Systems Engineering Professional Certification Return on Investment

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How does one measure the value of INCOSE Systems Engineering Professional (SEP) certification? Specifically, is the value of certification worth the effort required to achieve SEP?

This article offers my perspective on these questions that have been debated at length by the INCOSE membership. As an employer of systems engineers, member of the INCOSE Certification Advisory Group, volunteer certification application reviewer, and ESEP, I believe that the SEP program provides me a strong "return on investment."

Return on investment (ROI) evaluates the value of an investment by comparing the net benefit (or loss) from the investment to the cost of the investment. Expressed as a percentage or ratio, this calculation provides a simple way to calculate benefit or compare alternatives.

$$ROI = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}}$$

If an investment does not have a favorable ROI (a positive ratio), or if there are other opportunities with a higher ROI, then common sense dictates not to pursue that particular investment.

One's perspective on ROI for INCOSE certification depends upon whether one is evaluating it from an individual or an organizational point of view. An individual may calculate ROI in terms of making him or her more attractive to potential employers or increased salary, while an organization may calculate ROI based on increased proposal wins or increased systems engineering capability. The ROI calculation may also differ based on whether the organization performs system development, systems integration and testing, or consulting. Experience at my company, Strategy Bridge, indicates a favorable return on investment from the INCOSE SEP whenever significant systems engineering is required.

While all professional certifications offer tangible evidence of skills, knowledge, and experience against a defined minimum standard to an employer or customer, SEP certification provides the added benefit of a better definition of "systems engineering" and the related best practices. With the continued and rapid evolution of systems engineering, many organizations struggle. Fortunately, the INCOSE *Systems Engineering Handbook*, on which the certification exam is based, provides a common frame of reference for best practices and the benefits of effective systems engineering.

The investment required to achieve INCOSE SEP is measured in time and money. There is a nominal fee required with the application for certification, but the significant required investment is the time to learn and practice the discipline. SEP candidates must dedicate sufficient time to learn the knowledge, skills, and methods to practice systems engineering and to develop adequate relevant experience to apply it appropriately. No amount of time studying the handbook or taking a "boot camp" preparation course can shortcut this path to certification. While it is possible (though not likely) to get lucky on the certification exam, one can't fake the experience requirements required for CSEP and ESEP. INCOSE certification application reviewers are well-trained and highly experienced systems engineers who are quite serious about their collective responsibility to preserve the integrity of the SEP program. They look for how applicants have applied systems engineering as part of their evaluation. Experience requires incremental investment for individuals dedicated to the profession, and the experience requirement for CSEP and ESEP provides a significant barrier for non-practitioners seeking certification for the sake of being certified.

With an established denominator for the ROI ratio (cost of the investment), the numerator (net gain from the investment) becomes the "gain" measured as increases in competitive proposal wins, repeat or continued business, referrals, increased workforce productivity, and increased pay or job opportunities. From a company perspective, having certified systems engineers on staff provides customers a strong indicator of the company's ability to effectively apply systems engineering on projects. Thus, whether used as a discriminator between organizations or as a minimum standard for working on projects with a significant systems engineering component, certification becomes a critical element for winning and continuing business.

One of the basic tenets of the "supply and demand" dynamic in a competitive market-place is that an increase in demand, coupled with a comparatively stable supply, results in a higher equilibrium price. The business opportunity prediction for the United States federal marketplace shows that demand for SEPs grows faster than the number of people with systems engineering certification. From an individual perspective, certification provides a competitive advantage for jobs and a stronger negotiating position for salary.

During project execution, better solutions, improved processes, or new insights reduce the cost of execution and increase solution quality. While the impact of systems engineering certification on decisions during the development may not always be clearly measurable, the exposure to best practices and alternatives strengthens the systems engineering process. This process improvement yields the predictable and consistent quality necessary for successful projects.

The INCOSE systems engineering certification also requires that SEPs adhere to a code of ethics that employers and clients alike find compelling. The INCOSE SEP Code of Ethics requires these fundamental principles (http://www.incose.org/about/ethics.aspx):

> Systems Engineers uphold and advance the integrity, honor, and dignity of the engineering profession by being honest and impartial; maintaining the highest levels of integrity and keeping abreast of the knowledge of their disciplines; striving to increase the competence and prestige of the engineering profession; and supporting the educational institutions, the professional societies, and the technical societies of their disciplines.

As an employer, we take great pains to ensure that our new employees align to our core values and can represent our company with integrity. Since all INCOSE SEPs already pledged to uphold the fundamental principles in the Code of Ethics, we can focus our discussions in other directions to ensure a good employee-to-company fit. In fact, two of our three Strategy Bridge core values are nearly identical to the first two INCOSE fundamental principles. In one sense, we use the INCOSE Code of Ethics as a favorable indicator that a potential employee abides by our code of ethics.

Our company, Strategy Bridge, helps clients improve their systems engineering efficiency and effectiveness through hands-on interventions, facilitated workshops, and tailored training courses. We encourage our workforce to seek SEP certification and we pursue SEP-credentialed candidates for our open positions for one simple reason: our investment in INCOSE SEP-credentialed staff provides a favorable return as measured by our proposal win-rate and client satisfaction. Stated another way, the presence of INCOSE SEPs on our service delivery teams increases the credibility of our professional services, which translates to increased company success. For us, the ROI for pursuing an INCOSE SEP credential is just good business sense. ⊕

My Life as a CSEP

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When I define myself personally, I list that I am a mother of twins, a wife, and a resident of Texas. There is much more to me than that, but those few words give you a general picture. My professional definition can be similarly boiled down to systems engineer. It's not the title on my business cards (Lead Associate) or my listing with Human Resources (Senior Logistics Engineer) or either of my degrees (Mechanical Engineering and Operations Research). Instead, it is the umbrella definition for all the work I do; a title that says I am technically competent, understand the lasting impacts of decisions made early in a system's lifecycle, and am dedicated to improved outcomes. Rather than simply claiming I have these skills, CSEP provides an objective party's endorsement that gives me enhanced credibility.

Becoming a CSEP caused me to develop a broader understand of systems engineering. I wasn't formally trained in systems engineering, so this was the first time I'd studied the field and I realized that most of my tasks fit within the multidisciplinary world of systems engineering.

My manager at Booz Allen suggested to his staff that we pursue CSEP in the fall of 2007. I took a prep course that helped me understand how to fill out the application, get references, and study for the exam. Working on it several hours each week, it took me a couple of months to become a CSEP. As the first one in our office to finish the process, I was assigned to help my colleagues on their way. That activity was an interesting task for me in two ways. First, I helped explain the process we all followed in working toward becoming CSEPs. Second, I learned a great deal about how the offices, where I had previously worked (NASA, the United States Air Force, and several defense agencies in Washington, DC), did and did not comply with the INCOSE *Systems Engineering Handbook*. I now teach a CSEP test-preparation course within my company and continue to find that I learn something new about systems engineering every time I talk to a colleague about how their office is implementing the activities described in the handbook.