Utilizing Strategic Project Management Processes and the NATO Code of Best Practice to Improve Management of Experimentation Events

Dr. Andreas Tolk, Dr. Rafael Landaeta, Thomas Litwin
Frank Batten College of Engineering and Technology
Old Dominion University

Dr. Robert Kewley
Department of Systems Engineering
United States Military Academy

Structure of the Presentation

- Introduction
- Knowledge Management and Strategic Project Management
- NATO's Code of Best Practice for C2 Assessment
- Proposal for a Systems Engineering Approach
- Summary and Recommendations

Why improve the management of experimentation?

INTRODUCTION

Motivation for the Study

- Need to aid managers of projects
  - Focused on developing complex simulation systems
  - Applicable to federations of systems

  to cope with the challenges of
  - addressing the multiple constraints set
  - by the customer and sponsor.
- Evaluate usability the structure of the NATO Code of Best Practice (COBP) for C2Assessment
  - to guide the use of strategic project management and knowledge management application
  - in support of the re-use of simulation resources beyond the scope of a single project
  - across the different domains of the originally application domain, such as procurement, development, training, education, support of operations

Key constraints in R&D projects

- R&D projects with focus on building complex simulation systems:
  - the essential tasks to be used for strategic decision making should be identified to support the selection or development of relevant simulation scenarios;
  - simulation systems should be selected based on their ability to support the evaluation of these tasks;
  - the simulated system capability should be the driver for the decision;
  - the process should be applicable to evaluate alternatives for supporting simulation components and enable the project manager to make informed decisions;
  - the federation of these simulation systems should be supported utilizing the best middleware available for the task;
  - this decision should be driven by the functionality of the middleware and its necessity in the federation development process;

…

Key constraints in R&D projects (cont.)

…

- the integration of systems and middleware should be supported to the maximum extent;
- the decisions of model integrators should be reduced to a minimum, thus avoiding ambiguity of interpretations;
- existing solutions should be reused as much as possible;
- minimize the number of supporting simulation systems that represent the scenario;
- minimize the costs of obtaining the simulation systems and supporting data;
- maximize the use of simulation system under governance of the project manager;
- maximize the acceptance of systems.

What do we know from engineering management?

KNOWLEDGE MANAGEMENT & STRATEGIC PROJECT MANAGEMENT

Knowledge Management

- Knowledge management aims to address the challenges faced by modern organizations of competing and improving performance through knowledge
- Knowledge management is intended to use, improve, maintain, and create organizational capabilities to generate sustained competitive advantage in organizations
- Knowledge management is commonly defined as the processes, tools, and techniques that make available the right knowledge to the right knowledge worker, at the right time
- *Knowledge Management as the development of tools, processes, systems, structures, and cultures explicitly to improve the creation, sharing, and use of knowledge critical for decision making*

How can we use Knowledge Management principles to support better (re-)use of M&S for Experimentation?

Strategic Project Management

- Strategic project management is the term lately used by researchers and practitioners of project and program management to refer to the effective and efficient management of project-based organizations
- Strategic project management focuses on the best utilization and alignment of the resources of the project-based organization to meet its vision and goals.
- Strategic project management focuses on the *providing means to the management enabling them to provide guidance for more than one project at a time in a way that the strategic intent of the project-based organization is met*

Can we apply Strategic Project Management
to enable more efficient experimentation?

Key Questions to answer?

- What do I have to know to allow reuse of M&S
  - Assumptions and constraints
  - Context of model and data
  - Application domain
  - Key entities, processes, and relations
  - Success measures
- What documentation is available?
- What documentation is necessary?
- Are there any Lessons learned?

How to we structure our Operational Analysis Studies to enable/support respective goals?

