

The Support of the Acquisition Defense Governance Using Constructive M&S

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Presented at:

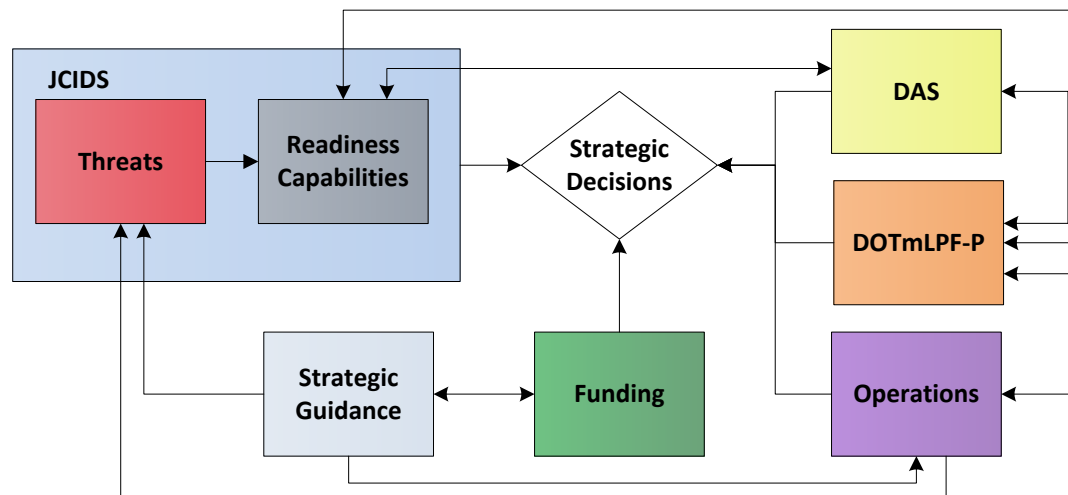
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Outline

- Introduction
- Introduction to Foresight Support System (FSS)
- Concept of M&S-based FSS
- Modeling Defense Acquisition System
 - ❖ Analytical Methods
 - ❖ M&S Methods
 - ❖ Concept of DAS Representation using M&S
- Future Work

Introduction



- ❑ Big picture of Defense System (DS) (DoD - JCIDS, 2015)
- ❑ Defense Acquisition System (DAS): main phases, portfolio of programs (DoD - DAG, 2013)
- ❑ Relationship between budget, strategy, and readiness (Harrison, 2014)

Introduction

- ❑ Readiness evaluation challenges (Harrison, 2014)
- ❑ Develop standardized way to use M&S for DAS program portfolio analysis (SISO, 2015)
- ❑ Challenges in representation
 - ❖ Data collection
 - ❖ Effective SME collaboration
 - ❖ Validation
- ❑ Lowered cycle times of strategic reviews using ICT - Electronic Coordination Tool (Performance of the Defense Acquisition System-DoD, 2015).

Introduction to Foresight Support System

- ❑ **Purpose of foresight** (Magruic, 2011; Piirainen & Gonzalez, 2015)
- ❑ **Forming Foresight Field, methods, support systems, state of the art** (Von der Gracht, Bañuls, Turoff, Skulimowski, and Gordon, 2015)
- ❑ **25 main method categories, characteristics for creativity, expertise, evidence and interaction** (Popper, 2008)

