SYSTEMS THINKING – Monday @10:30

Facilitator: Bill Fortney, NC State
Panelists: Marcos Esterman, RIT; Tom Gannon, WPI; James Hacunda, Shire

Panelists

- James => ECE background, industry experience in aerospace and medical technology
- Tom => ECE background, industry experience on military products
  Systems thinking focuses on the relationships between components and interactions of the system with its environment (holistic versus reductionist mindset)
- Marcos => Materials, product design, lean manufacturing, and entrepreneurship background
  Systems thinking explores issues of interdependence, interfaces, system dynamics, and reliability

What is the connection between systems thinking and systems development?

- Design processes are often conceived as linear with a goal of eliminating iteration
- Systems thinking is a prompt for divergent thinking and integration

How do you know when a design is done?

- It is important to define the problem at hand and define the target early on in a project, however problem understanding and project requirements evolve over time.
- Acceptance of problem solutions requires balancing performance objectives, resource requirements, and time available. Stakeholder engagement in project scoping is critical. Negotiation should be expected.

How do you develop an <u>appreciation</u> for systems engineering (within capstone and beyond)?

- Incorporate stakeholders in project management activities
- Model iteration in our teaching (it's OK and provides tremendous added-value)
- Stress the performance – time- money model in capstone mentoring
- Insist on early proof-of-concept feasibility tests (illuminates what can and can't be done)
- Embed systems engineering objectives in introductory design & laboratory courses
- Remember the value of periodic peer reviews/mentoring in addition to formal reviews
- Identify and discuss issues of societal impact associated with project work

Some teaching/learning principles that apply to systems engineering…
The one who does the work, does the learning
(create authentic project opportunities/environments that expose students to system issues)
The one responsible for process improvement accelerates this learning
(promote reflection and self-assessment)
Allow the learner to fail and employ mentoring

See books/paper by Kolozs on Systems Engineering Lite
Seek inspiration from children's books byWhat it Means to be an Engineer andRose Revere the Engineer