Problem Space Risk Characterization

Facilitator: Dr. Regina Griego, Sandia National Laboratories, INCOSE Fellow. drgriego@comcast.net

Dr. Regina Griego is a leader in the areas of requirements engineering and systems engineering. Her academic and industry focus incorporates modeling as a way to formalize problem understanding and develop requirements. Regina has also been instrumental in enterprise modeling and improvement in various application domains throughout her career. She is a Fellow of INCOSE (International Council on Systems Engineering), and was the Technical Director for INCOSE in 2009-2010 and Founding President of the INCOSE Enchantment Chapter.

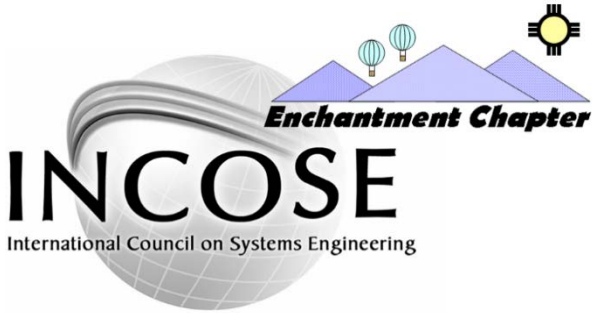
Regina has over 25 years of experience in various positions including first line technical management, leading technical integration on programs, as a lead systems engineer or requirements engineer, teaching requirements and systems engineering, building requirements/systems engineering capability, and as a design engineer. Regina is currently the lead Systems Engineer on a strategic capability developed and supported by Sandia.

Regina has a B.S. and Ph.D. in Electrical and Computer Engineering from New Mexico State, an M.S. in Electrical and Computer Engineering from University of Arizona, and an M.S. in Computer Science from University of Colorado, Boulder.

Day-2 Workshop Participants

Kaleb Bjorkman	**NMTech**	**kaleb.bjorkman@student.nmt.edu**
Rick Dove	**Paradigm Shift International**	**dove@parshift.com**
Regina Griego	**Sandia National Laboratories**	**drgriego@comcast.net**
Bill Schindel	**ICTT Systems Science**	**schindel@ictt.com**