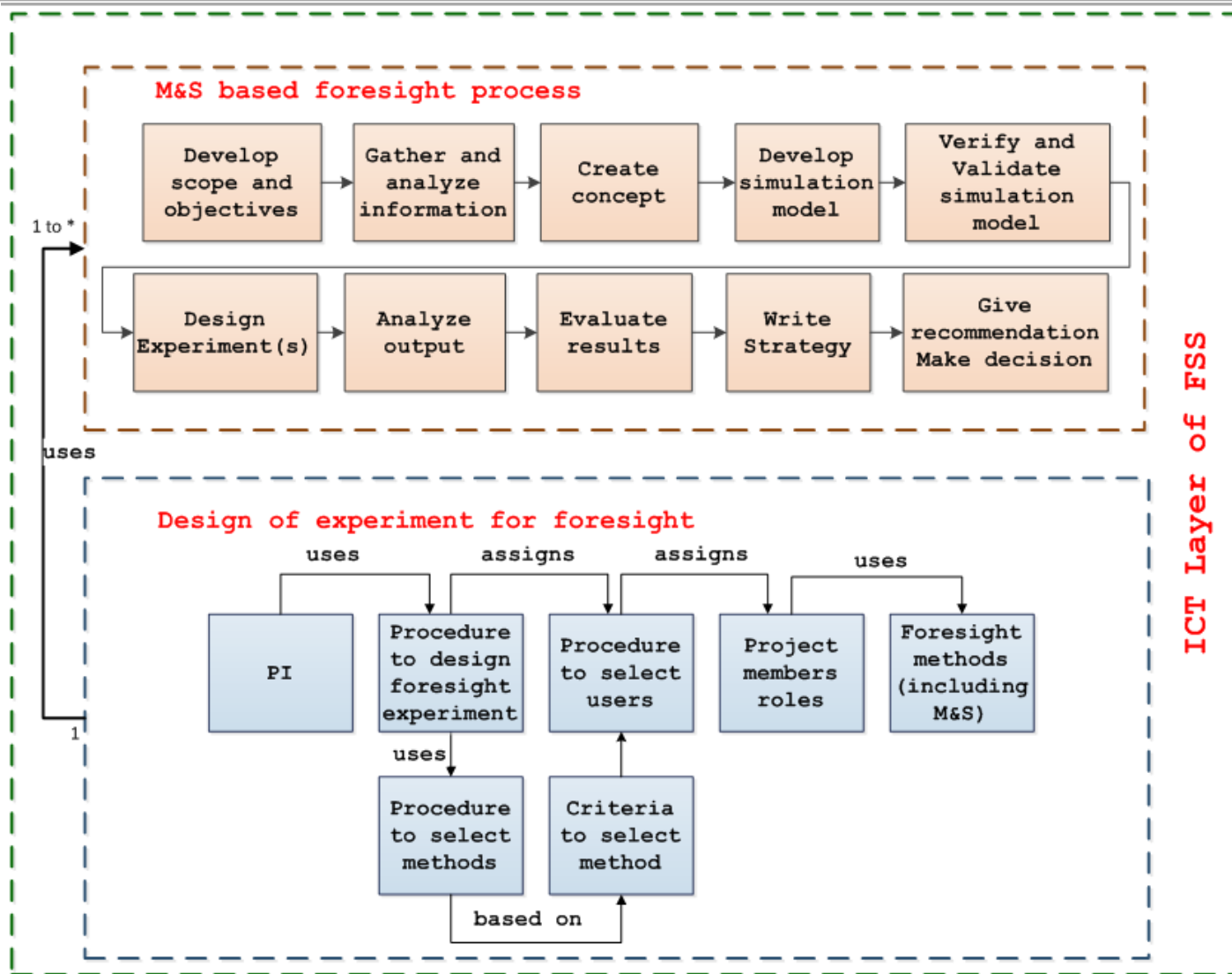
Introduction to Foresight Support System

- ❑ Web based Foresight Support System (FSS) developed by the German Federal Armed Forces – enhanced collaboration (Durst, Durst, Kolonko, Neef, & Greif, 2015), but needs more scientific rigor, robustness, and foresight validation (Von der Gracht et.al, 2015)
- ❑ M&S based FSS data-driven approach provides more rigor and scientific soundness (Kolominsky-Rabas et al. 2015)
- ❑ M&S/ICT based FSS to support DS strategy development?

Concept of M&S-based FSS

- ❑ How should the DS strategic initiatives and DAS programs be conceived, funded and implemented in the future?
- ❑ How should the DAS adapt and be monitored in the future?
- ❑ Collaboration of multiple stakeholders
- ❑ Coordination of strategy development activities
- ❑ A methodology (choice, combination and use of foresight methods, tools, and SMEs)

Concept of M&S-based FSS



Modeling Defense Acquisition System: Analytical Methods

- ❑ Analytical methods (AM) – quick, simple models as compared to simulation models (Hester & Tolk, 2010)
- ❑ Analysis of Research Development Test and Evaluation (RDT&E) cost growth (Zaw, Willy, Roncace, and Bischoff 2014)
- ❑ Broader analysis to improve Program Life Cycle (PLC) performance (Kiemele, 2011)
- ❑ Quantifying value of test (Bjorkman, Sarkani, and Mazzuchi 2013)
- ❑ Value of system architecture flexibility in early stage of acquisition (Page 2012)