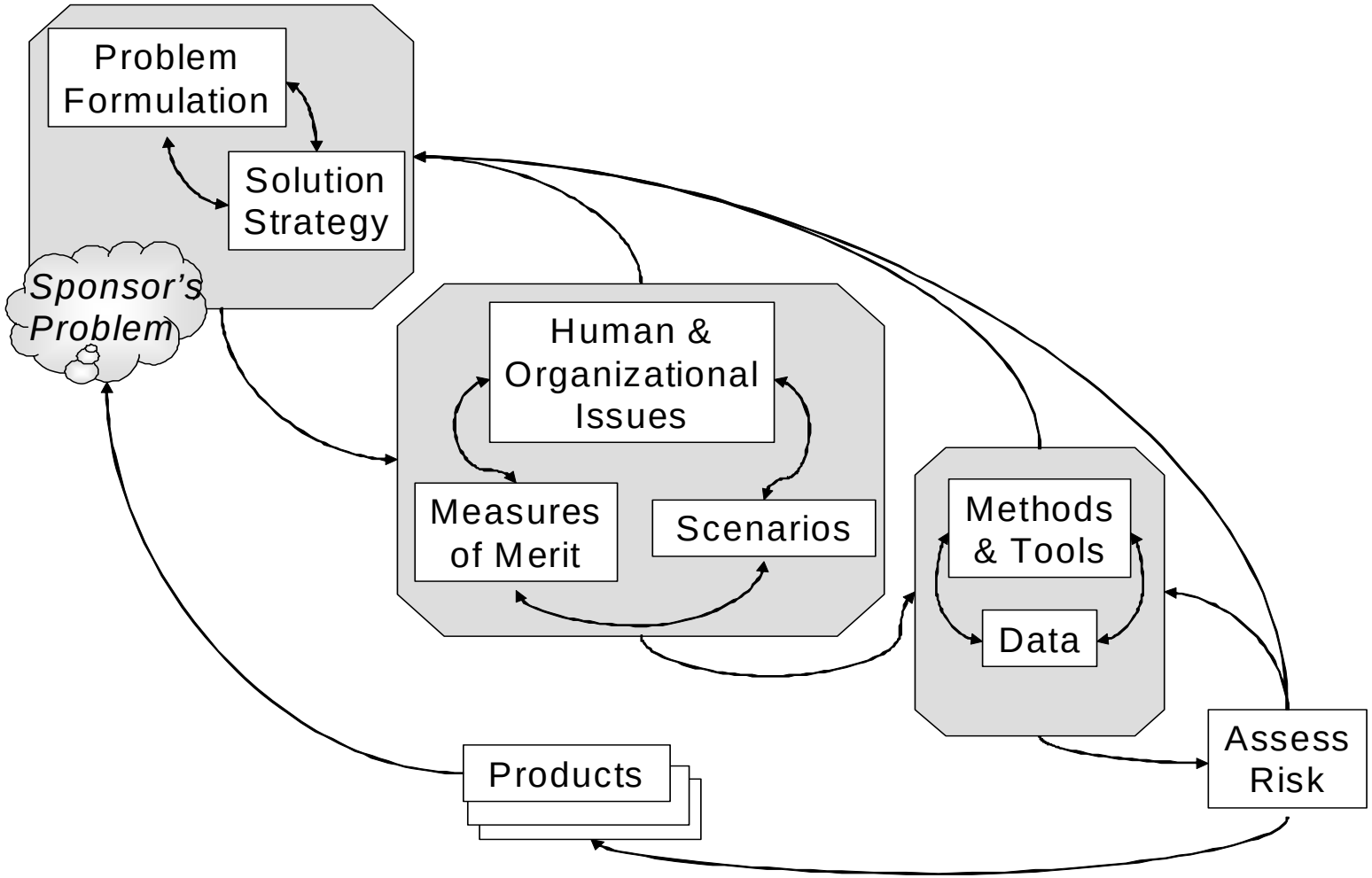
What do we know from NATO and CCRP?

NATO CODE OF BEST PRACTICE FOR C2 ASSESSMENT

NATO COBP for C2 Assessment

- The NATO COBP for C2 Assessment
  - Was developed by international C2 experts in the SAS-026 activity
  - Is rooted in operations research methods
  - Recommends best practices for the structure of C2 evaluation projects
  - has been adapted as a standard within the Joint Staff and Office of the Secretary of Defense *(OSD)* Networks and Information Integration *(NII)*

