Systems Engineering Concepts Applied to a Hospital Emergency Department

Session 1 – Stakeholders & Stakeholder Perspective
Session 2 – Systems Engineers & SE Perspective
Session 3 – System Simulation Users & Perspective

Bob Malins
Co-Lead, INCOSE Healthcare Working Group
rjmalins@eaglesummittech.com

INCOSE International Workshop (January 30 – February 02, 2016)

Introduction

- **Origins of this week's workshop**
  - The PCAST report: "Better Healthcare and Lower Costs: Accelerating Improvement Through Systems Engineering"
- **IW2015 Outcomes**
- **Goals for the Emergency Department Workshop**
  - Session Overviews
  - Discussion Goals

Please fill out the sign up sheet – Please take a look at our survey.
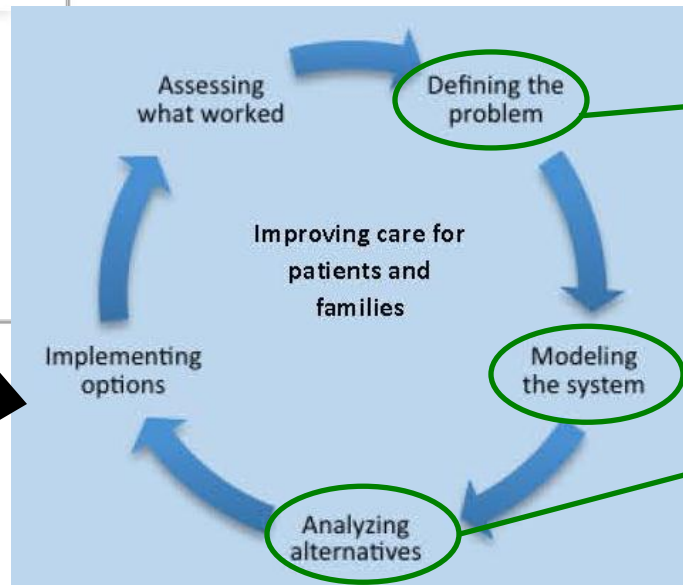
Background: IW2015

The overall workshop goal was to gather information to direct, and ensure value-add of, INCOSE activities with respect to alignment with the recommendations of May 2014 PCAST report.

REPORT TO THE PRESIDENT
BETTER HEALTH CARE AND LOWER COSTS:
ACCELERATING IMPROVEMENT THROUGH
SYSTEMS ENGINEERING

Executive Office of the President
President's Council of Advisors on
Science and Technology

May 2014

From the PCAST Executive Summary: *"Other industries have used a range of systems-engineering approaches to reduce waste and increase reliability, and health care could benefit from adopting some of these approaches. … Notwithstanding the instances in which these methods and techniques have been applied successfully, **they remain underutilized throughout the broader system**."*

Assessing what worked — Defining the problem — Improving care for patients and families — Modeling the system — Analyzing alternatives — Implementing options

- • <u>Session 1. Stakeholder Needs</u> – what do healthcare delivery organizations believe are the high payoff applications of the systems approach?

- • <u>Session 2. Capabilities</u> – what are the key tools systems engineers can bring to bear to meet stakeholder needs?

- • <u>Session 3. Application Context</u> – what approaches should the systems engineering profession pursue to improve healthcare delivery?

This workshop did not address specific healthcare problems. It was intended to start the process of defining how INCOSE (as an organization and as a collection of individuals) could make systems engineering more relevant to healthcare.

- **Key Take-Aways**
  - The healthcare "system" is vast
    - Multiple "hypersystems" each containing multiple system of systems
    - Hard to find a starting point
  - Engineering oriented presentations don't communicate
    - Key players (esp. MDs, NPs, RNs, etc.) do not have an engineering background
    - Do not respond well to engineering language
  - Healthcare simulations nearly always take a systems approach
    - Many large hospitals have simulation directorates
    - Healthcare simulation professionals have much in common with systems engineers
    - Healthcare simulations look at system characteristics
    - But don't have the full picture systems engineering provides
  - The legal and regulatory environments strongly drive behaviors
    - Some behaviors – like medical device interoperability – are technologically feasible but hindered by liability regulations
    - System impacts of legal-regulatory environment not well understood

There are many systems thinkers in healthcare – but few systems engineers

- **Guidance and recommendations received**
  - Healthcare industry has many systems thinkers, but few systems engineers
    - Recommendation: INCOSE HWG outreach to non-SE partners
  - Systems engineers must demonstrate the systems engineering value proposition in a healthcare context
    - Recommendation: SE for Healthcare Value Proposition briefing
    - Recommendation: MBSE Challenge Team example model of a systems engineering model for hospital operations
  - Systems engineers must show MBSE adds value beyond that of on-going non-SE systems modeling and analysis
    - Recommendation: INCOSE HWG members create white paper
    - Recommendation: INCOSE HWG outreach to Society for Simulation in Healthcare

This year's Systems Engineering Concepts Applied to a Hospital ED workshop addresses three of the action items

SE Applied to the Hospital ED

- **Goals**
  - Extend IW2015 outcomes by focusing on a specific problem
  - Begin addressing the need for healthcare specific examples of systems engineering products
    - Review and discuss stakeholder perspectives
    - Review and discuss multiple systems engineering perspectives
    - Review and discuss systems approaches to process improvement

- **Desired outcomes**
  - INCOSE members learn how systems engineering methods can be applied to assist healthcare providers
  - Healthcare stakeholders and partners have a better understanding of what systems engineering can offer
  - Essential dialogs among INCOSE members, stakeholders, and partners are established

Outcomes of the workshop will guide actions by the Healthcare Working Group in 2016

IW2016 Workshop Agenda

- **Session 1. Stakeholder Session (Sat p.m.)**
  - Scope: presentations by ED practitioners
  - Desired outcomes: identify high priority issues, needs, and constraints from the stakeholders perspective

- **Session 2. Systems Engineers Session (Sun a.m.)**
  - Scope: presentations from on-going and emerging system engineering efforts
  - Desired outcomes: identify the high payoff ED issues that systems engineers can address

- **Session 3. Simulation Session (Sun p.m.)**
  - Scope: presentations on systems approaches to healthcare process improvement
  - Desired outcomes: understand how systems engineering can benefit on-going process improvement initiatives.

Each session is structured to be about 1/2 PowerPoint presentations and about 1/2 discussion of issues, gaps, and action items

Discussion Sessions: Hospital EDs

Overarching Questions

- <u>Workshop Overall</u>
  What is your direction and feedback to the HWG on how *INCOSE* can best contribute to improving Emergency Departments?

  - <u>Session 1. Stakeholder Perspective</u>
    What do the ED stakeholders believe are the issues, needs, and constraints to improving ED performance?

  - <u>Session 2. Systems Engineering</u>
    How can systems engineering best address the issues in EDs?

  - <u>Session 3. Systems Simulation</u>
    How could MBSE, specifically, support simulation for process improvement?

Session 1 – Stakeholders

- **Session goals**
  - Identify the most important system issues in hospital ED
  - Expand HWG dialogs with healthcare stakeholders

- **Speakers**
  - Dr. Ali X. Ghobadi, MD
    - Assistant Chief - Emergency Medicine, Kaiser Permanente-Orange County
  - Dr. Aaron Bair, MD
    - Professor, Emergency Medicine, University of California-Davis Health System
  - Professor Bohdan "Bo" Oppenheim, PhD
    - Professor of Systems Engineering, Loyola Marymount University

- **Discussion Goals (after the break)**
  - Overarching goal: What is your direction and feedback to the HWG on how INCOSE can best contribute to improving Emergency Departments?