Steven Mattern gave a presentation during the March 2012 “Virtual Chapter” meeting on the topic of required competency for system safety professionals. My first reaction was intrigue at the use of the term “competency” rather than “qualifications.” I am not sure what the difference might be, but it “feels” like the first has to do with being able to do the tasks, while the second has more to do with having the correct items on a resume. I think the latter term is probably the correct one, but I will use the first because it sort of made me stop and think a bit.

For the past several years, the answer to the question of the required competency was partially answered by the Board of Certified Safety Professionals’ (BCSP) Certified Safety Professional specialty examination in system safety aspects. However, that certification is no longer offered, so that means of determining whether a person has the requisite minimal competency no longer applies.

That leaves us with a problem. What are the necessary competencies and qualifications, and how do we determine if a person has them? It seems like it matters, and it seems like the International System Safety Society (ISSS) should provide some assistance to those who need to be able to judge the level of competency of a particular individual. It is also important for people in the profession to know what is expected of them to assist in selecting the appropriate training, course work and experience to advance their careers.

Mattern presented two examples of attempts at addressing this issue. One was a detailed circular chart representing NASA’s view of system safety competencies. The chart breaks the competencies into five broad categories, which are further subdivided into specific areas. The categories (in no particular order) are: system safety analytical methods, mathematical skills, system safety in operational management, system safety in acquisition, and system safety rationale. These broad categories are a mixed bag of skills, goals, project phases and desired approaches. However, these give a flavor of the breadth of the field. While interesting, I think the list is too inconsistent and incomplete to be particularly useful. For example, it is not obvious why mathematical skills would be included, but general knowledge about how things work (engineering, physics, chemistry, etc.) is not.

The second set of materials that was presented came from the work of an ISSS “Competency Committee,” composed of five of our knowledgeable elders. They divided the system safety competency pie a little differently, focusing on safety engineering, safety management, education and training, and certification. They also went a step further and developed a philosophical precept indicating four levels of competency in each of these four areas — ranging from “supervised practitioner” to “expert and/or mentor.” The group put all of these criteria into a four-by-four table, creating further specific criteria for each cell in the table. As you can probably guess, this turned into an extensive effort because each block was broken down into subcategories, each of which has its own set of criteria. The group seems to have stalled out at 17 subcategories (many of which have
their own subcategories), with 203 separate criteria.

A third effort at determining the necessary competencies for the profession was undertaken in developing the BCSP’s examination for the System Safety Aspects Certification. The development of this examination brought together yet another group of “experts” in the field. We worked together as a team to identify not only what we believed to be the desired competencies, but also developed questions to test for these various identified competencies. This resulted in an extensive and detailed description of what we believed to be critical — and testable — at that point in time.

All of these attempts have proven one thing: The field of system safety is broad, complex and requires extensive training and experience in an amazing number of general areas of knowledge. It also requires an in-depth knowledge of details specific to a particular industry, such as aircraft, semi-conductor manufacturing tools, medical devices, trains, etc.
While a solid understanding of physical science, mathematics and the other fields of study are necessary, they certainly aren't sufficient. In addition to the broad educational background so necessary for understanding "how things work," there is also a need for sufficient "hands on" experience to allow the safety professional to visualize the operation of the system in human terms.

Normally, the bulk of the system safety effort occurs prior to the creation of any hardware. Therefore, it is important to have a good imagination to be able to visualize what the items will look like, how they will work, and how people will interact with them. Having experience "doing things" goes a long way toward being able to excel at the art of visualizing the system, using incomplete descriptions and drawings.

Assuming all these qualifications are in place, the question turns to the issue of implementing the system safety process (whatever that is). Back in the old days, this meant understanding MIL-STD-882 and implementing the various tasks described therein. Unfortunately, that standard is not at all clear about its intent. It is written in such a way that the reader already has to know the intended process and approach to be able to interpret the intent of the standard. This is not a fatal flaw in the standard — it just means that it can't be used as a tutorial, and that a solid background and understanding of the system safety process is required to use the standard.

This implies that there is something more to the field — something specific about the field of system safety that one must understand in order to be a qualified system safety professional. That brings us to the real meat of the question. What is it that we do that is different from those things done by other members of a project team?

I ran into this question a while back when I went on a tour with an engineering society to a medical device design and manufacturing facility. At the end of the tour, there was a question and answer period, during which I was compelled to ask how big a safety staff the company maintains within its staff of 150-or-so design engineers. The answer surprised me: They have no engineers or other people assigned to safety. Since safety is such an important aspect of medical devices, the answer took me by surprise. None? Really? The presenter went on to explain that all of the company's designers are safety
conscious and familiar with the standards and regulations, therefore dedicated safety professionals are not necessary.

Is that true? Are we not needed? Do we not bring anything special or important to the team? If we do something special, what is it that makes us special or necessary? Is it our backgrounds, or the position itself? Do we have something special or an unusual skill set to offer? Do we know of a process that is unique and difficult to learn? Or is it just that we are tasked with focusing and paying attention to safety issues, as opposed to other things, such as cost or reliability?

I actually don’t know how to answer these questions. I have learned from experience that there is something about the human mind that seems to make it almost impossible to focus on success and failure at the same time. Maybe that is all we really have to offer. Maybe it is just being a person who can understand how things work, understand how they are used, how they can cause harm, and most important, how to keep our focus on safety rather than all of the other things that others are doing.