

Career of the Month

March 2016, Based on Interviews With Professionals Using Science in the Workplace

Luba Vangelova

Systems Engineer

Systems engineers coordinate with business owners, operations staff, and professionals, supporting a wide range of industries to ensure that products or services are well integrated and solve the right problems. Increased technology deployment is raising the demand for systems engineers, who see a system not only as technology but also as the people interacting with the technology. Anne O'Neil runs her own systems engineering consulting business.



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Work overview.

My favorite part of the job is working with people. No stakeholder has the full picture, so I help bring different perspectives together to paint a complete picture. I help clients recognize that their performance can benefit from introducing a systems engineering function. I then define the roadmap and strategy to do that and help put it in place.

I get involved when clients are first thinking about doing a project to help them understand what they're trying to accomplish. I get this information by

consulting with executives to understand their strategic goals and with operations and maintenance stakeholders to understand the operational needs and context of the project. I then define the high-level system functionality and performance requirements and convey this information to the design engineers, so they know what to design. As engineers work on their individual pieces, I continue to collaborate with them, ensuring that the design detail and interfaces are complete and coherent.

Systems integration problems tend to appear during the construction phase when systems engineering has not been

effectively applied earlier during the planning and design phases. For instance, when building a facility, the focus is on integrating such things as energy management and fire and security. You might want to monitor how much natural light enters and use controls to adjust the artificial lights or turn off lights or lower heat in unused spaces. If there are unclear or missing technical requirements, installers may have to make assumptions or stop construction to clarify them, and delays can be very costly.

Career highlights.

I am proud to have established the systems engineering function at New York City Transit (NYCT), the first transit authority in North America to formally do so. I led the systems engineering effort for the concept phase for subway upgrades covering two-thirds of the city. I was also profiled by CNN Money in 2009, when they named systems engineering the best job in America.

Career path.

I have always liked understanding why things work and doing art and design. In high school, I participated in a summer engineering and science program and got excited by the prospect of applied science and being able to make a difference. I got my undergraduate degree in electrical engineering with a focus on control systems.

After graduating, I worked on control systems designs in the power generation field. I later switched to the transportation sector, initially working on *intelligent transportation systems*, which look at the highway network as a system and use technology to improve capacity and reduce congestion.

As a principal communications



Systems engineering is critical for running a subway system.

engineer with the NYCT, I worked on subway expansion projects. I became involved with diverse project teams in which engineers of different disciplines developed integrated designs. After eight years as the NYCT's chief systems engineer, I launched my own consulting firm.

Knowledge, skills and training needed.

Study a traditional engineering field or applied math or science, get professional experience, and attain a graduate degree in systems engineering. It helps to have a solid grounding before moving up to a holistic viewpoint. It's also critical to develop written and oral communication

and presentation skills because there is so much interaction with various team members and stakeholders.

Advice for students.

I'm a people person. Although many teachers in high school suggested this wouldn't make me a good engineer, having good people and communication skills has been very beneficial for me in this team-based profession. I also highly recommend that people engage with professional societies, through which they will learn about best practices and keep abreast of their industry and peers. Also, find opportunities to meet and talk to engineers and get involved with

programs that help you better understand the opportunities in engineering. Internships are a great way to gain experience while attending school.

BONUS POINTS

O'Neil's education:

BS in electrical engineering and communication systems graduate courses, Tufts University.

On the web:

incose.org

Related occupations:

Architect, urban planner.

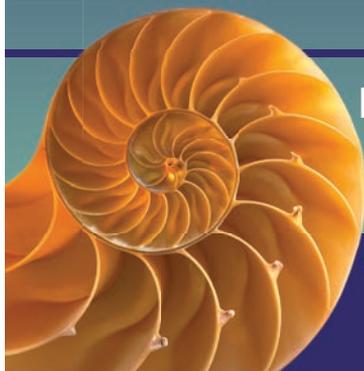
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