

# Report from the System Life Cycle (SLC) Forum of the 2010 Spring Simulation Interoperability Workshop

Orlando, FL, USA

April 13, 2010

Presented to: National Defense Industrial Association (NDIA)  
Systems Engineering (SE) Division  
Modeling and Simulation (M&S) Committee  
April 20, 2010

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# Simulation Interoperability Standards Organization (SISO) Background

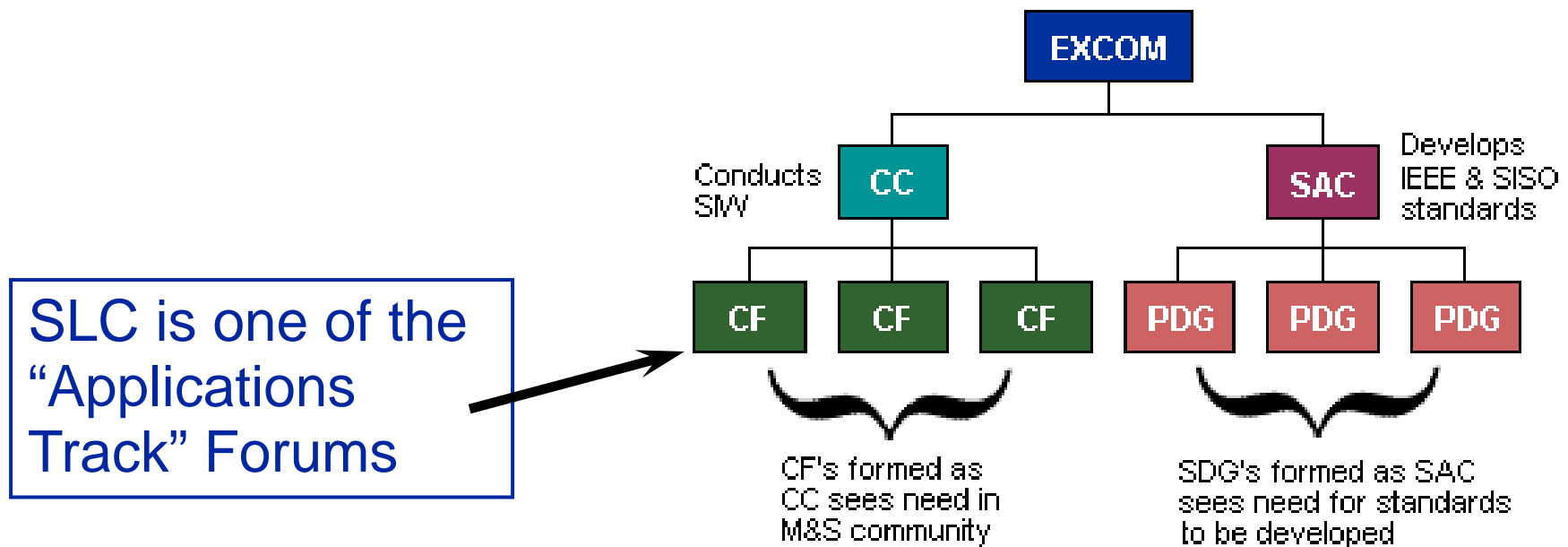
## Vision Statement

***SISO is dedicated to the promotion of modeling and simulation interoperability and reuse for the benefit of diverse M&S communities, including developers, procurers, and users, world-wide.***

## Mission Statement

***SISO's mission is: To provide an open forum that promotes the interoperability and reuse of models and simulations through the exchange of ideas, the examination of technologies, and the development of standards.***

# SISO Organizational Structure



## Legend:

<b>EXCOM</b>	<b>Executive Committee</b>
<b>CC</b>	<b>Conference Committee</b>
<b>SAC</b>	<b>Standards Activities Committee</b>
<b>CF</b>	<b>Conference Forums</b>
<b>PDG</b>	<b>Product Development Groups</b>

# System Life Cycle (SLC) Forum

## Forum Focus

- The System Life Cycle (SLC) forum focuses on M&S and related enablers of integrated, collaborative enterprises for system/vehicle or weapon system product development, particularly from a life-cycle wide, mission capability/system-of-systems perspective.
- Topics of Interest include:
  - Policy
  - Processes
  - Tool suite strategies
  - System/product simulations
  - Enterprise process simulations
  - Collaboration / optimization means
  - Work force implications
- SLC includes executable models of work flow, manufacturing, distribution, transportation and customer, patient, crowd, or traffic flow.
- Priority is on actual, broadly applicable experiences in all of these areas.

