



I am doing something a little different with this TBD. Instead of chatting about whatever happens to be on my mind when I sit down to write, I am instead providing an interesting proposal — developed by Lee Flint — on the possibility of the International System Safety Society (ISSC) (or better yet, a chapter) becoming involved in local science fairs. This idea sprang from some observations I made while assisting the Bay Area Chapter of the ISSC judge a science fair in San Jose, California. I was concerned that we judged the projects based on system safety criteria, without forewarning participants or giving them any materials that might assist them in including system safety considerations in these projects or presentations. We did our best to find projects that included something akin to system safety considerations, but there certainly didn't seem to be any pre-planning on the part of participants.

Based on this observation, I wondered if there might not be an opportunity to do more in the future. Lee ran with this idea, and developed the idea in a way that might become a more in-depth chapter project to assist and possibly mentor students toward better safety awareness. I think Lee came up with an interesting proposal — I hope it sparks an idea that could develop into an interesting and useful augmentation to introduce Science, Technology, Engineering and Mathematics (STEM) programs to the concepts and value of system safety engineering.

### Introduction

The criteria and guidelines described here would be approved by the International System Safety Society (ISSS) for use by participants wishing to compete in the ISSS Engineering and Science Fair Challenge Program.

The system safety process described here would be scaled to an introductory level tailored to the scope of typical engineering and science fair projects at the seventh to 12th-grade level.

For purposes of this program, the “project” constitutes the “system” and, therefore, the terms “project” and “system” are used interchangeably.

### Objective

The objective of incorporating system safety into engineering and science fair projects is threefold:

- A. To introduce aspiring engineers and scientists to the system safety engineering discipline
- B. To encourage participants to employ system safety engineering methodologies and techniques in the *concept* and *design* phases of their projects
- C. To help ensure that safety, consistent with engineering and science fair sponsors' goals, is *designed* into all aspects of a project (i.e., the system)

### Criteria and Guidance Format

- A. The engineering and science fair criteria would be presented as challenge tasks
- B. Each individual challenge task is divided into two parts: Purpose and Task Description
  - i. “Purpose” provides a brief reason for performing the task
  - ii. “Description” provides a non-generic task outline
- C. Task descriptions should be tailored by the Fair project team as appropriate to their particular project/system

### Criteria and Guidance Approval

- A. Approval/Endorsement
  - i. For use by participants wishing to compete in the ISSS Engineering and Science Fair Challenge Program
  - ii. ISSS approval/endorsement of criteria and guidance is desirable



“I hope (this proposal) sparks an idea that could develop into an interesting and useful augmentation to introduce Science, Technology, Engineering and Mathematics (STEM) programs to the concepts and value of system safety engineering.”

- iii. The sponsoring chapter should approve/endorse the criteria and guidance
- iv. The Engineering/Science Fair sponsor must approve the criteria and guidance

### Criteria Scaled and Tailored

- A. The system safety process needs to be scaled to an introductory level
- B. The process should be tailored to the scope of typical engineering and science fair projects at the seventh to 12th-grade level
- C. The “project” constitutes the “system.” Therefore, “project” and “system” can be used interchangeably

### Challenge Tasks

- A. **Challenge Task I — System safety plan to meet specific project/system requirements**
  - i. Establish, develop, and execute a planned approach
  - ii. Tailor criteria
  - iii. Develop acceptable level of risks
  - iv. Define hazard probability and severity levels
  - v. Identify documentation planning
- B. **Challenge Task II — Preliminary Hazard List**
  - i. Identify potential hazards for Project Team emphasis
  - ii. Examine the project/system early on
  - iii. Review previous experiences and lessons learned on similar projects/systems
  - iv. Identify special concerns, hazards or undesired events
- C. **Challenge Task III — Preliminary Hazard Analysis**
  - i. Identify safety-critical areas to provide an initial risk assessment

- ii. Identify hazardous components
- iii. Determine safety-related interface considerations among various elements of the project
- iv. Identify environmental constraints, including the operating environments
- v. Conduct operation, test, demonstration and maintenance
- vi. Define safety-related equipment, safeguards and possible alternate approaches
- vii. Identify potential malfunctions to the project/system, components/subsystems or software

- D. **Challenge Task IV — System Hazard Analysis**
  - i. Perform and document a verification of project compliance with safety requirements
  - ii. Identify hazards associated with the component interfaces and system functional faults
  - iii. Assess the risk associated with the overall project/system design, including:
    - 1. Software
    - 2. Subsystem interfaces
    - 3. Hazard elimination and mitigation actions taken

- E. **Challenge Task V — Project System Safety Assessment**
  - i. Perform and document an overall comprehensive evaluation of the mishap risk being assumed
  - ii. Identify all safety features of the hardware, software, and system design
  - iii. Identify potential procedural, hardware and software-related hazards

I welcome your thoughts and input on Lee’s proposal. Please email me at [charles\\_hoes@hoes-eng.com](mailto:charles_hoes@hoes-eng.com). Let’s come together and help develop the next generation of system safety professionals. ●