M&S Methods

DES

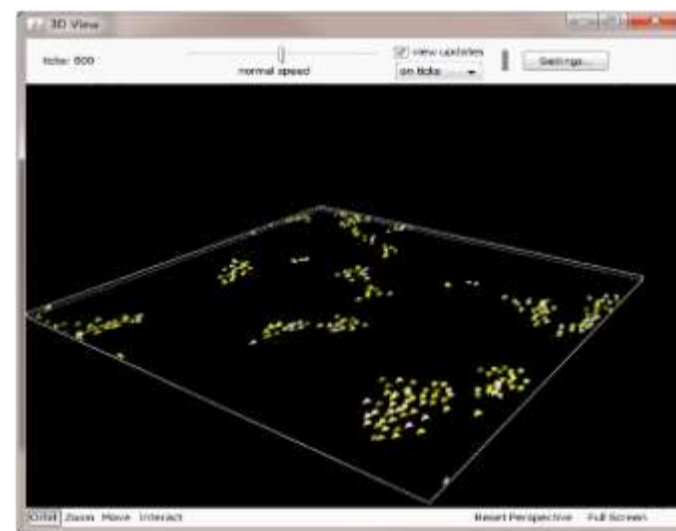
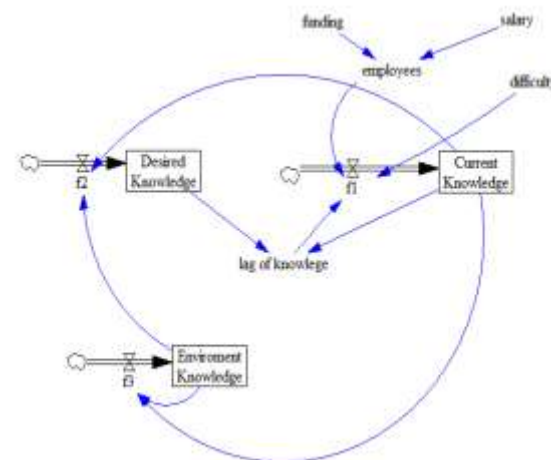
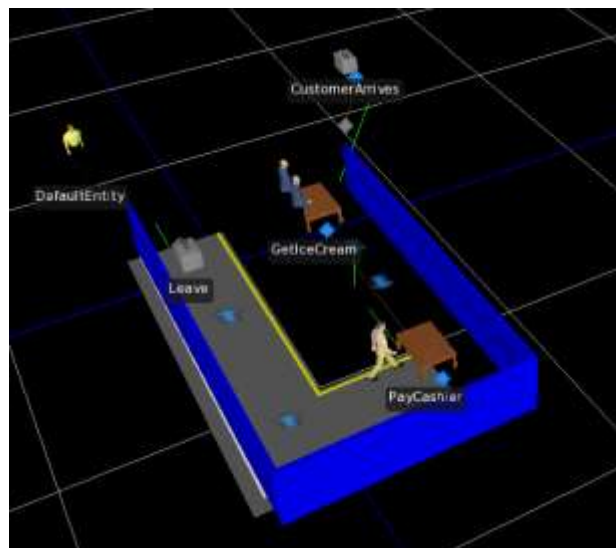
- Events
- Queue
- Entity, resources
- Logic