System Life Cycle (SLC) Forum  
**Planning and Review Panel  
Membership (2010)**

<u>Name</u>	<u>Organization</u>	<u>Position</u>
Tim Jahren	Raytheon	Chair
Ken (Crash) Konwin	Booz Allen Hamilton	Vice-Chair
Dan Cerys	BBN Technologies	Secretary
Jim Coolahan	JHU/APL	
John Fay	Jacobs Technology	
Jim Hollenbach	Simulation Strategies	
Rich Reading	Cutlass Systems Engineering LLC	

# System Life Cycle (SLC) Forum

## 2010 Spring Forum Agenda (1 of 2)

0815-0830		Introduction & Welcome
0830-0900	10S-SIW-001 *	Model & Simulation Development Best Practices
0900-0930	10S-SIW-043	M&S Standards in DoD – A Unified Approach
0930-1000	10S-SIW-015	Auto-Code Based Model-Driven Engineering Techniques for Simulation Development
1000-1030	BREAK	
1030-1100	05S-SIW-022 @	Toward a T&E Overlay for the Distributed Simulation Engineering and Execution Process
1100-1130	10S-SIW-060#	Simulation and System Engineering or the Consequences of an Inescapable Union
1130-1200	10S-SIW-055	Exploiting the Semantic World of M&S
1200-1330	LUNCH	

\* Best Paper Nomination (SIWzie)  
@ Joint Session with ANL/T&E Forums  
# Joint Session with DSPT Forum

# System Life Cycle (SLC) Forum

## 2010 Spring Forum Agenda (2 of 2)

1330-1400	10S-SIW-006	Life Cycle of Weapon Control Systems for Wire Guided Torpedoes
1400-1430	10S-SIW-062*	Test of Core Manufacturing Simulation Data Specification in Automotive Assembly
1430-1500		SLC PRP Recap
1500		Adjourn

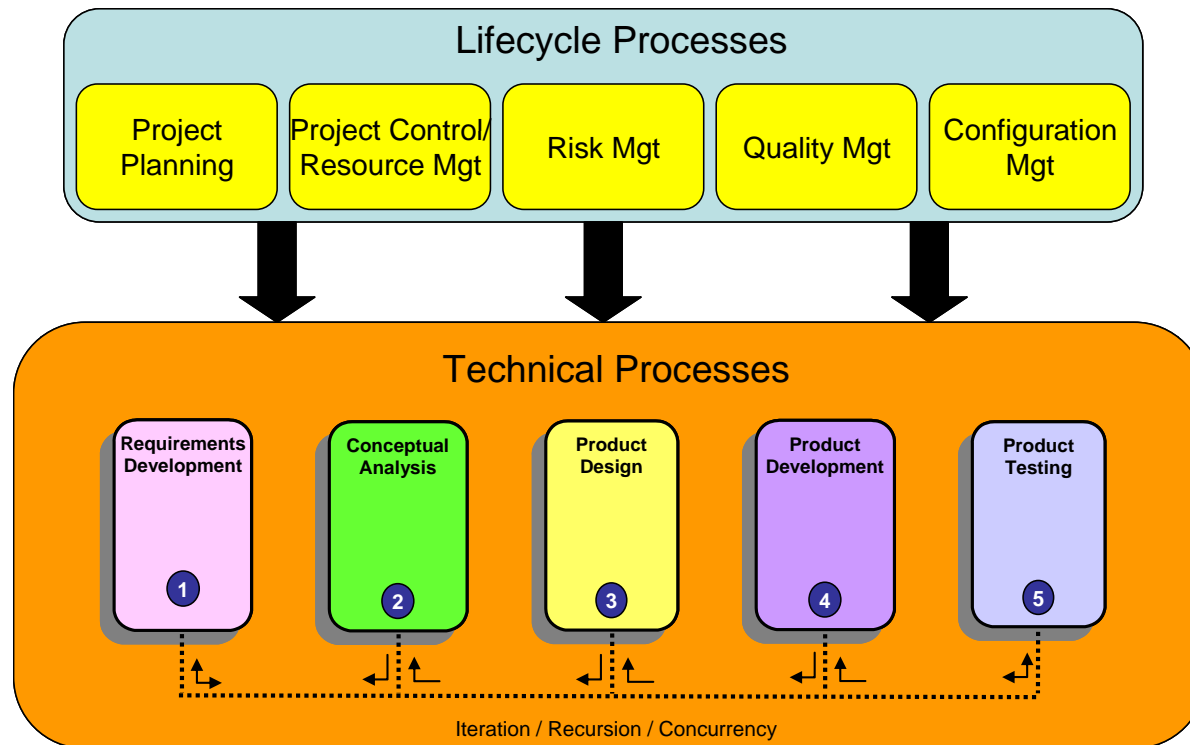
\* Best Paper Nomination (SIWzie)

