A System Model for Human Interactions

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In my previous Last Word article (RW February 18, 2009), I introduced the value of soft skills. It is now time to merge those concepts with hard skills by drawing upon our engineering training. While people and technology skills initially appear to be unrelated, they are both built from the same underlying principle: modeling complex systems and their elements to predict their behavior.

It took me 40 years to appreciate the value of soft skills. Having grown up in a household that did not emphasize soft skills, I did not know how useful they were. Both of my parents were trained as chemists and comfortable with the physical world. For us, people were unpredictable and mysterious.

While studying electrical engineering in college, I discovered that electrical and mechanical systems were easy to understand. Physical models were useful for predicting results, even with large and complex systems. Now, after experiencing life for half a century, I realize that people in a complex organization are nothing more than elements in a system, albeit a social system with its own rules and models.

Both a capacitor and a person have a state that arises from its history. When their history is combined with an input, they both produce an output. A model of a complex system has high predictive value if, and only if, the model embodies accurate rules of its elements. Rules for people and rules for hardware or software are very different but they are rules nevertheless that can be examined and codified.

Know Your Types

What are the rules for people in a social system? Each person has criteria for the kinds of transactions that will produce personal gratification and rewards. A nurturing engineer delights in helping others; a creative engineer thrives with the opportunity to push the state of the art; an obsessive engineer feels good when cataloging each detail of a project; a charismatic engineer thrives as a group leader. The list goes on. Depending on the individual's personal value system, when faced with an input, he/she will produce a response based on their personal criteria for enhancing well-being and comfort. The stimulus and response are tightly coupled for each type of personality.

There are many catalogs of personality types, and it is worthwhile getting a feeling for the differences. The web site www.personalitypage.com/personal.htm provides a list of 16 types based on the Myers-Briggs classification system, which includes Duty Fulfillers, Guardians, Nurturers, Caregivers, Mechanics, Doers, Performers, Artists, Executives, Scientists, Visionaries, Thinkers, Givers, Protectors, Inspirers, and Idealists. Which type are you, your supervisor, your spouse, or your best friend? You can click through on the

list to see a discussion of each type. Most of us are a mixture of a few with one or two dominating. Each personality type can be modeled.

The next step introduces the idea that every human interaction can be modeled as a transaction with multiple stimuli and responses. You do this for me, and I will do that for you. Your verbal output and body language are inputs to me, and I respond according to those input and my cognitive state. My response then becomes an input to your system. Social interactions are feedback systems. Even the most trivial discussion can be modeled as a feedback transaction where the choice of what, when, and how to speak is a component of a transaction.

Of course this becomes more complex in a group where each person is an element in a more complex system having multiple elements and a variety of transactions. But the social dynamics in a meeting are similar to a computer operating system with hundreds of modules connected to each other. There too, messages fly around giving the composite system predictable and useful results.

Watch and Learn

If my analogy between a computer and human system is correct, why isn't this obvious? The simple answer is that most of us find it difficult to both be an element in a system while simultaneously observing the system as an outsider would observe it. But one can learn to do both, which I call being "split-brained," by simultaneously participating and observing. The key element in playing this dual role is in slowing time so that you can observe both the system and yourself.

Without slowing time down, one is likely to simply act and react using the first choice that comes to mind without first exploring the likely consequences of actions and reactions. But if one stops for a second to compose a list of choices, one realizes that some choices are better for achieving the desired outcome than others. Should I say something immediately or remain silent, thereby giving someone else a chance to speak? Should I ask a focused question or should I lead an open brain-storming discussion? Which choice is best given my values and personality?

Most people do not slow time down enough to engage their rational neo-cortex in making decisions. The animal brain stem is fast responding, the neo-cortex is slow. Managing time is the key to learning soft skills, which is often nothing more than creating a list of choices, picking the one that matches your values, and then acting on that choice. By managing your relationship between your responses to stimuli, you in fact change the system because you are also in the social system.

It is now time for a neurobiology digression. While we each think of ourselves as a holistic and unified "me," in reality, our head is actually composed of dozens of brain substrates each of which communicates with other substrates. This communication is less than perfect. Our language substrate is only one of many and it only has limited information from the other substrates. Our consciousness is a bit like the dashboard of an

automobile, providing some information about the engine state but other information is hidden. For example, your language center has no input from the part of your brain that monitors blood sugar. You can observe that your stomach is rumbling, and you can infer your need for food, but there is no direct input from the substrate that regulates energy.

Nature evolved a brain system that optimized survival, not conscious awareness and rational thought. Under real or imagined pressure and threats, our fast responding emotional substrate controls behavior. If our ancestors perceived a threat, immediate action was required; for example, choosing among the classical fight, flight or freeze response. Thinking takes too long. Activating biological readiness is entirely unconscious and virtual instantaneous. If you are interested in what modern science knows about the system in your head, read Robert Sapolsky's book, *Why Zerbras Don't Get Ulcers.*" Even if you only scan the text, as an engineer, you will come to appreciate that our brain is also a complex system composed of multiple elements each of which follow simple rules.

Let us explore the implications of our new model in the context of a meeting among engineers and their manager. Each person in the room is actually a few dozen brain substrates each of which can and does communicate with the other substrates in the room as well as with internal substrates.

The tone of voice arises from a different substrate than the rational engineering content and is received by other substrates. A logical argument may be composed by the neo-cortex but the auxiliary emotional channel is also transmitting our internal emotional state. The listener decodes both the content and auxiliary channels. The emotional channel might hijack the content if the suggestion seems to be a threat to career advancement. However, the speaker may incorrectly assume that only the rational substrates of his colleagues are receiving the input.

All interactions with people are always taking place on two channels: rational and emotional. None of us can shut down the emotional channel regardless of our desire to do so. Emotional broadcasting is an always-on transmitter. We and the other mammals evolved that way.

Recognize Emotions to Build Soft Skills

Engineers and scientists love to assume that professional conduct should be stripped of emotions so that a rational dialog results. Oddly enough, medical evidence now shows that emotions are even required for such simple tasks as driving an automobile. Those with injuries to their emotional substrates cannot do the simplest of tasks. Take a simple example. You are driving along and see a child in front of the car. Without emotions, the driver would not care if he hit the child, or if he crashed into a parked car. Emotions are simply the answer to the question: why should I care? If you do not care about anything, you cannot function. It takes many brain substrates to be a human being.

With practice, one can be proficient at recognizing the interactions between people. For those without an intuitive ability to observe such interactions, one can spend a little time

learning the skill so that it eventually it becomes automatic. During your next meeting, take a few minutes to quietly analyze the interactions, and then make a system model of what you observed. You may also notice how different stimuli produce different responses, not unlike a technical system. Devote at least 50% of your attention to the emotional channel.

If hard and soft skills draw upon the same system techniques, why are engineers known for not having good soft skills? For me the answer is two-fold: (a) elements in a social system have different rules that hardware and software elements, and (b) we are each in the system that we are observing. With a little effort, an engineer can learn to adapt their skills to handle both issues.