Day-1 Intro and Results Poster



Socorro Summit Topic: Problem Space Risk Characterization

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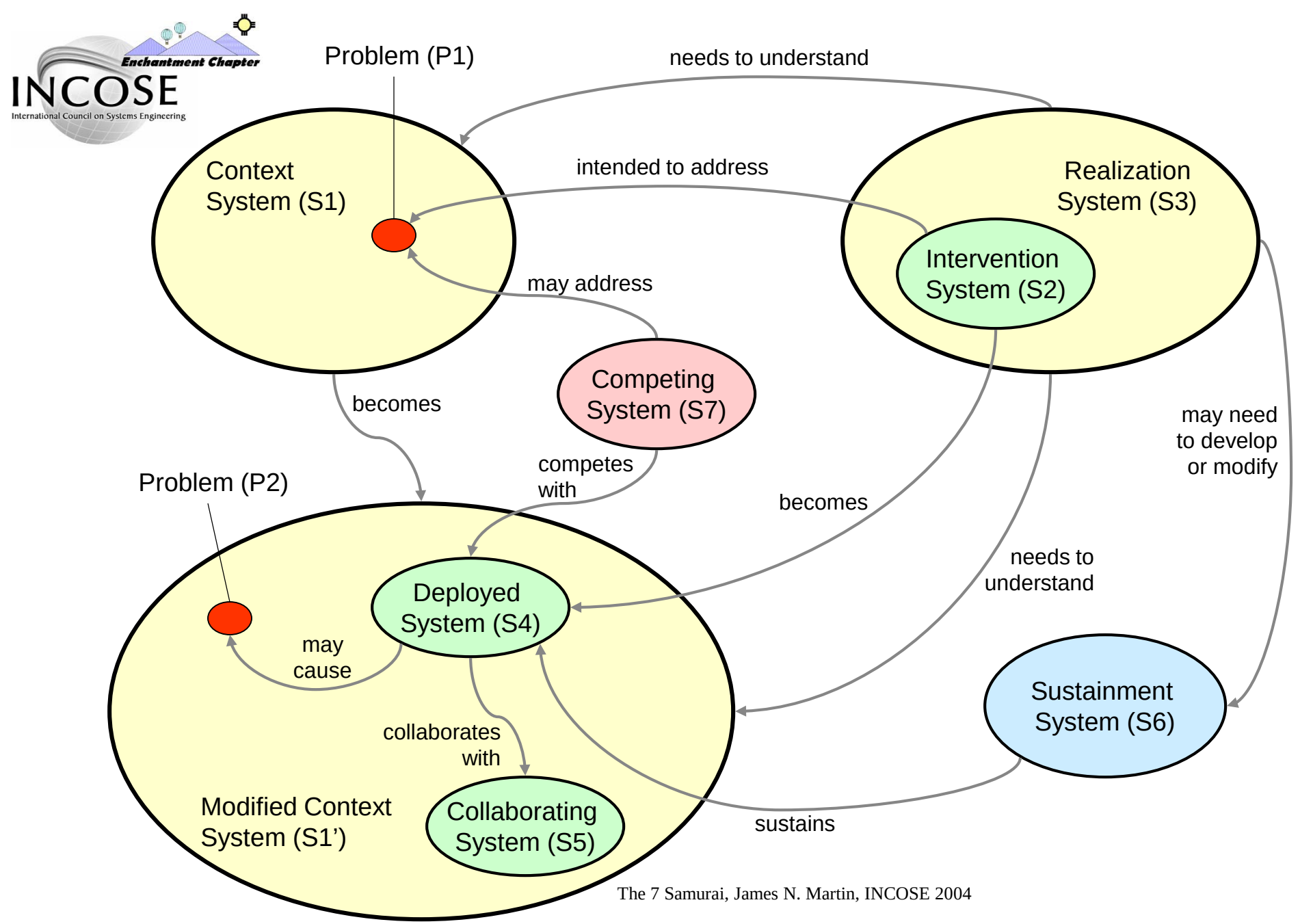
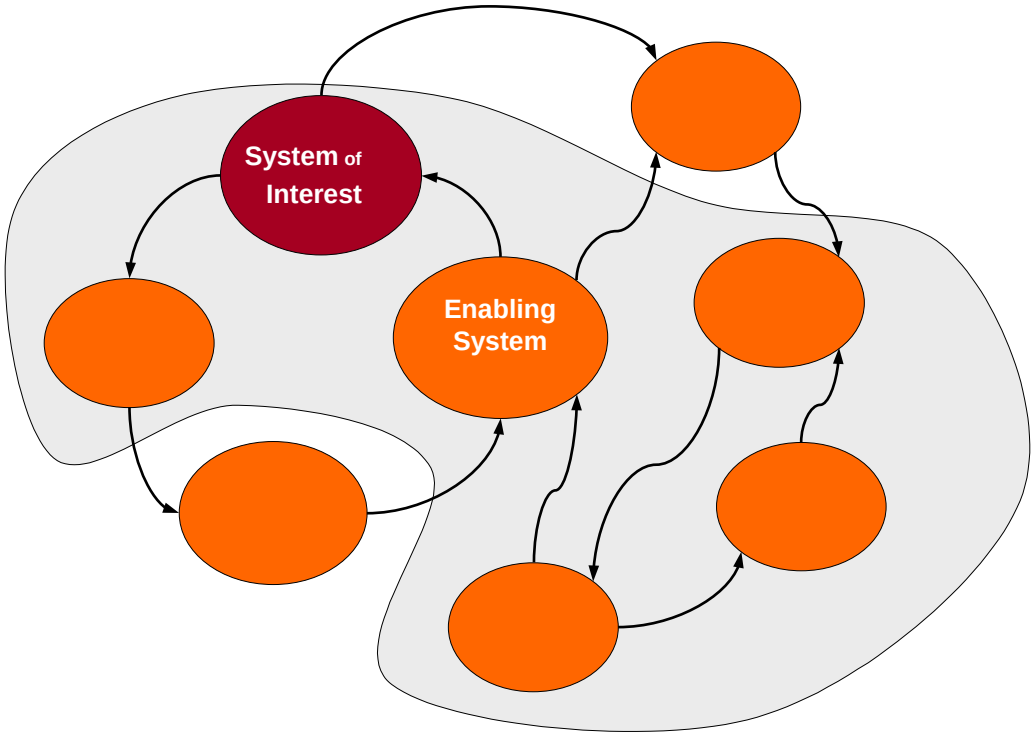
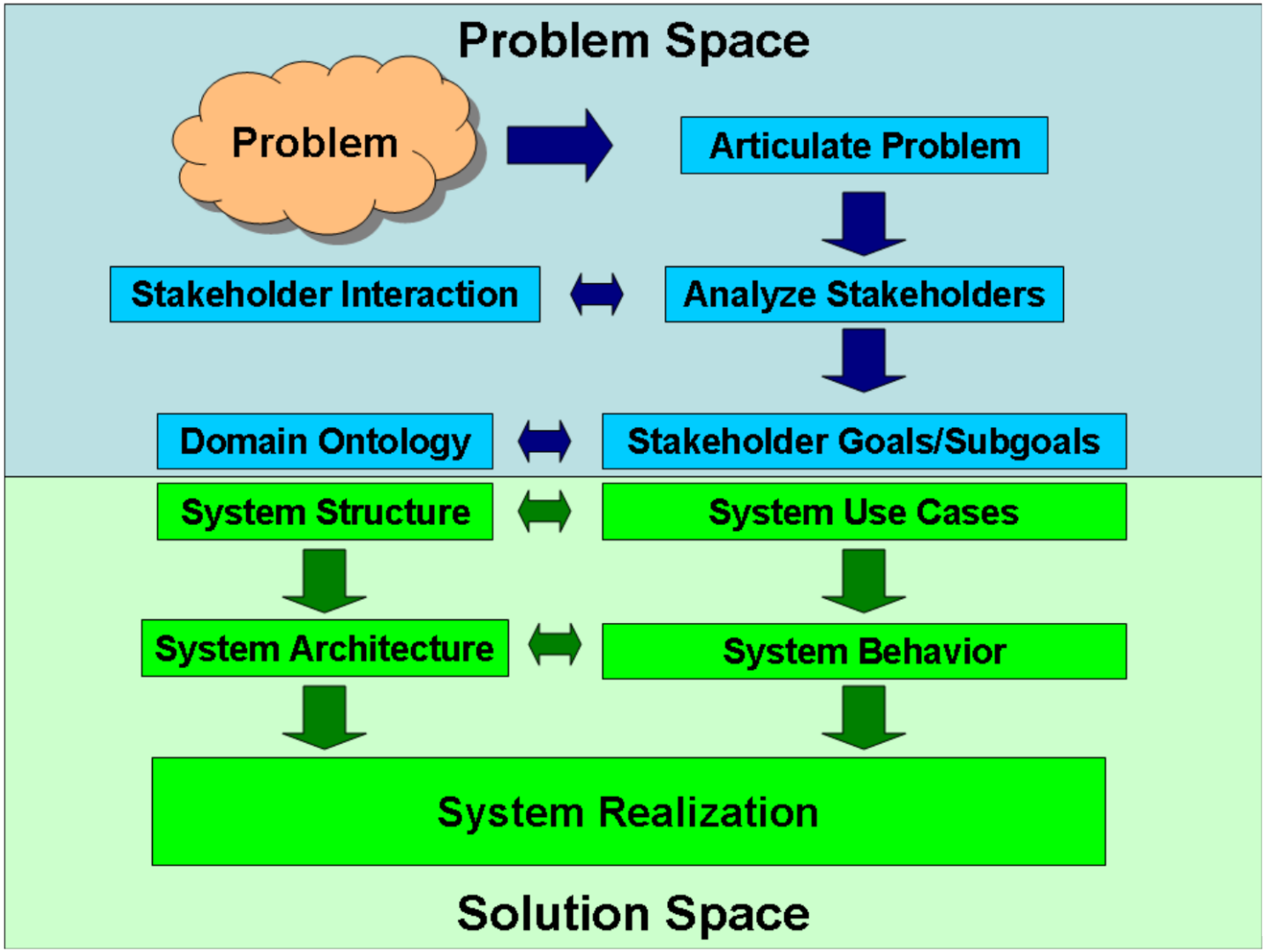