NCOBP Phases



Study Hypothesis

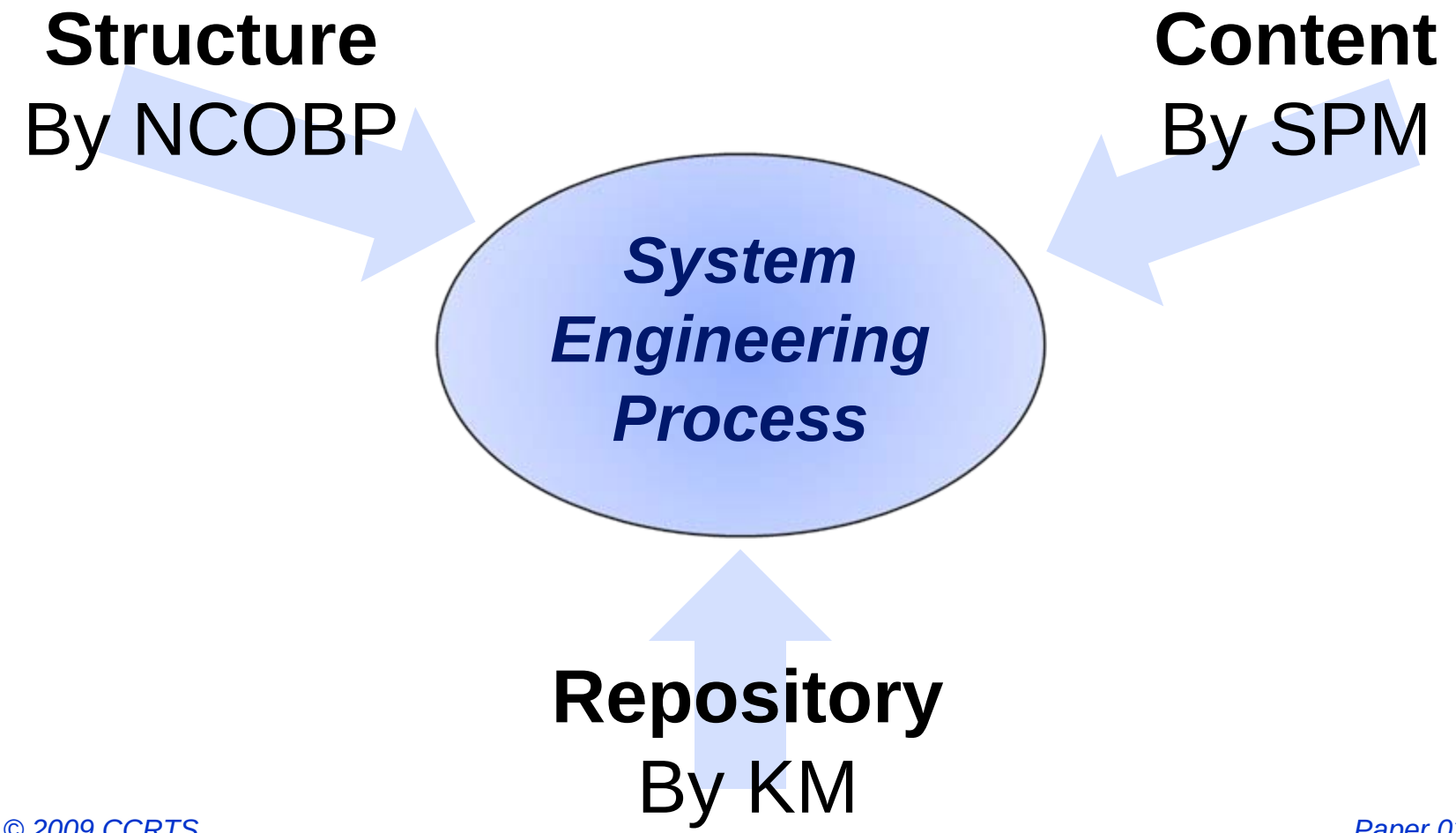
- *It is possible to use the structure of the COBP*
  - *To identify phases*
  - *To identify required support*
  - *That can be provided by Knowledge Management and Strategic Project Management*
  - *Enabling cross-domain re-use of simulation resources.*

If we are using the structure of the NCOBP
and enrich the structure with KM and SPM artifacts,
Can we come up with a good method?

What do we recommend?

