



A topic that seems to keep popping up is how the International System Safety Society can assist with helping new (or maybe not so new) system safety engineers advance their careers by providing mentoring opportunities. The role and importance of mentors and mentoring is a topic that is near and dear to me. I don't know other people's challenges and experiences with learning to become competent in a new field, but for me, it typically doesn't happen until I have had a chance to be mentored by an expert. I can take years of classes, attend conferences, attend workshops, sit through lectures and generally stuff my mind with all sorts of theoretical knowledge, but until I have a chance to work side by side with an experienced and compassionate mentor, it just doesn't sink in.

That being said, while I am convinced of its value, I am not quite sure what the word "mentoring" means, or what a mentor might be. One definition of "mentor" is a trusted counselor or guide. This seems obvious, but I think it is not a complete definition. A slightly better version might be "someone who imparts wisdom to and shares knowledge with a less-experienced colleague." An even better description that I found on the Web is that a mentor is "more than an adviser. A mentor provides you with wisdom, technical knowledge, assistance, support, empathy and respect throughout, and often beyond, your career."

It is my experience that having a mentor is rare. Back in the old days when I was in college getting my degree in physics, I was lucky enough to have been "adopted" by a person who became a lifelong mentor to me. He is still my mentor, even though I haven't seen him for many years. I never quite figured out his background, or where he obtained his qualifications, but that didn't really matter. Bob was the physics and chemistry department's "do everything" machinist/mechanic/electrical engineer/curmudgeon. He occupied the lowest room in the building, down in the bowels of the building with

the pumps, water systems, racks of batteries for the lab tables upstairs and the other noisy, smelly, seemingly "alive" equipment that was needed to support a large building full of classrooms and laboratories.

The story of Bob's life included a tour of duty during WWII on a war ship in the South Pacific, followed by working as a millwright in the redwood forests of Humboldt County, California. The thing about Bob is that he knew everything — he was the smartest, most rounded, most knowledgeable person that I have ever met. He was also a person who had the patience to teach me not only to know about stuff, but to know *how* to know about stuff. He made it clear to me that not knowing something, or knowing how to do something, is just a condition at a moment in time — it doesn't have to be permanent. He taught me how to be a skeptic, and how to see through the mist of misunderstanding, obfuscation and tradition. Most of all, he helped me learn to trust my understanding of things, even though it might not be in agreement with what others believe or claim to know. He guided me not just to believe, but instead to *find out*.

During my college years, I worked in the physics stockroom to put myself through school. I ended up building and repairing a wide range of electronic and mechanical equipment. Bob was always there to let me try (and often fail), help me out of my problems and always lead the way to using that knowledge and approach for the "real" world outside of the job or my education. He was full of funny, but pointed, stories and always a joy to talk to because any and every topic was on the table — especially if it was about science, engineering, finances or government.

The lessons I learned about school, work and life during the years of his mentoring me stick with me to this day. I learned a way to look at the world and approach problems that guides me every day. If I pay attention, I can almost always hear him guiding, helping and pushing me along.



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When I graduated for the second time and finally left the comfort of college, I was inexplicably hired as a system safety engineer by Lockheed Missiles and Space Company. The first time that I had heard of “system safety” was during my initial interview with them. It was the first time I considered the idea that “safety” might be related to an engineering activity. I had absolutely no intention or foresight that my career would have anything to do with safety, and even less inclination toward rockets or the other things on which they wanted me to work. I just plopped down with a job that was completely and totally foreign and unknown to me. I have no idea what made the Lockheed folks think that I might be a fit for the profession, but they were correct.

Luckily, I managed to be seated next to the second mentor of my lifetime. Frank was there to talk, guide, joke, prod and twist my brain and thinking in ways that made absolute and total sense to me. When I got that job, the system safety department was totally overwhelmed and understaffed. The office was in the middle of a full-up design, development and production program with 15,000 or so engineers scattered across the country, creating an immense and extremely complicated system. There were four of us doing the system safety work for the entire program — meaning that we were incapable of knowing more than just the very tip of the iceberg.

The condition of being overwhelmed was an amazing advantage to me. It meant that I could pick any safety topic that might come into my view and there was important work to be done with regard to that topic. I could, and did, choose to work on a wide variety of issues just to learn more about them. It also meant that we had to find the important things and let others work on everything else. Frank helped me to learn how to sort through the haystack to find the things that were not

only “high risk,” but that would likely be missed by others. Frank kindly and effectively guided me to knowing how to attack problems.