The 7 Samurai, James N. Martin, INCOSE 2004

System Context

- **What are all the systems that this system interfaces with**
- **What are the enabling systems that are dependent on this system or that this system depends on**
  - Who owns or represents them?




Problem Space
Problem
Articulate Problem
Stakeholder Interaction
Analyze Stakeholders
Domain Ontology
Stakeholder Goals/Subgoals
System Structure
System Use Cases
System Architecture
System Behavior
System Realization
Solution Space

Problem Space Risk Characterization
Day-1 Brief Out Poster

- **Need:**
  - Use the most optimal combination of resources to solve the right/most critical problem, given the anticipated intended use over its lifecycle
- **Customers:**
  - Users of (esp. high-consequence) systems
  - Maintainers/sustainers of systems
  - Deliverers of systems and their integrity/longevity
  - Funder/payer
- **Impediments to Focus On:**
  - Efficiency of the transactional nature of business
    - Contract vs. problem satisfaction
  - No uniform method of problem-space characterization
    - Because of the complexity, limited ability to simulate/emulate ultimate environment interactions and intended usage, using systematic methods (Or even unintended/incidental usage)
  - Habitual nature of humans to jump to a solution
    - Creating the boundary of the solution before completely identifying the problem space / understanding system scope

Day-2 Workshop

Participants

- Kaleb Bjorkman, NMTech, kaleb.bjorkman@student.nmt.edu
- Rick Dove, PSI, dove@parshift.com
- Regina Griego, Sandia National Labs, drgriego@comcast.net
- Bill Schindel, ICTT Systems Science, schindel@ictt.com

Impediments discussed

- **Efficiency of the transactional nature of business**
  - Contract vs. problem satisfaction
- **No uniform method of problem-space characterization**
  - Because of the complexity, limited ability to simulate/emulate ultimate environment interactions and intended usage, using systematic methods (Or even unintended/incidental usage)
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But…

