INCOSE IW 2019
MBSE Workshop Update...

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Integrated MBSE Vision
What does the integrated systems engineering look like…

- Hydraulic Fluid: SAE 1340 not-compliant

Minimum Turn Radius: 24 ft.
Automatic Dry Pavement Braking Distance at 60 MPH: 110 ft. 90 ft
Didn’t see it coming…
Do you see the problem?
“…recalls SUVs because drivers are accidentally turning them off while driving”. Placement of transmission selection/radio next to each other ($1.4M in direct costs)

NHTSA reports record number of cars (37m) recalled in 2017
25% are never repaired
Do you see the problem?
Does this work? 
Case Study: Fuel Pump Control Module

Fuel pump control module bad placement…

• Resulting in Bi-Metal Corrosion, failed ECU
• 86,000 vehicles recalled.. $8.6 Million direct costs
How about now?
Even when you were evaluating places to put it.

Bi-metal contact, corrosion risk
Doing the math...

Nodes = 5
Potential Links = 10
Networks = $2^{10} = 1024$

Nodes = 30, potential links = 435, unique configurations = $2^{435}$
Number of atoms in the universe est. between $2^{158}$ and $2^{246}$
This requires change…
High-tech experience
How to make the culture change?

Q: How many psychologist does it take to change a light bulb?
A: Only one, but they have to want to change
Anatomy of an project…

- **Nervous System**: SE & SE Tools -- connects management to project
- **Epidermal System**: facilities, security
- **Digestive System**: Personnel, finance provides energy/resources for project
- **Skeletal System**: project support groups
- **Circulatory System**: Information Systems, LAN’s, PDM
- **Muscular System**: Does the work… engineering, etc.
- **Respiratory System**: Marketing bringing in new ideas
- **Brain**: Project Management
Transplant process…

• Transplant overview/process
• Medical ethics and priority
• Organ function and symptoms
• Social aspects with families,…
• Finances…cost, acquisition, maintenance,…
• Dietitian…weight, nutrition, physical condition,…
• Pharmacology…anti-rejection, side effects, infections,…
• Case worker…prequalification, tests, clearances from…
• Legal…living wills, etc.
• Surgeon…risks, etc.
Transplanting MBSE into an organization…

- Transplant/tool overview/process—agreed new process
- Medical/tool ethics and priority—agreement on when tools will/will not be used, buy-in from organization,…
- Organ/tool function and symptoms—understanding of what functions the tool will perform and what symptoms it addresses
- Social aspects with organization—support organization to support the tools, PR campaign, internal user group,…
- Finances…cost, acquisition, maintenance,—financial budget to cover implementation/maintenance of tools
- Tool Dietitian…weight, nutrition, physical condition—training plan, deployment plans, maintenance, etc.
- Pharmacology…anti-rejection, side effects, infections,—tool usage incentives, metrics, opportunities, etc.
- Case worker…prequalification, tests—on site support, who can use it, etc.
- Surgeon…risks—Project, IT, and Design Center Mgmt
Is your organization transplant ready?
Thank you