

17th Annual Systems Engineering Conference

BUILT FOR
TODAY.

DESIGNED FOR
TOMORROW.

“A World report on
the state of Systems
Engineering Tools as learned
from the INCOSE 2014 Tool
Vendor Challenge”

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What is this talk about?

- TVC 2014 Goals and Objectives
- Explain the TVC challenge.
- Summarize Results (Standards, Trends, Challenges)

- Allow for demonstration of systems engineering tools against a common use case derived from a practical problem.
- Challenge is targeted to drive vendors towards the INCOSE SE Vision 2020 (need to update to Vision 2025).
 - Places greater emphasis on greater collaboration.
 - Increasingly more complex systems
 - Shorter development time
 - Geographically distributed teams

- Demonstrate capability to perform Systems Engineering
 - Capture Stakeholder Needs
 - Requirements Management
 - Capture the Definition and Description of the System
 - Capture Derived System Requirements
 - Capture Assumptions
 - Capture External and Internal Interfaces
 - Decision Analysis
 - Design Optimization
 - Capture and Portray end-to-end Traceability
 - Conduct Impact Analysis
 - Gap Analysis
 - Consistency/Accuracy/Completeness Checking
 - Automatically Generating Documentation such as an RFP, SPEC, ICD, Test Plan
 - System Configuration Management and Change Control
 - Modeling and Simulation

Work that a Systems Engineer does!

- Demonstrate capability to perform analysis and integrate with other Engineering Functions
 - Reliability Analysis
 - Mechanical Engineering (CAD/CAE)
 - Electrical and Electronics
 - Software
 - Mission Analysis and Simulation
 - Training Systems Development
 - Logistics Analysis
 - Cost Analysis
 - Affordability Analysis
 - Program Management (Schedule, WBS, Risk)
 - Safety Engineering
 - Test Planning and Development
 - Risk Identification and Analysis
 - Supportability Analysis

Informs work that an IPT does/Informs Systems Engineering!

Challenge Problem



- Provide Ice for Disaster Recovery.
- Sin City in the Summer, a dessert city located in a hot, dry climate zone experiencing temperatures ranging between 70 – 100 degrees Fahrenheit (20-35 C).
- A recent natural disaster has devastated the area within a 100 mile radius.
- An estimated 15000 people lost power due to the destruction, and need to find shelter.
- Most roads are impassible to the public so there is limited vehicle transportation and the electricity is out in most of the disaster area.
- As part of emergency response requirements, shelters must be set up within 24 hours from when the evacuations begin to help sustain those who need to relocate.
- As part of the initial emergency response, ice must be provided to sustain perishables such as medicine and foods, and to support first aid needs.
- Power and potable water are to be provided with the shelter solution.

- Make Ice vs Procuring Ice.
- For the Selected Alternative: Elaborate on behavior, architecture, performance requirements.
- How will Ice be Stored, What will the layout be, How much Ice is needed/day?
- Analyze System Performance based on changes to the environment. (roadways will become passable, electricity will be returned sporadically)
 - Cost to supply and store the ice, water, fuel, and maintenance of generators, ice machine rental, purchase, generator rentals/purchase, other).
 - Dynamic analysis / stimuli behavior response to derive and validate requirements.
 - Water and fuel consumption, Maximum number of ice machines required, Storage size requirement, Water flow rate requirement, Power requirement, etc....
- How do tools capture, communicate, document, track, report, manage, control of: Requirements, Design description, Configuration, Architecture, Trade-offs, Cost, Test, Rationale, Importance, Traceability, Risk, Uncertainty and a Sensitivity, Layout, Interfaces, etc...
- Integration and Interoperability Standards used/supported.

Who Participated

Method Park America Inc.	<ul style="list-style-type: none">• Didn't present
Daussault Systems	<ul style="list-style-type: none">• CATIA, Modelica, Enovi, 3D Experience Method, KnowledgeWare, Reqtify
Visure Solutions	<ul style="list-style-type: none">• Visure Requirements, JIRA, TFS, Rational, Jazz HP
Sysenex Inc.	<ul style="list-style-type: none">• Risk ID
The REUSE Company	<ul style="list-style-type: none">• Requirements Quality Suite (RQS)
Sparx Systems	<ul style="list-style-type: none">• Enterprise Architect
ATEGO	<ul style="list-style-type: none">• Artisan, Parasolver, PRC RM, Mathematica, modelica, SySIM, Asset Library
PTC	<ul style="list-style-type: none">• CREO, Windchill, integrity RM, MathCAD, ThinkWorx
3SL	<ul style="list-style-type: none">• CRADLE, Excel, WORD, Document Publisher
IBM	<ul style="list-style-type: none">• Rhapsody, Quality Manager, Modelica, DOORS Next Gen
SPEC Innovations	<ul style="list-style-type: none">• Innoslate
VITECH Corporation	<ul style="list-style-type: none">• CORE
Cognition Corporation	<ul style="list-style-type: none">• Cockpit

Vendors listed in the order they presented @ IS 2014

RIF/ReqIF	OSLC	MS Office
OLE	XML	XMI
XRI	FMI	FMU
SysML	LML	OPM
DDS	DMN	Etc...



**There is a
Sea of
Standards
and Custom
Interfaces.**

**How do we
choose?**

- Requirements Management is well established and standards exist. There were many tools presented that perform and support these systems engineering activities.
- There are a number of good, well established System Modeling and Architecture tools. There are well established standards and languages.
- Most tools have their own Base-lining capability.
- Starting to see Web based tools to address distributed work teams, and to help improve collaboration
- Process and Workflow was included in some solutions as it is becoming more important for managing work and collaboration
- Requirements Quality Features.
- Started to see 3D Modeling, PLM, and some analysis capabilities.

- Need to do a better job of solving the problem by demonstrating the application of Systems Engineering.
- Vendors still are resistant to present a solution that demonstrates the use of more than just their own suite of tools.
- Didn't see many Test tools
- Better Integration and Interoperability
 - Design, Analysis, Test
 - Cost, Risk, Trade study
 - Safety, Logistics, Sustainment, Manufacturing
 - Reliability, Security, etc....
- There are a wide variety of choices that come with both custom and standard integrations. You really need to do your research to figure out what will work for you.

- Vendors for traditional requirements and systems modeling tools participated.
- We started to see Vendors from other genres like PLM, Risk Identification, Process Modeling also participated.
- No vendors for scheduling, decision analysis, cost estimating, CAD, etc....
- Need to update challenge for 2025 Vision
- Any Questions???