PROPOSAL FOR A SYSTEMS ENGINEERING APPROACH

General Idea

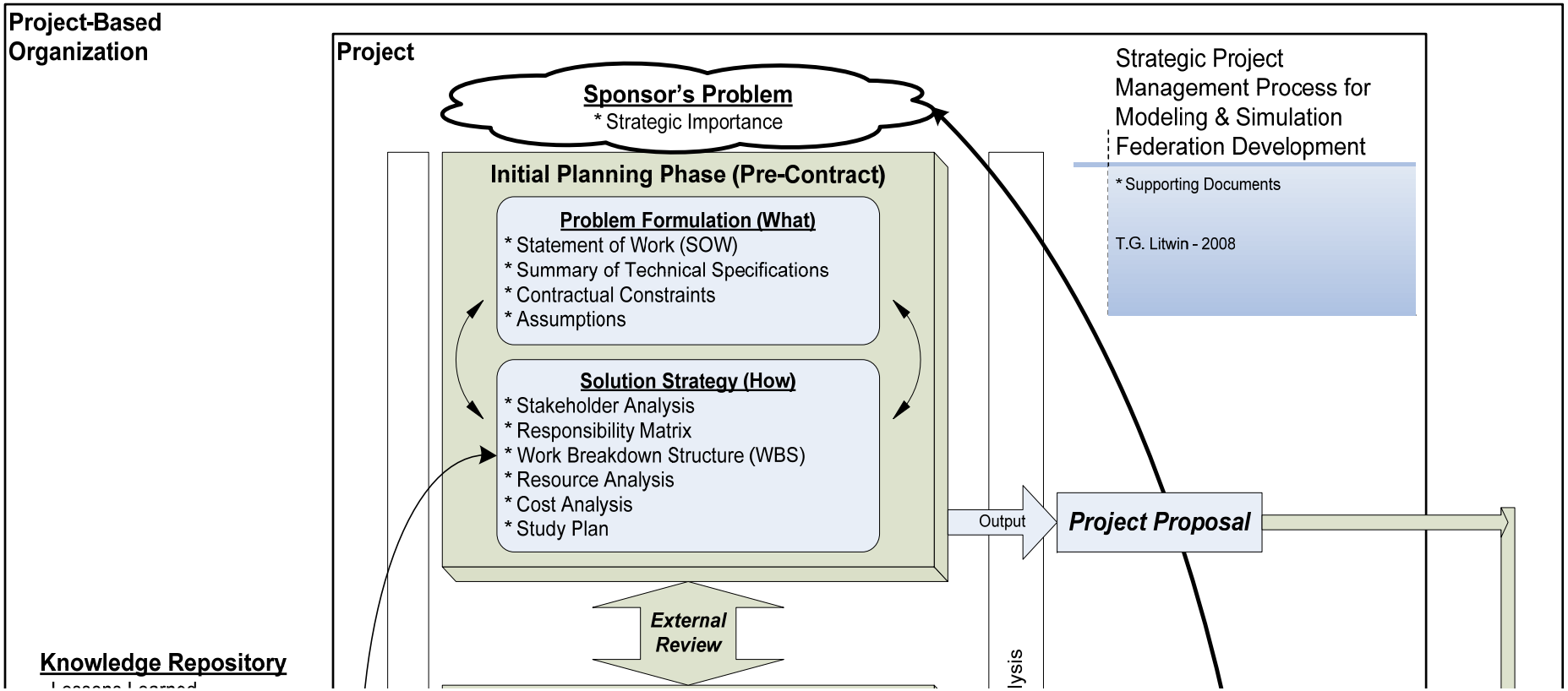


SPM Process Core Phases and Products

Core Phase	Output Product
Initial Planning	Project Proposal
Refining	Project Work Plan
Implementation	Final Product
Project Review	Lessons Learned