# System Life Cycle (SLC) Forum

## Key Points

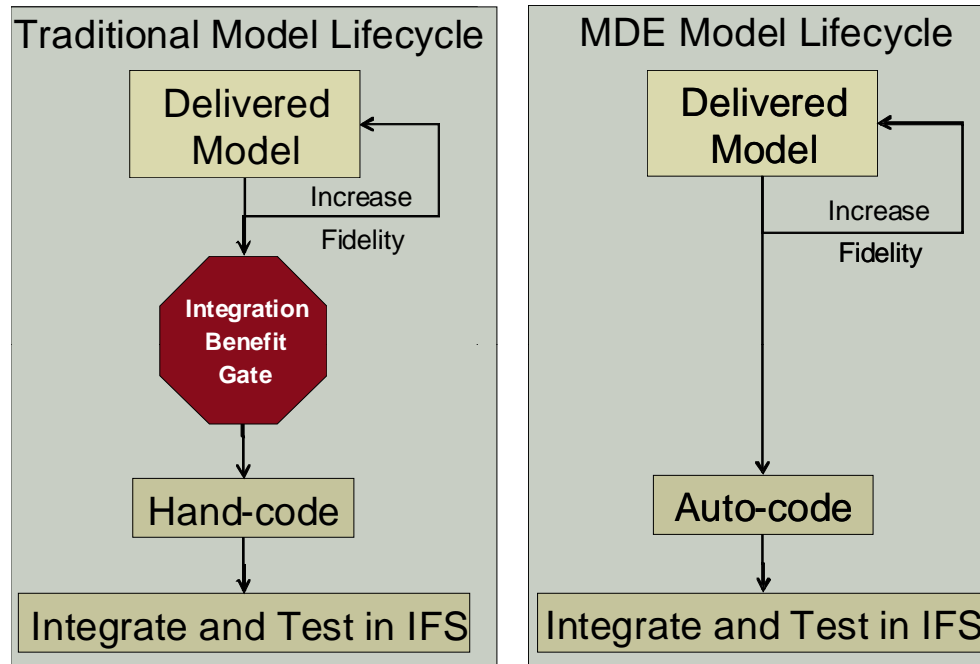
- Deputy Under Secretary of Defense for Acquisition and Technology (DUSD(A&T)) has funded a study by to identify best practices for the development of individual models and simulations. The study is expected to be completed and released in the next few months. The team will be invited back to SISO to complete the final report, and it will be considered for inclusion as a possible guidance document by SISO. {10S-SIW-001}
- Recent examples were cited where models are developed within the domain experts' sets of tools, while simplifying integration into the simulation. Tools exist that automatically generate code that accurately represents the model in a fraction of the time required to hand-code the model. The use of this process to automatically generate code from models can reduce code generation and integration times as well as eliminate errors in hand-writing code from models. {10S-SIW-015}
- The principles offered by the Semantic Web can be applied in support of M&S interoperability and reuse. Consider that a simulation may be described by multiple object models supporting fairly well understood conceptual models. There are relationships that exist among things. Furthermore, a simulation may be associated to specific interoperability architecture, and its models associated to specific software architecture. These relationships, if exposed, can be significant and can be extremely useful in promoting reuse and incrementally automating the construction and integration of simulations, federations, and their datasets. Semantic Web supporting technologies such as XML, RDF, OWL, SPARQL, GRDDL, and Linked Data can be leveraged and applied to promote interoperability and reuse within the M&S community. {10S-SIW-055}
- A Core Manufacturing Simulation Data (CMSD) information model has been developed which describes the construction of an automotive assembly line simulation. The production line simulated can produce multiple car configurations that are defined according to the door type, roof type and color. The results of the prototype demonstration prove that, with appropriate extensions, CMSD can handle most production line type manufacturing systems data. A CMSD draft data specification in the UML format has been developed by NIST. The CMSD draft is currently going through the balloting process guided by the SISO Standards Activity Committee (SAC). {10S-SIW-062}

# M&S Development Best Practices



- The following SE framework has been developed to capture M&S Development Best Practices.
- There are a total of five major developmental phases for the technical process, plus an additional sixth category for supporting lifecycle processes. Each bin has a set of associated lower-level activities.

# Performance of Auto Coded Models



To analyze the performance of the MDE process a unit test was created to verify the simulation model against the original vendor model. The simulation model was compared directly to the vendor supplied model. Key output parameters were evaluated to ensure the simulation models matched in every phase of the development process.