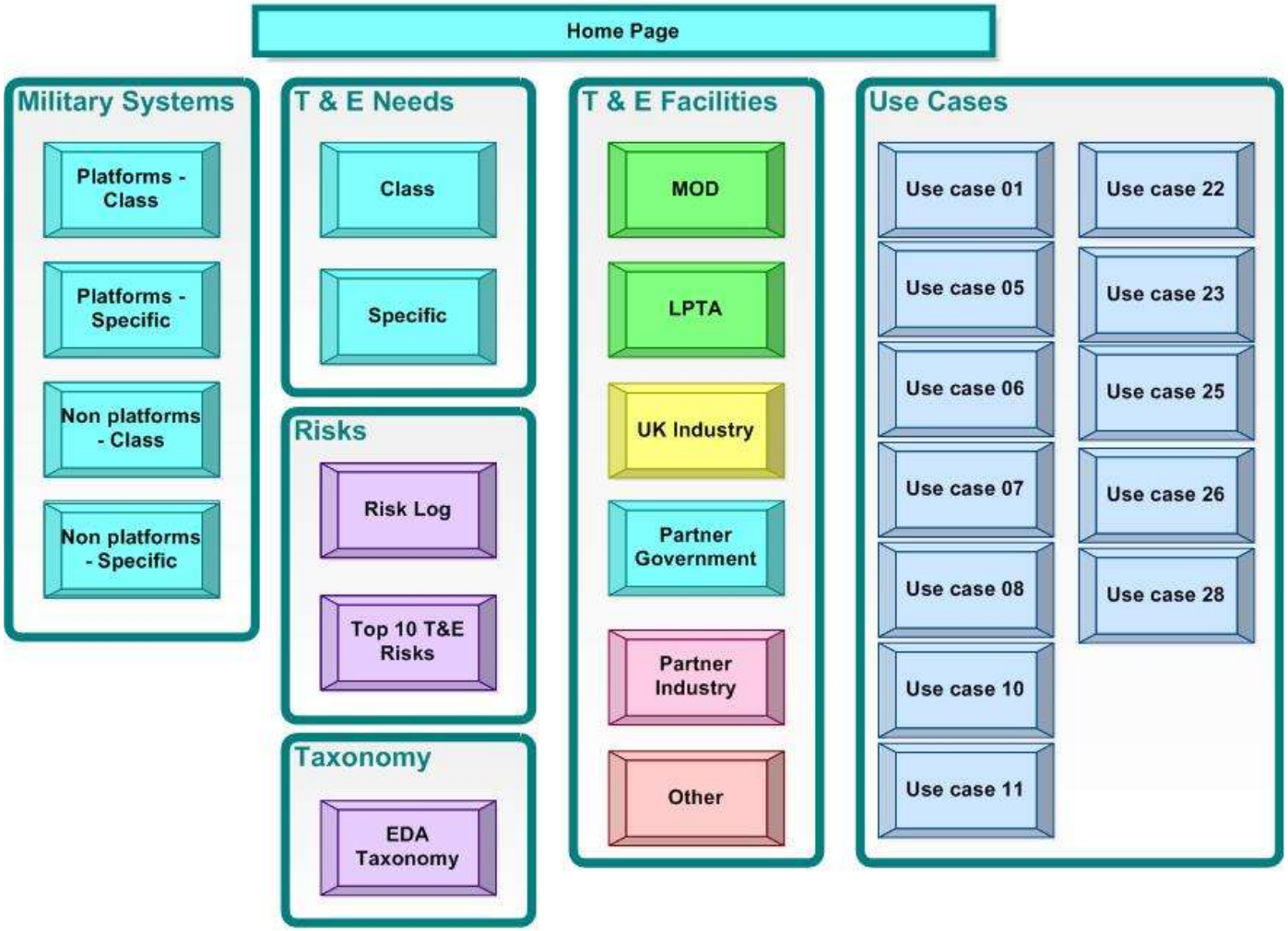
Toolset – Architecture in MooD



Toolset – Prototype Front Page



Affordability, Value for Money and Decision Making

Toolset is designed to directly support the decision maker:

- Set of Use Cases defined and designed in
- Some Use Cases relate directly to monetary aspects (investment plans)
- Use of Data Maturity to highlight confidence in input data, thus outputs
- Toolset informs and supports – it does not perform “black box” calculations

Affordability

- Enable consideration of “what-if” futures across defence programmes – Evaluation is necessary but is a considerable cost contributor

Value for Money

- Some investment opportunities will need to consider VFM
- Opportunities to invest in evaluation and improve WLC – e.g. SE and simulation

Summary of Challenges and Success

Simple but powerful toolset

- Balance granularity/abstraction with data burden and delivering useful analysis
- Avoid attempts to integrate “live/dynamic” interfaces with other tools

Data Availability and Maturity

- Broad, full data set that can be enriched and enhanced

Increase Confidence of Decision Maker

- Data maturity scales
- Avoided black box logic or mathematics

Integration onto MOD IT

- Considered as part of toolset design and down-selection
- Authority has helpers

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Lessons learned and shared

Phased approach:	Set the bar high, but manage reality
Explore options:	Conduct prototype activities and review
Stakeholder engagement:	Active user involvement during design and development
Data:	Is always a risk
Reuse existing work:	Previous research and data sets
Keep it simple:	Build confidence in smaller data sets
Flexibility:	Be prepared to consider refinement of approach

Questions?

www.QinetiQ.com