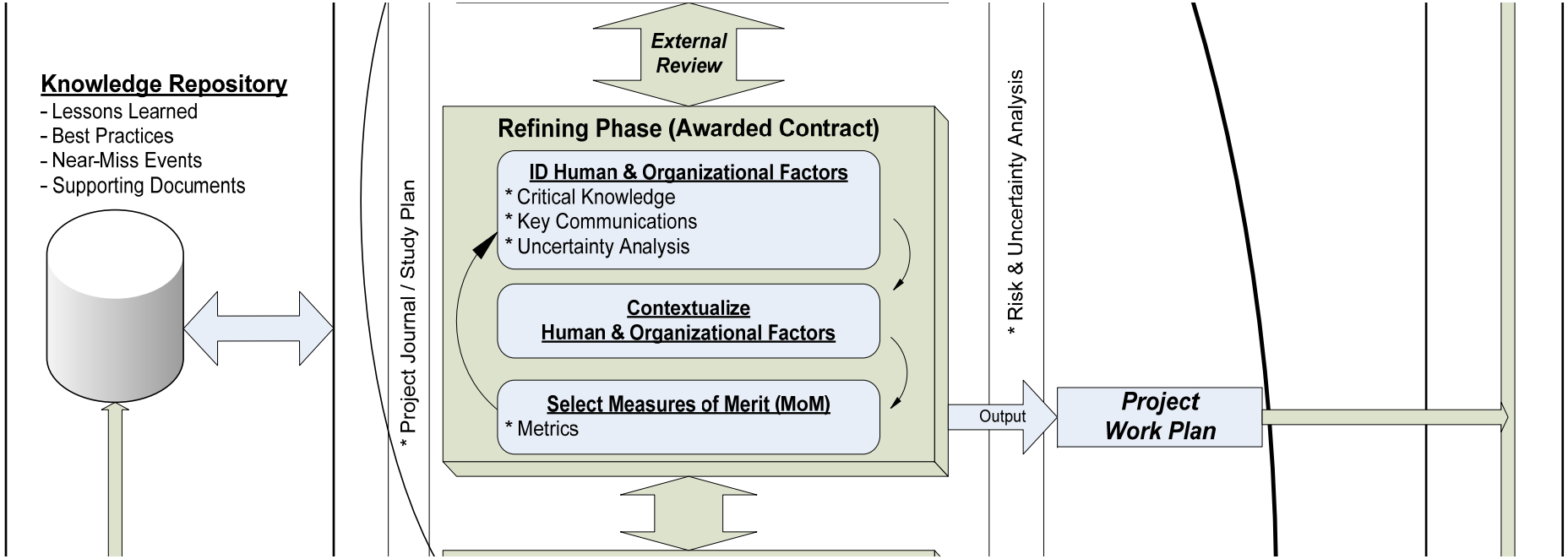
Initial Planning Supporting Documentation

Supporting Documentation
Statement of Work (SOW)
Summary of Technical Specifications
Contractual Constraints
Assumptions
Stakeholder Analysis
Responsibility Matrix
Work Breakdown Structure (WBS)
Resource Analysis
Cost Analysis
Study Plan


Project-Based Organization
Project
Sponsor's Problem
* Strategic Importance
Initial Planning Phase (Pre-Contract)
Problem Formulation (What)
* Statement of Work (SOW)
* Summary of Technical Specifications
* Contractual Constraints
* Assumptions
Solution Strategy (How)
* Stakeholder Analysis
* Responsibility Matrix
* Work Breakdown Structure (WBS)
* Resource Analysis
* Cost Analysis
* Study Plan
External Review
Output
Project Proposal
Strategic Project Management Process for Modeling & Simulation Federation Development
* Supporting Documents
T.G. Litwin - 2008
Knowledge Repository

