



Technological Improvisation

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If our ideas about the outside world are correct, our technology will work well. If those ideas are wrong, we're likely to see results we didn't anticipate.

We know from practice that a screwdriver is a mediocre hammer. Yet screwdrivers are often used as hammers and, in certain circumstances, achieve the same results. When we use a common tool in an uncommon way, what determines success and who gets the credit for it?

One Sunday morning in New York's Penn Station, Twitter became a common tool in an uncommon setting. I was waiting for a train when the announcement board displayed the message "train delayed." A moment later, the text changed to "service suspended."

None of the train personnel could explain the meaning of the message. Everyone in the crowd had some strategy for how they should behave in this unanticipated situation, which mostly involved four basic steps: gather data, assess the options, make a plan, and execute the plan. Most quickly moved to the ticket line to ask what they might do. A few skipped the first two steps, decided their plan was to yell at someone, and quickly began to execute it.

I started gathering data by turning to Twitter. I searched a half dozen

hashtags before finding a few tweets about a derailment south of Philadelphia. This would end service for the rest of the day, so I started looking at other travel options. A rental car was too expensive. Airplanes were too complicated for a Sunday morning. A third option, an economy bus that shuttled students up and down the East Coast, was more promising. As it happened, I had walked past the bus station the day before. Within an hour, I had a ticket and was speeding my way home.

In my retelling of the story, Twitter got the credit. I run in a circle that's familiar with Twitter but believes it to be solely the domain of the nerdy youth and bombastic presidential candidates. None of them know how to use Twitter and all were impressed that I got something useful from it. However, my story probably gave Twitter more credit than it deserved. The happenstance of finding the bus station was at least as important as the role Twitter played.

In fact, the most important element of the story was likely my tendency to improvise with technology while gathering data and assessing my options. For a software person, I am remarkably undisciplined about these things. Push a button here, add a line of code there, follow the data, and see where it goes. Like all great improvisations, my strategy had more structure than it might

appear. Without structure, improvisation is mere "Chaos and old Night." As I stood in the station staring at my phone, an internal voice was telling me to gather data before I assessed the situation, and to assess before I planned.

Mostly, we engineer technologies to work in engineered environments. When we deploy the tools of big data, for example, or the Internet of Things, or even autonomous vehicles, we talk of frameworks and assumptions and interfaces with the outside world. If our ideas about that outside world are correct, our technology will work well. If those ideas are wrong, we're likely to see results we didn't anticipate.

When I returned to my class that week, I listened to a guest lecturer tell my students about the accomplishments of artificial intelligence. As he discussed expert systems, autonomous cars, and game-playing systems, he mentioned that all these devices operate in engineered environments. The technology is based on certain assumptions about the world in which it will operate. I don't think many in the room caught the subtlety of the argument, instead assuming that they should be able to use every form of complex technology in any way they desire. Should an autonomous car help solve a relationship problem or a facial recognition program help guide them across the country, they would gladly take the credit for turning a screwdriver into a hammer and getting a result that was better than expected. ■



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