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24 October 2014

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DSTL/TR83940



Ministry
of Defence

An investigation into Modelling and Simulation (M&S) in support of UK Ministry of Defence (MOD) Test and Evaluation (T&E)

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24 October 2014

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Presentation Format

- Introduction
- Aims of investigations
- Approach
- Research & key findings
- Future work
- Summary

Introduction

Increasing complexity in Test & Evaluation (T&E)



Aims

To investigate:

- Where MOD already obtain benefits from M&S
- What benefits we get from M&S
- How and where can we achieve greater benefits from M&S
- How to demonstrate that these benefits can be achieved

Approach

- Phased approach
- An industrial consortium contracted to perform research.



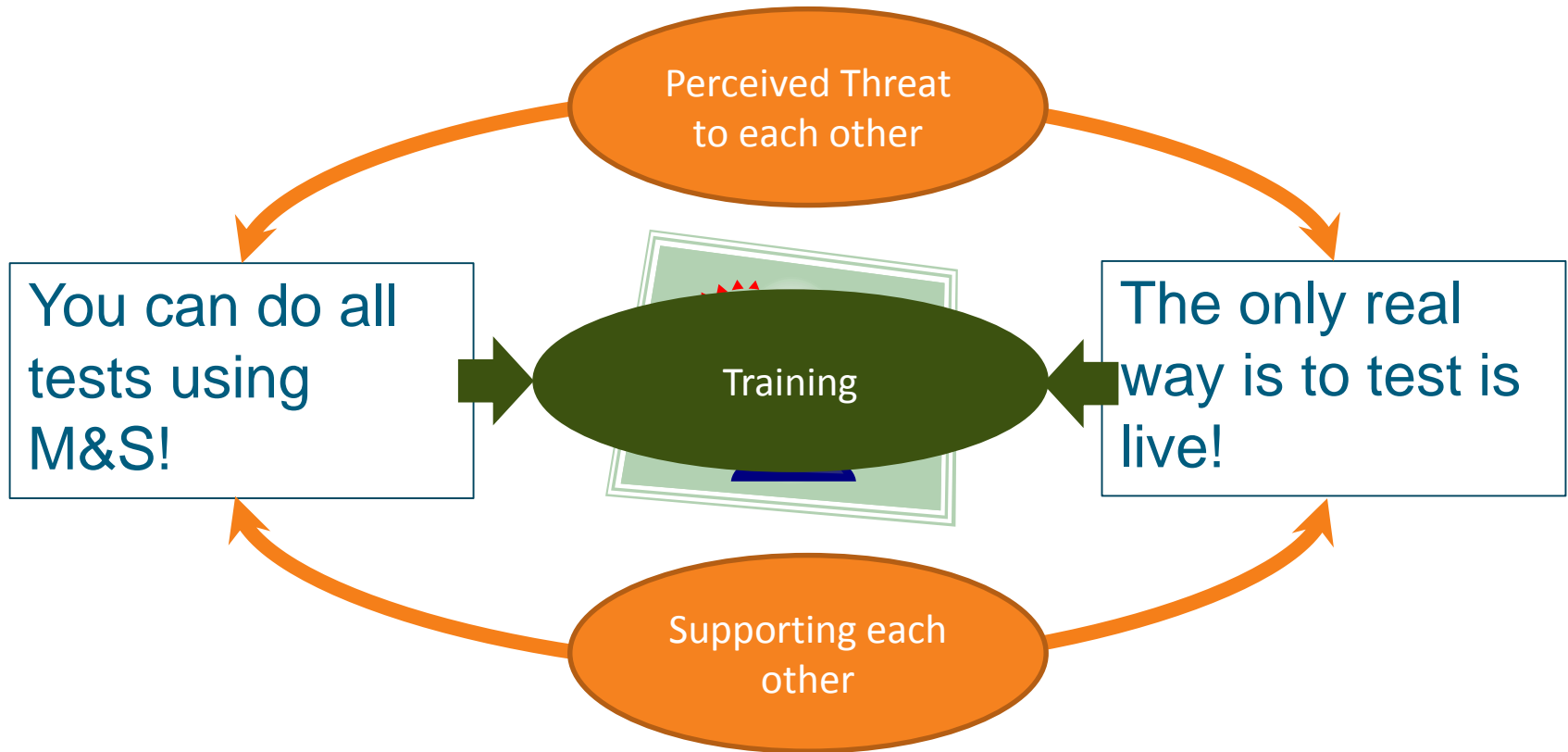
Phase 1 – Existing use of M&S

- Over 40 live projects identified
- Down selected to 4
 - Maritime
 - Land
 - Air
 - Research

Findings

- Lots of areas have already obtained benefits
- Quantitative information not readily obtainable
- T&E requirement setters conflict

T&E requirement setters conflict.