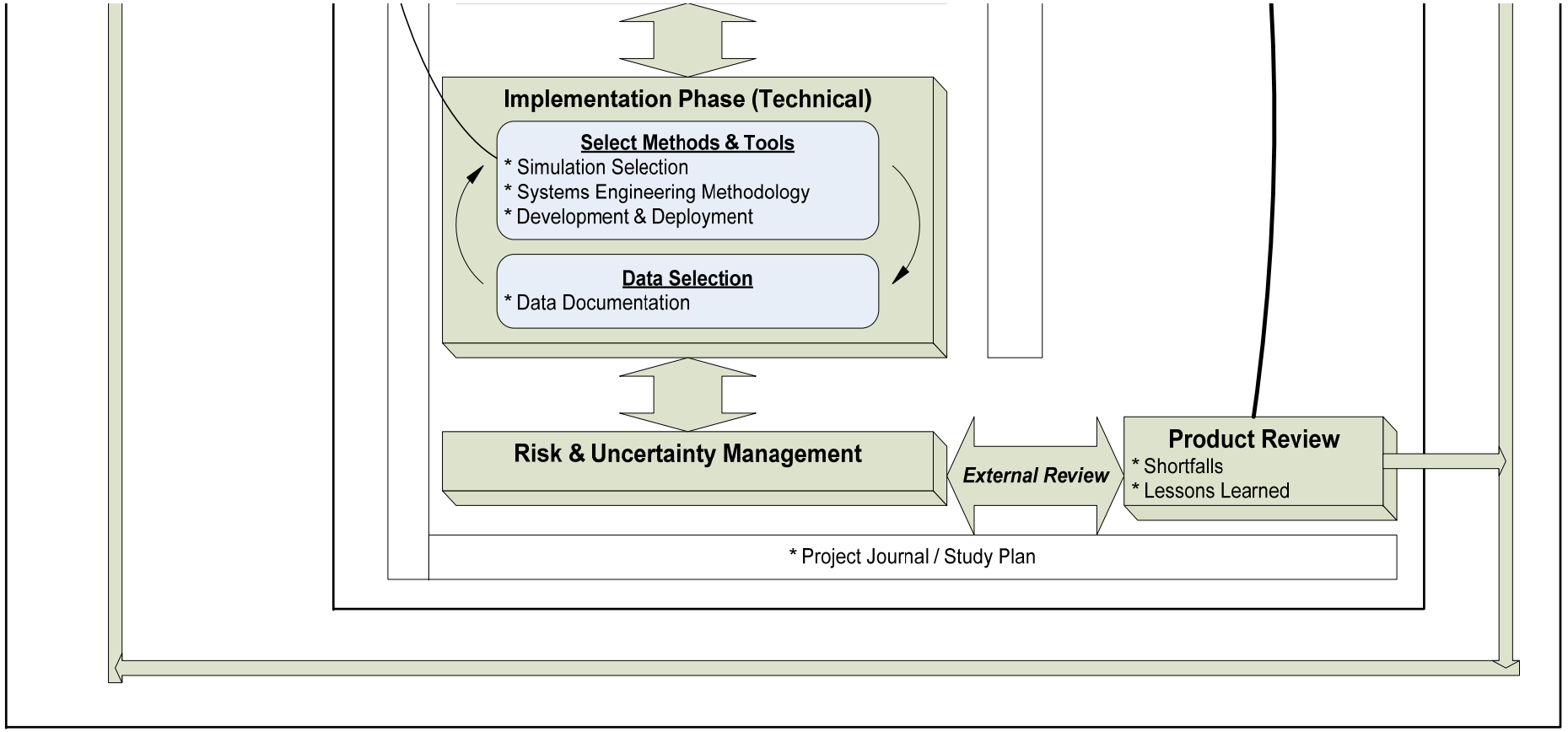
Refining Supporting Documentation

Supporting Documentation
Critical Knowledge
Key Communications
Uncertainty Analysis
Metrics


Knowledge Repository
- Lessons Learned
- Best Practices
- Near-Miss Events
- Supporting Documents
* Project Journal / Study Plan
External Review
Refining Phase (Awarded Contract)
ID Human & Organizational Factors
* Critical Knowledge
* Key Communications
* Uncertainty Analysis
Contextualize
Human & Organizational Factors
Select Measures of Merit (MoM)
* Metrics
* Risk & Uncertainty Analysis
Output
Project
Work Plan

Implementation Supporting Documentation

Supporting Documentation
Simulation Selection
Systems Engineering Methodology
Development & Deployment
Data Documentation


Implementation Phase (Technical)
Select Methods & Tools
* Simulation Selection
* Systems Engineering Methodology
* Development & Deployment
Data Selection
* Data Documentation
Risk & Uncertainty Management
External Review
Product Review
* Shortfalls
* Lessons Learned
* Project Journal / Study Plan

