ISB Systems Education Experiences

BOEING

SYSTEMS THINKERS IN STEM

A CONVERSATION WITH:

CHRIS LAUSTED

WATCH CHRIS' VIDEO AT bit.ly/STIS_cl

SENIOR RESEARCH ENGINEER AT THE INSTITUTE FOR SYSTEMS BIOLOGY

Which systems thinking skills do you use?

#2: Consider the Wholes and Parts
A tumor is an ecosystem of interdependent parts. I try to understand the tumor by analyzing DNA, RNA and protein data.

#4: Consider Issues Appropriately
There are many ways to engineer a solution to a problem, and sometimes your first idea isn't the best one. Technology also must be designed with certain parameters in mind, like the size of the samples it will be analyzing.

#16: Use Leverage Points to Produce Effects
I use all of the systems thinking habits to create technology that can help answer biological questions.

1. **What is your role within the STEM community?**
   I am an engineer in the field of molecular biotechnology. I make tools that biologists can use to see and understand what is happening at the molecular level, such as instruments that analyze DNA and proteins.
2. **What complex problem do you address in your work?**
   I develop novel instrumentation to further scientific knowledge in the field of molecular biotechnology. I believe that better technology means better science. Just like the invention of the telescope opened up the exploration of space, the microscope and other biotechnology opened up the world of biology. The first project I worked on at the institute was building a DNA "printer." Instead of printing the 4 colors of an inkjet printer, it printed the four bases of DNA to quickly create DNA devices called microarrays, or "gene chips."
3. **What elements do you need to consider when addressing this problem?**
   I work for a nonprofit research institute so my work is not product-driven but knowledge-driven. This affects the reasons and the methods I use to engineer. I use systems thinking for all of my projects, including cancer. Cancerous tumors are made of many different types of cells, so I make network models from the collected DNA, RNA, and protein from all the different types. This requires technology that can measure all of these molecules, while using the smallest possible sample.
4. **How did you get to where you are today?**
   I have always loved engineering, designing, and building. My interest in engineering stemmed from tinkering on my family farm, where I built a small tractor from a pile of junk when I was a child. In college I studied mechanical and electrical engineering, but then took a course called Molecular Biology for Engineers which changed my perspective and drove me to implement biology into my career.
5. **What advice do you have for becoming a systems thinker?**
   Engineering is widely applicable, and can be combined with many fields such as agriculture, physics, and medicine. I regularly use computation, math, and coding in my job, and many STEM professions require these skills as well.