Probably the most important lesson that he drilled into me was that, “first, you have to understand the system.” My normal instinct was (and still is, in many ways) to start a frontal attack on a problem in an attempt to find solutions. But that never works because I don’t have any way of sorting through to identify the important problems and solutions. He gave me permission to slow down and do my homework, even though my boss or customer might be pushing for answers and demanding results. It is sometimes difficult to resist the pressure to get it done immediately, if not sooner, and to make snap decisions. Frank, however, gave me permission to learn first and *then* do the work from a position of knowledge. During the first couple of years of working with him, he managed to boil down the entire system safety profession into four lines on a white board that all of us (including him) would periodically look at to remind ourselves of what we were doing and the path to the solutions. I don’t recall the exact wording on that white board, but it went something like:

1. Understand the system
2. Figure out dangers/hazards that are physically possible
3. Figure out how those dangers/hazards could become real
4. Find ways to prevent them from happening

That is about it. Pretty obvious — although it is often a big task because there are so many ways for things to go wrong in large and complex systems. Frank’s main contribution to me, beyond being a fount of technical in-

formation about a wide variety of engineering topics, was the idea that there is a simple and straightforward set of steps that work to solve any problem, whether it is in the field of system safety or in any other aspect of my life.

As with my experiences with Bob, Frank's help was directed at "the job," but poured over into the rest of my life. Both of these mentors helped me learn a new way of thinking about the world, and helped me change my paradigm of how things work, as well as how I work (both mentally and physically).

They taught me how to look at the world as a system of interconnections and that solving highly complex and convoluted problems is not done by solving the whole problem, but by solving lots of little problems that I can understand. If I can't understand it, then I can't do anything about it. Therefore, the job is to understand the parts and pieces until the whole becomes clear. If I can't do that, then it is unlikely that anyone else can either, which makes it unlikely that it will be understood by anyone and therefore, it is unlikely to work properly or safely. If nobody can understand the system, that means there is a problem with the design, and it needs to be re-done in a way that can be understood. Of course, it is always possible that I am just not smart enough to understand and that others can, but my bet is that if they can't explain it so that I can understand, then they probably don't know either.

So what does this have to do with the International System Safety Society? How can we provide a service such as mentoring if it is so rare, time consuming and individualized? The ISSS can give classes, put on workshops, and hold roundtables and discussion groups. We do these sorts of things at our conferences and now and then at chapter events. However, while those kinds of learning opportunities are necessary, they are not sufficient to assist people in forming the mental model, or paradigm, required to make effective and efficient use of all of the information. Something more is needed. I believe that mentoring is part of that "something more."

One way mentoring happens in many industries is through attending and participating in standards com-

mittees that are created to help develop industry-wide standards and guidelines. For example, I have been actively involved with many of the Semiconductor Equipment and Materials International (SEMI) standards committees, specifically those involved with safety in design or operations. The SEMI standards are extremely important to the member organizations, which therefore fund the meetings and support their employees

in attending to help make sure that their needs are considered. The dynamics of these meetings are such that lots of discussions take place, including one-on-one interactions that not only bring the parties to a consensus on the content of the standards, but act as a kind of "mentoring" opportunity between attendees as they struggle to understand issues and form good, effective standards to which all member organizations can adhere.

There might be other avenues for extended mentoring opportunities within the ISSS. I think the joint development and creation of handbooks, guidelines and best practices would have a similar outcome. If done well, these materials would form the basis of products that our member companies would

be willing to help pay for with direct donations but, more important, with paying for their employees to attend conferences and workshops and for time outside of conferences.

It seems these types of activities (the joint development of materials needed by international industry) could be a win-win-win proposition. The member companies win because they help develop materials that put them all on a level playing field and create materials needed for bidding and training purposes. The individuals win because they get extremely valuable experience and mentoring. The ISSS wins because it gains in reputation and membership.

I believe that the ISSS needs to find ways to expand its services beyond simply providing information by developing means for our members to provide and share wisdom, technical knowledge, assistance, support, empathy and respect throughout, and often beyond, our careers. ●

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