Phase 2 – Case Studies



Findings

- Detailed cost/time savings could not be obtained but informed estimates are possible.
- An approach that could support all domains would be a test-bed that includes an:
 - Open Architecture (OA)
 - Synthetic Environment (SE)

Phase 3 – Cost Benefit Analysis

- Cost benefit analysis for



- The Integration & Scenario re-use in a Shore Integration Facility



- Protective Patrol Vehicle (PPV) Dynamic Modelling of Foxhound



- Human Machine Interface (HMI) of UAS

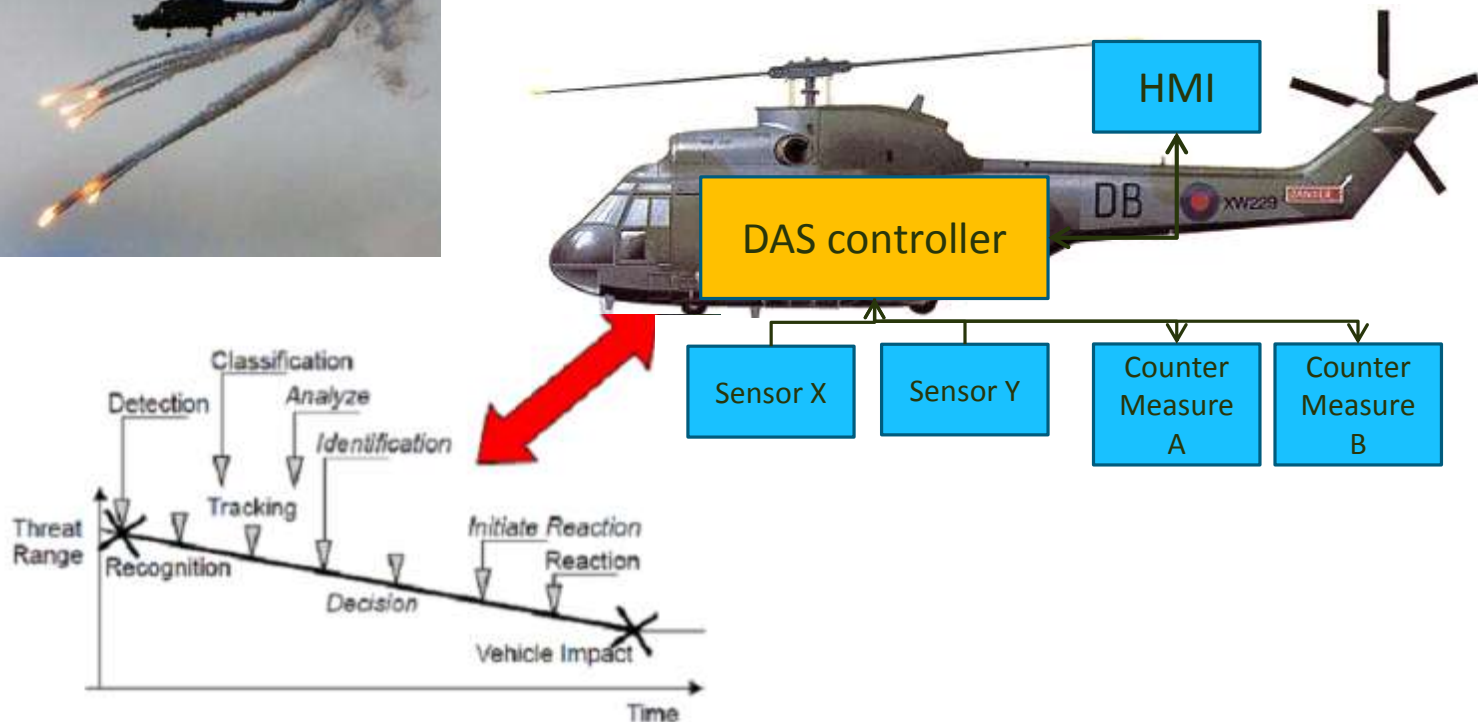


- Controller Decision Logic in a DAS

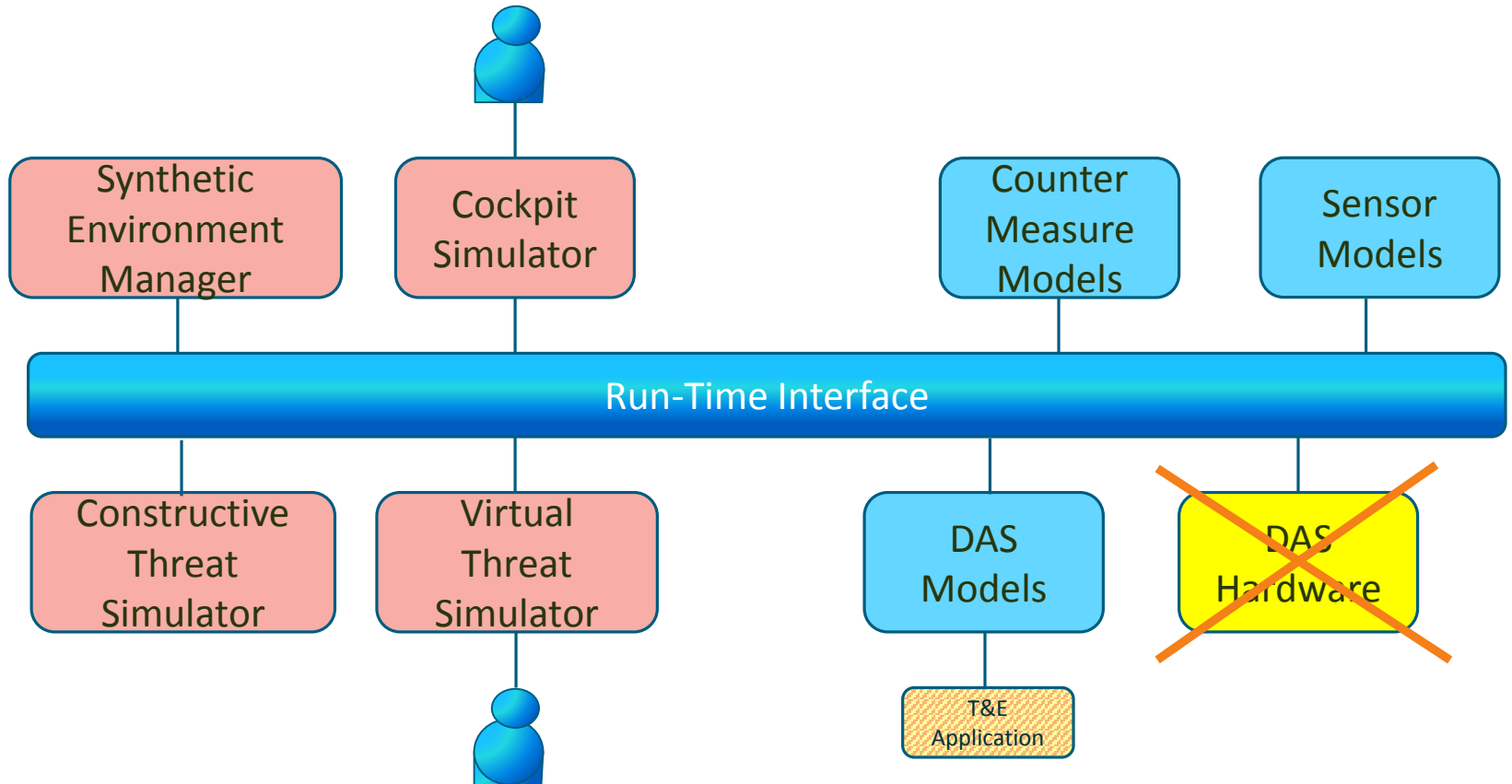
Findings

- An Open Architecture (OA) Synthetic Environment (SE) test bed using a High Level Architecture approach has the potential to return benefits across all domains
- Fidelity and confidence levels need to better defined for T&E
- Plug and Play not a simple option
- Greater benefit will be achieved from Model re-use (Standardisation)

