



Not For Women Only

Heidi Hahn, Los Alamos National Lab

As some of you may know, I run a program here at Los Alamos called Future Female Leaders in Engineering (FFLIE), which is a pipeline program for undergraduate female engineering majors that gives participants summer internships and specialized professional development and networking activities, then pays for their graduate education through their Masters degrees, before bringing them on as regular employees.

I will be presenting a paper on the professional development curriculum for the first year students, titled *What Can You Learn About Systems Engineering by Building a Lego™ Car?*, at IS2018. Here's an excerpt of the abstract: During their first year, FFLIE students receive training on LANL's Mission Assurance Program, which involves the integrated application of systems engineering, project management, and engineering quality and rigor to ensure mission success.

The instruction is organized around the system development project life cycle and emphasizes activities and artifacts associated with the various life cycle phases. A home improvement project (adapted from Braakhuis, Janssen, Koudenburg, de Liefde, Malotau, Rens, and Stevenson,

2010) with cartoons that animate the scenario is used in a series of table-top exercises to illustrate various points. The training culminates with a project—building a car for a Lego™ Derby race—on which the students demonstrate skills they had just learned in the classroom instruction.

The paper briefly reviews the instructional content, with an emphasis on the activities and artifacts exercised in the Derby project; provides lessons learned; and concludes that there's a lot one can learn about SE by building a Lego™ Derby car if the experience is properly structured! Overviews of FFLIE students' learnings about requirements, measures of performance, trade studies, and verification and validation are provided.



A few of the take-aways:

- It is harder to write a good set of requirements than you would think, and you only gain an appreciation for this after you've tried to do it.
- Write measures of performance (MOPs) as you develop requirements; if you can't write a MOP for a requirement, the requirement is probably not well specified.

- It pays to develop measures of performance that can be verified early in the development process as well as after the product has been realized—an extension of the measure twice, cut once principle.
- Trade studies don't have to be scary – we're doing them all the time in our heads! SE just asks that they be documented.
- Configuration management doesn't have to be scary, either—put a date on the cocktail napkin you hatched your idea on and paste it into your lab notebook; make changes in a different color and initial and date them as well.
- Take care to ensure that verification measurements are accurate indications of the characteristic being verified—one racer was disqualified for failing to meet the ground clearance requirement after she had verified the dimension at a place that was not the lowest part of the car.

This project would be easily transferrable to teaching middle schoolers SE concepts without using a lot of jargon. And, with some slight modifications to make it less girly-focused, it could be equally appealing to girls and boys.

I can make the materials available to anyone who wants them—though not with the supplies needed to make the cars!

Come to the IS presentation (Monday, July 16 at 11:30 am) or contact me at hahn@lanl.gov to learn more. ∞

Join Up! Empowering Women as Leaders in Systems Engineering

Alice Squires, EWLSE Chair

We invite men and women to join EWLSE to advocate for women as leaders in systems engineering.

Sign-up through www.incose.org and be added to the EWLSE email distribution list and gain access to the Empowering Women area on INCOSE Connect.

- Login to your member account.
- Select Welcome <your name> top right.
- Select Profile Home.
- Scroll to My Committees/Working Groups and select Browse/Join a Working Group.
- Select 'Empowering Women.'
- Scroll down to Committee Tasks and select Join this Working Group.

∞

What Does a Scientist Look Like?

When asked to draw a scientist, school-age kids in the United States are increasingly sketching women. That's the main conclusion of a new study that compiled information about 20,860 pictures drawn by students age 5 to 18 over 5 decades.

<http://onlinelibrary.wiley.com/doi/10.1111/cdev.13039/full>

In the 1960s and 1970s, less than 1% of students depicted scientists as female. But the percentage of women in the "draw a scientist" sketches—like the one pictured, drawn by a third grade girl in San Antonio, Texas—has reached an estimated 34% by 2016.

When looking at drawings penned by girls: About 1% drew women in the first 2 decades—but in the past decade more than half have drawn women, reports *Child Development*. ∞