they morphed…

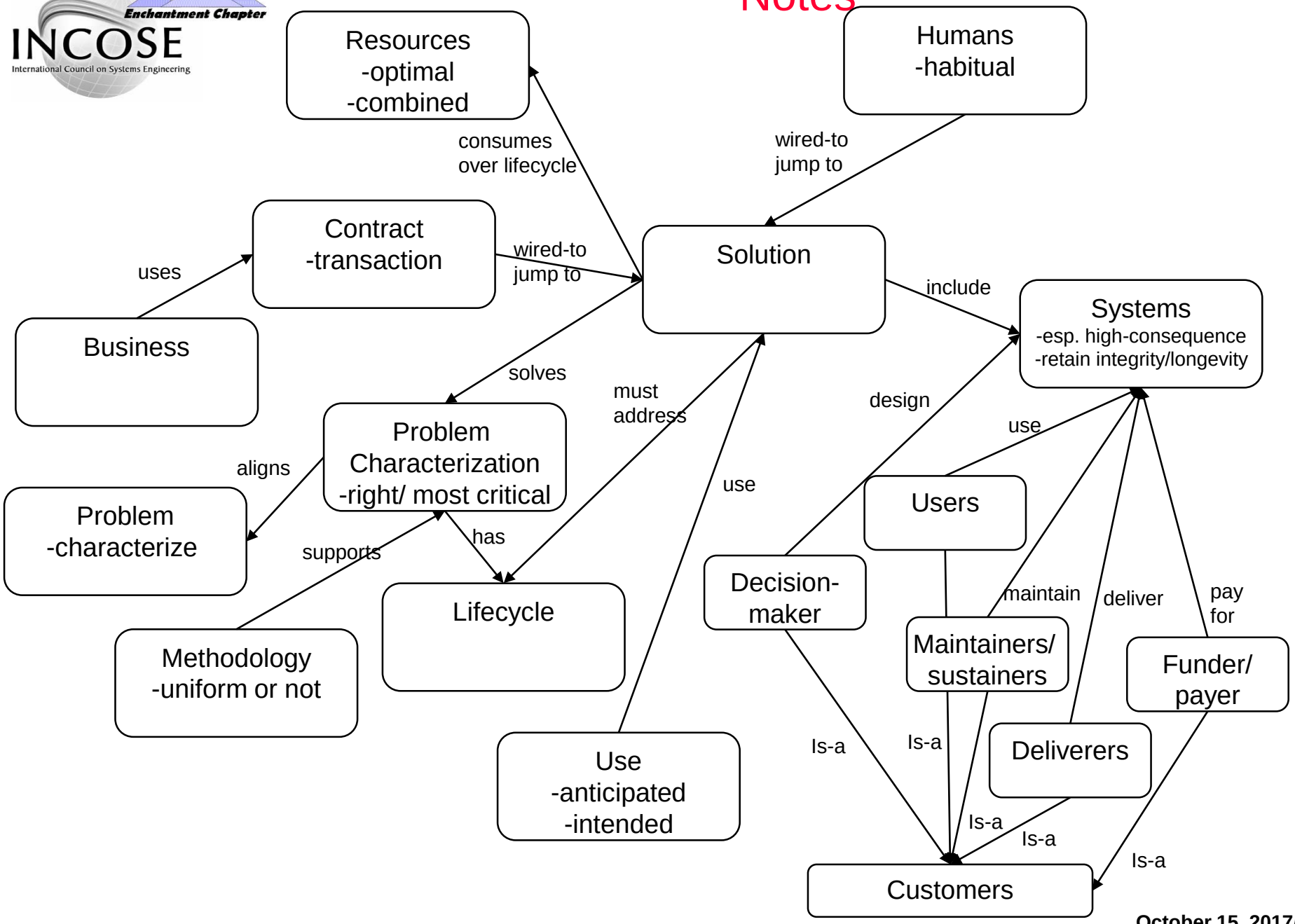
Impediments -> Requirements

Problem Characterization is not being done sufficiently

- **Address Motivation (Wiring/habitual) of SEs, decision-makers & payer/funder**
  - Leadership
  - Incentivize
- **Address Cost**
  - Change contractual nature of business to include the problem definition
  - Understand the cost/benefit trade-space for problem characterization and establish ROI
  - Standardization /reuse of methodology
  - Addresses the optimal use of resources for the problem characterization and the solution over the lifecycle
  - Right-size the problem characterization effort
- **Requires Methodology**
  - Make it fit for purpose and accounts for all dimensions of problem over the lifecycle
  - Supported by training / education – includes technical leaders that can apprentice others
  - Human compatible / engagement compelling
  - Leveraged previous problem characterization process/pattern/templates
  - Includes continuous evaluation of efficacy (learning over time)
- **Complexity of problem space needs to be addressed**
  - Model-set that addresses complexity
  - Includes problem visualization
  - Compatible with solution process
  - Dynamics and evolution of problem and solution / systems

Enchantment Chapter
INCOSE
International Council on Systems Engineering

Notes



Plan for subsequent solution collaborative action

- **Get to the bottom of Motivation of SEs, decision-makers & payer/funder**
  - Wiring/habitual of jumping to the solution
  - Are there patterns that are natural to characterizing problems (tacit knowledge)
- **Take this to INCOSE working groups**
  - Agile Systems Engineering
  - MBSE Patterns
  - Model-based Concept Design
  - Requirements Working Group
  - Human Systems Integration