Project Review Supporting Documentation

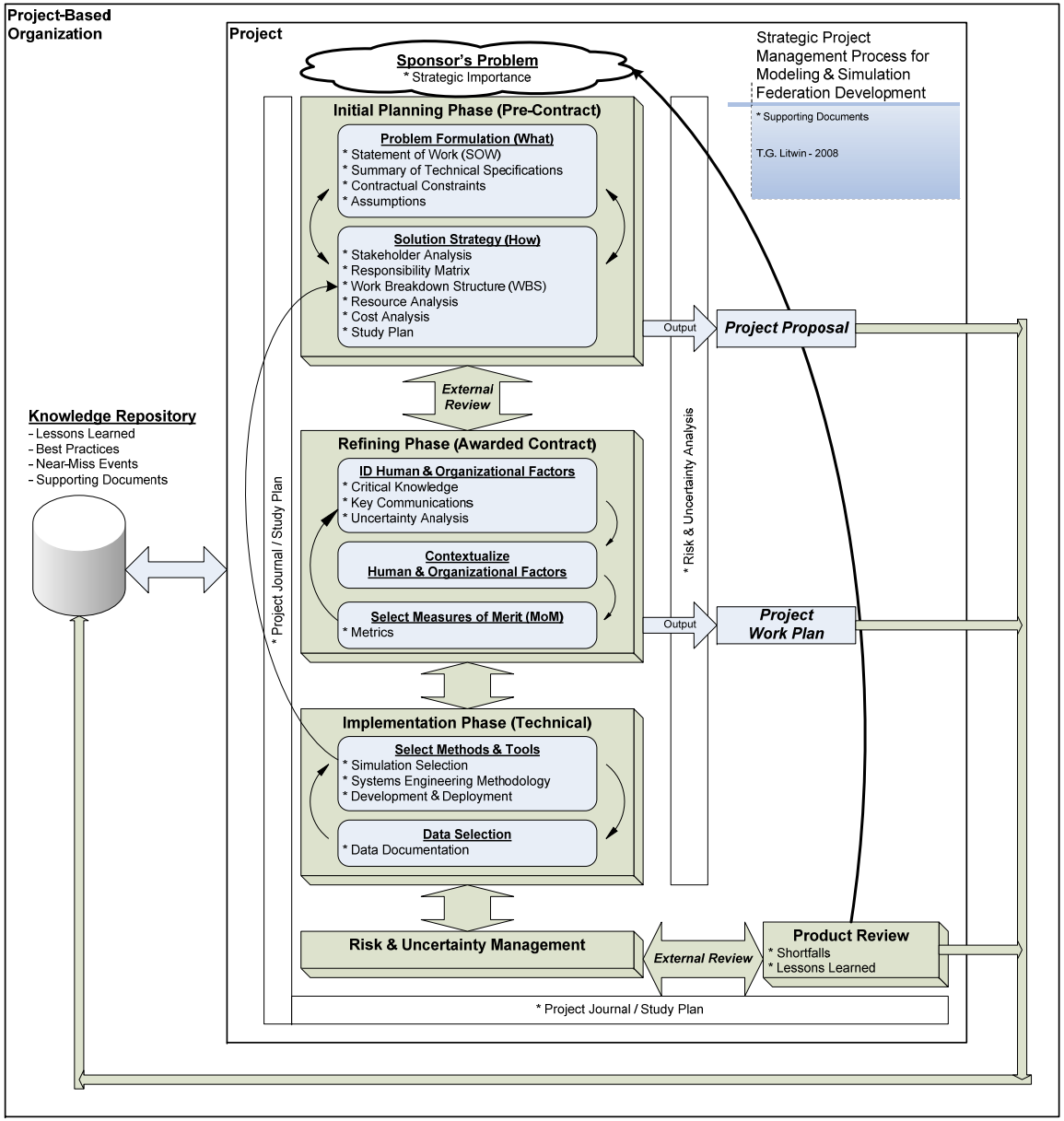
Supporting Documentation
Shortfalls
Lessons Learned

Knowledge Repository

- Step One: Capture Documentation
  - NCOBP Artifacts as Categories
    - Who worked with Red Cross
    - Who worked in Somalia between 1991 and 1993
    - Who applied certain Metrics
- Step Two: Capture Data
  - Same idea as step one, but data instead of text
  - XML with standardized tags
- Step Three: Ontological Means
  - Conceptual representation of experimentation
  - **Ontology = Data + Structure + Processes + Axioms**

What should you do?

SUMMARY AND RECOMMENDATIONS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* Project Journal / Study Plan
* Risk & Uncertainty Analysis
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Select Methods & Tools
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Product Review
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Recommendation

- Project Journals
  - Improving Management within the project
  - Self awareness, self criticism, and self development
  - Capturing important events
- Lessons Learned
  - Knowledge or understanding gained by experience
  - Identify common structures and patterns
- Knowledge Repository
  - Text, XML, and logical structures
  - Metadata and annotations

Summary

- Recommended approach
  - is well aligned with current approaches in
    - OA and C2 Assessment
    - Strategic project management
    - Knowledge management
  - Is aligned within itself
    - Strategic project management process (SPMP)
    - Identifies metadata and annotation needs for net-centric OA
  - Is extensible
    - Risk management
    - Cost management

Selected References

- Robert H. Kewley, Andreas Tolk: "**A Systems Engineering Process for Development of Federated Simulations**" *Spring Multi-Simulation Multi-Conference, Military Modeling & Simulation (MMS),* San Diego, CA, March 2009
- Andreas Tolk, Thomas G. Litwin, Robert H. Kewley: "**A Systems Engineering Process enabling to create Operational Requirements driven Federations**" *Winter Simulation Conference*, Miami, FL, December 2008
- Thomas G. Litwin, Robert H. Kewley, Rafael E. Landaeta, Andreas Tolk: "**A Systems Engineering Process in Support of Requirements Driven Federations**" *American Society for Engineering Management Symposium*, West Point, NY, November 2008