

Successful Systems Engineering Careers ***A Retrospective View***

INCOSE Chesapeake Chapter's Annual Holiday Party and Awards Ceremony
The Engineers Club at the Garrett/Jacobs Mansion
Baltimore, Maryland
December 10, 2021

Ronald R. Luman, Chief of Staff
Johns Hopkins University Applied Physics Laboratory

Attributes of a Successful Systems Engineer¹

- **Technical Depth**

- extensive experience and expertise in interdisciplinary engineering problems and solution spaces
- ability to “go deep” on the most critical technical elements

- **Technical Breadth**

- awareness of broad functional and domain areas
- deep and hands-on experience of SE processes and practices
- ability to develop and integrate a systems level solution
- understanding product development domains and product utility

- **Leadership**

- ability to inspire and motivate every member of the systems team
- passion to deal with complexity and solve problems
- uses data and sound logic to reach decisions
- demonstrated capability to make tough decisions

“Be bold, do great things, make the world a better place”²

¹Stephen Welby, IEEE Executive Director, INCOSE Annual Symposium, 2013

²Ralph Semmel, JHU/APL Director

Successful Systems Engineering Career

Phase 1: Establish a strong, deep technical foundation

- An “individual performer”
- Technical achievements in a particular application domain
- Usually while in one or just a few organizations
- Achieve individual and organizational alignment of values, mission, vision
- Learn from mistakes, while there is a safety net
- Note: It is perfectly well and good to stay in this phase for an entire career. The world desperately needs deep specialists.
- **Risk: Leaving this phase too soon, before deep expertise is established**

Successful Systems Engineering Career

Phase 2: Gain recognition as a systems engineer through breadth and leadership

Phase 2A: Develop Breadth (aka “technical peripheral vision)

- Interest in new, complex problems that require application of multiple disciplines to develop a successful system
- Deep understanding of interfaces, technology opportunities and limitations, and boundary conditions for the system at hand—beyond one’s assigned responsibility
- Reputation naturally begins to broaden beyond the home organization, depending on the scope and scale of the project(s)
- **Risk: Leaving this phase too soon, before you truly acquire that technical peripheral vision**

Successful Systems Engineering Career

Phase 2: Gain recognition as a systems engineer

Phase 2B: Demonstrate informal technical leadership

- Embrace achievement of impact for the mission, and to leave the project or organization better off than when you joined
- *Demonstrate the willingness to step up to important roles at risk*
- ‘Technical leadership’ inherently requires leading people, which does not come naturally for many engineers
- Better to be **called** to formal leadership (Phase 3) rather than to be or be seen as **seeking it too soon**
- Be self-aware. May still have “rough edges” or areas that still need work.
- **Risk: Leaving this phase too soon, before it has been demonstrated that people will follow you**

Successful Systems Engineering Career

Phase 3: Formal technical leadership

- Put your own success aside and set conditions for others to succeed
- High degree of personal risk compared to informal leadership
- Expectations of supervisors and staff are high
- Mistakes have a higher cost, both personally and organizationally
- Increasingly, leaders are operating without a net
- Rewards are great. Much more can be achieved with a team than by an individual
- **Risk: Leaving this phase too late. (Many get stale or burned out, etc.)**

Successful Systems Engineering Career

Phase 4: Mentoring and advising—a return to informal leadership

- Prepare the next generation
- After you have had some significant successes, made many mistakes, you will have learned many lessons that are worth sharing
- Requires a reputation for putting interests of colleagues and the institution first
- COVID has accelerated retirements, creating a severe loss of corporate memory and mentoring capacity
- Phase 4 can take many forms, and Phase 3 is not a prerequisite

Successful Systems Engineering Career

A four-phase model

Phase 1 Establishing a strong, deep technical foundation

Phase 2A Developing Breadth

Phase 2B Demonstrating informal technical leadership

Phase 3 Formal technical leadership

Phase 4 Mentoring and advising—a return to informal leadership

Be bold, do great things, make the world a better place