

Simple Scales

Years ago, I taught a night course in electric power engineering for grad students. Most of the them had a good working knowledge of linear circuit theory. Linear circuit theory was what they learned as undergrads. It was essentially simplified direct current circuits. Sure, the instructors would throw a few wrinkles, but it was easy. The circuits were your simple battery connected to a light bulb sort of stuff. The problem with electric power circuits were two: they weren't linear and they were extensive. Compare the simple battery light bulb circuit to the massive electric grid. To solve the light bulb circuit, the most math you need was ninth grade algebra. To figure out heavily loaded power lines, you have to solve perhaps the most complicated math problem ever faced by Good Will Hunting.

The solution consists of solving thousands, perhaps millions of simultaneous, non-linear, differential equations.

Hardly ninth grade algebra.

Consider that I had to teach weary, sleepy, night school students, who had just spent all day working their day jobs, how to calculate the power flow of an electrical grid. So rather than slog through the theory of how to solve differential equations, I opted to have the students relate to their understanding of how the grid actually works. I chose to simplify the conversation to match their understanding. Then once they got that, the math would follow.

I choose simplicity over complexity, because sometimes complexity masks real understanding.

The director of software development at Esri, Scott Morehouse's favorite expression is "Simple Scales, Complex Fails". He used this statement as his mantra for the development of software. Clearly, software development is complicated. In addition, many aspects of GIS is complicated as well, but he always drove his team to do what I did in that night class years ago. Try to explain things as simply as possible, then the level of understanding scales. He also understood that complex software, while it might work in the lab, tends to become bogged down and doesn't work well – doesn't scale well with large data sets. ArcGIS's portal technology, the ArcGIS platform is great example of simplicity and scalability. As more and more people use GIS in their everyday work life, scalability become just as important as functionality, maybe even more so.

I recall a situation working with a brilliant electrical engineer from a third world nation. He asked if we could model a complex control system in electric substations with GIS. I asked him what the problem he was trying to solve. He described several scenarios in which the control system took incorrect action when faced with a failure in the power system. In effect, the system tripped out a larger section of the grid than was necessary. He had devised in his mind that modeling the control system in GIS could help diagnose and ultimately correct this intermittent problem. I told him it was possible, but to me it seemed a bit overkill. I asked him what was the biggest problem facing their company. He then asked what I meant, from an engineering perspective or something else. I followed up with that I was asking in general, taking the electric company as a whole, what your company's biggest problem was. He came up with a several things, such as data was bad, engineering standards were lacking and they had a variety of inconsistent operating practices. I continued to press, asking for something more dramatic. He finally asked me, well you don't mean like 60% of our customers don't pay their electric bills? Is that what you meant?

Exactly.

He was focused on trying to solve very complex technical problems using GIS, when the big problem was people not paying their bills. It was a tough problem, but not a complex technical one. A simple mapping of the intensity of this problem could help the company attack this problem in a much more deliberate way. The company had never done this. This simple use of location technology could have an order of magnitude more impact on the company than modeling something as complex as a substation control system.

In my years working in the utility business, it is often the simple problems, the non-elegant ones that are the toughest to solve. In 2009, Esri did a survey called “Is Your GIS Smart Grid Ready” One of the questions was this: “After the completion of construction/maintenance, how long does it usually take before your GIS data reflects the new construction/maintenance information?” The majority of responses were between 30 and 90 days. What? Why is that? The simple answer is that the authoritative data takes too long to get to the right people.

What if, authoritative information could be made available to every employee and contractor at any time, on any advice from anywhere? Then the answer to the question posed in the survey would rightfully be seconds. Simple. Just getting information to everyone is such a simple solution, but it’s been tough and elusive for many companies.

That’s what the ArcGIS platform and specifically, ArcGIS for Electric and Gas Utilities does. Simple stuff. It provides an easy way to share, communicate and collaborate. Sure, we can do a lot more with the platform. We can model all kinds of departmental workflows. But at it’s heart the platform provides the sophisticated modern technology that gives the users a simple way to just get the information out and back when and where we need the most – right now, not 30, 60 or 90 days from now.

So the next time you feel like sitting down and cranking out the solution to simultaneous, non-linear, differential equations, think twice, solve tough simple problems with the ArcGIS platform.

See all the great technology deployed in simple and impactful ways at Esri’s International User Conference. Be sure to attend the electric and gas kickoff session on Tuesday morning July 21st at 8:30AM in the San Diego Convention Center. See how simple scales.