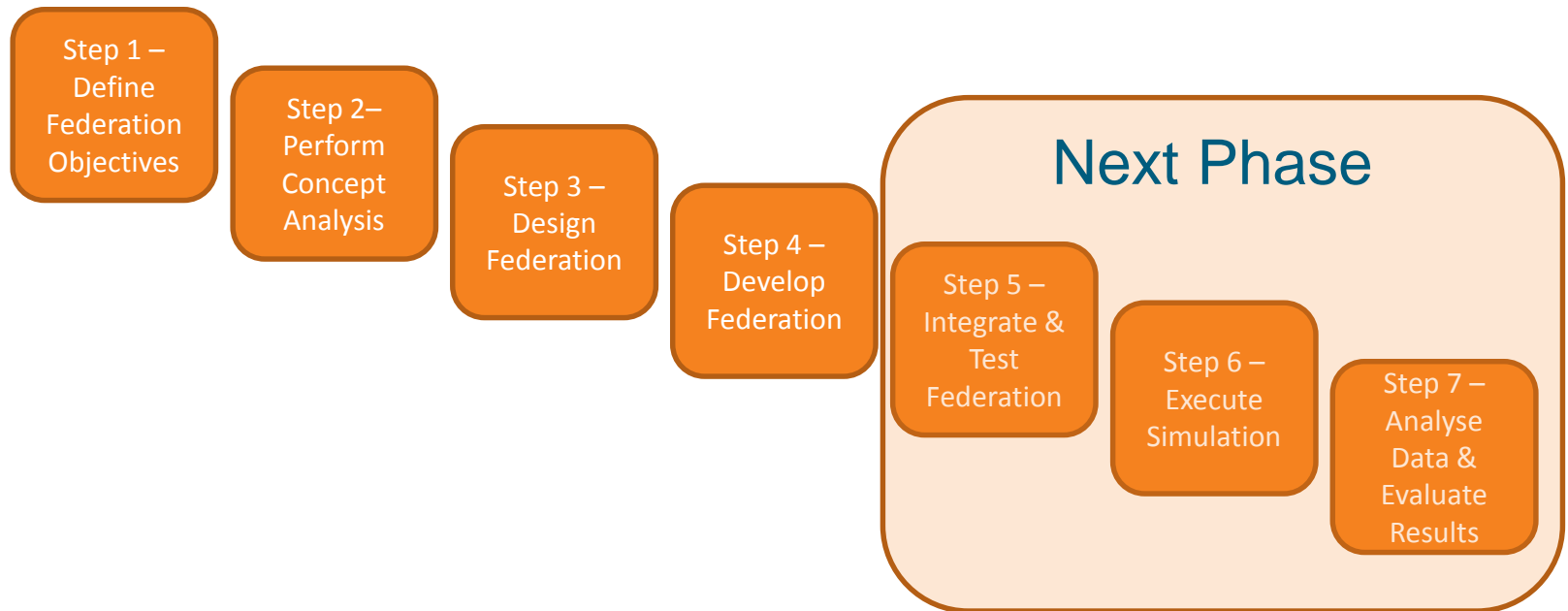
Phase 4 - Demonstration



Demonstration Architecture



Design of Federation



Distributed Simulation Engineering and Execution Process (DSEEP)
Standard [IEEE Std 1730-2011].

Findings

- Models are not always kept up to date with hardware
- Data/logic or hardware not always available due to IP, this had to be addressed by contractual agreement or application software
- Confidence levels of results must be agreed
- DSEEP works well to ensure all participants are engaged
- Simple formalised Agreement process (Excel spreadsheet) worked well

Summary

- M&S is widely used for de-risking at system level
- Not easy to obtain quantitative evidence of benefits
- Cultural issues between live and M&S communities
- Open architecture and standards are essential
- Intellectual Property issues can be addressed
- Re-use is essential as models, federation agreements and Verification and Validation (V&V) process are expensive
- V&V must be planned early to minimise cost
- Confidence levels and model fidelity must be agreed

Thank you

Questions



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