SD

- Continues time,
- Stocks, flows, aux variables
- Feedback

ABM

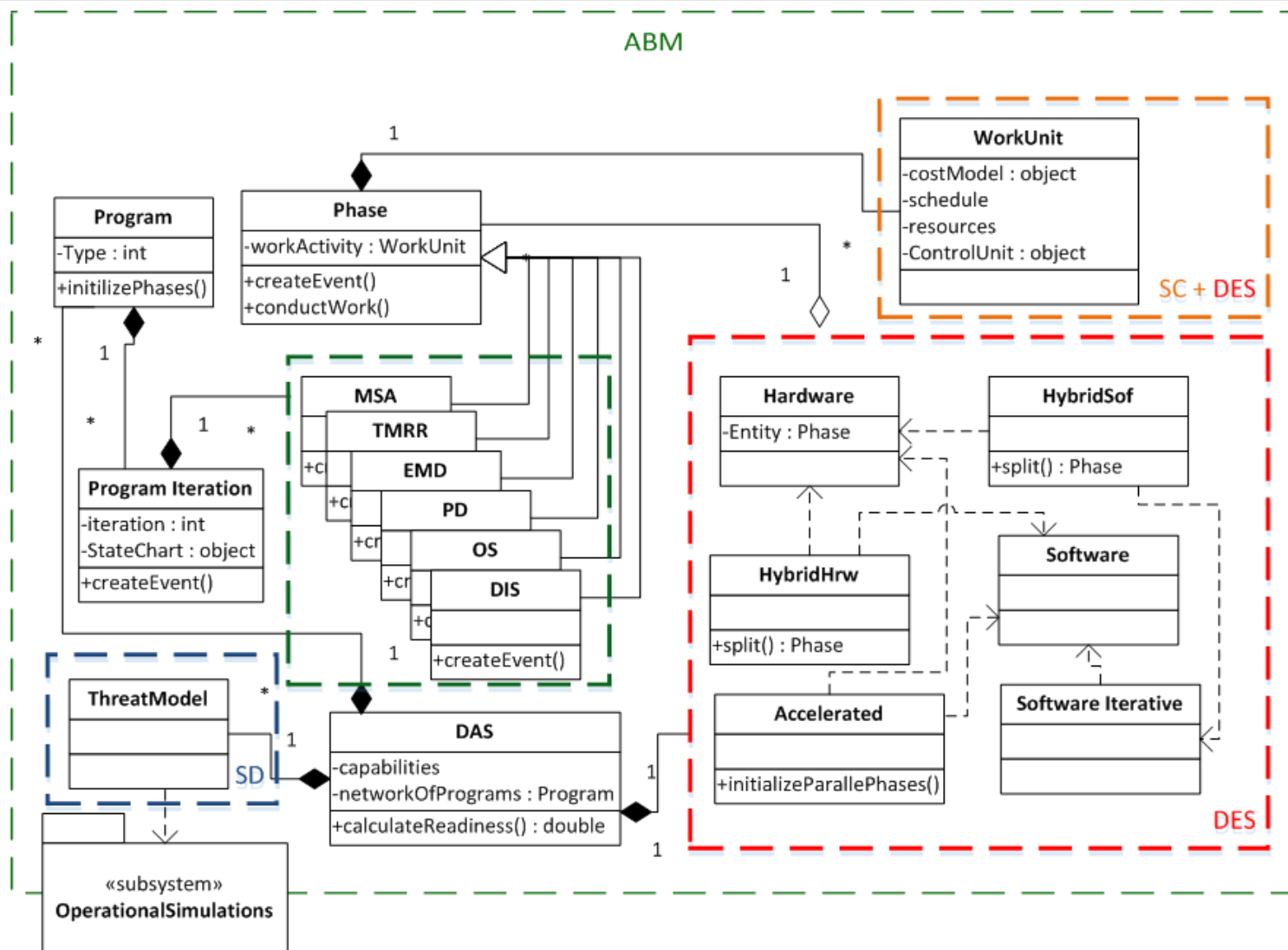
- Agent behavior and interaction
- Environment



Concept of DAS Representation using M&S

- ❑ M&S suitability for the use in the analysis of R&D governance problems (Balaban and Hester 2012)
- ❑ Difficulty to successfully describe dynamic processes contributing to DAS at multiple levels
- ❑ Subjective decision points, large variability across programs
- ❑ Representation requirements vs what could be potentially analyzed
- ❑ M&S conceptualization process can produce valuable insights
- ❑ Acquisition programs, categories, iterations, phase overlaps (5000.02 Operation of the Defense Acquisition System, DoD, 2015) — generalizability vs uniqueness?

Concept of DAS Representation using M&S



Concept of DAS Representation using M&S

Category/Phase	MSA	TMMR	EMD	PD	OS	DIS
Hardware	A1	A2	A3	A4	A5	A6
Software	Use A1	Use A2	B3	B4	Use A5	Use A6
Software Iterative	Use A1	Use A2*	Use B3*	Use B4*	Use A5*	Use A6
HybridHrw	Use A1	Use A2	Split to use A3 and B3	Split to use A4 and B4	Use A5	Use A6
HybridSof	Use A1	Use A2*	Split to use A3 and B3*	Split to use A4 and B4*	Use A5*	Use A6
Accelerated	Use A1	Use A2 and A3 in parallel		Use A4 and A5 in parallel		Use A6

Future Work

- ❑ Investigate requirements of FSS in the DAS context
- ❑ Investigate feasibility of FSS implementation: methodological (foresight methods selection and combination) and ICT technological gaps
- ❑ Develop or reuse simulation models of operational scenarios
- ❑ Develop theories and threat models
- ❑ Representation of sub-processes and decision algorithms within each phase agent
- ❑ Representation of network of acquisition programs - portfolio coverage, evolutionary patterns
- ❑ Develop templates for output analysis

Thank You

Q&A

Back up slides