AIA Michigan

PERSPECTIVES

Driven by Technology

Karl Daubmann, AIA, Lawrence Tech University, DAUB

Key Points:

•Technology is changing the activities and relationships in the AEC industry and there are many parallels in other markets from which we can learn.

• Automation of certain activities might allow us to focus on other high-level activities like creativity.

Karl Daubmann, AIA, is a registered architect with a record of distinguished projects inspired and driven by his interests in design technology, manufacturing, and multidisciplinary design. Daubmann began the DAUB research studio in 2012 as a means to focus on those preoccupations. He is a Fellow of the American Academy in Rome. He is currently Dean and Professor at Lawrence Technological University.

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The thought of driverless cars was never on my list of desires, until I began commuting. My drive to work used to be 2 miles (if I drove) but now it is 40 miles each way. Before this change, driving was a deliberate activity that often brought joy, now it is necessary action and out of my control. This change in lifestyle has given me an opportunity to listen to books on tape, refine my perspective on technology, and ponder issues like the driverless car. Now that driving is a chore, I'd happily outsource its automation. This change in my thinking about driving has lead me to consider design technology and how our industry is evolving technologically.

In Marty Neumeier's book MetaSkills: Five Talents for the Robotic Age, he discusses what he calls "the robot curve" and makes the case that any activity that can be pushed toward automation will be. Rather than seeing this in the context of losing jobs, he positions this technological pressure positively by interrogating the uniquely human skills that we can leverage; the highest being creativity. Given my role in design and education, this positioning of creativity in our Knowledge Economy is an obvious opportunity. My research has been moving into areas of manufacturing, robotics, and automation. I've been examining how these topics are transforming what we do as designers and architects and how it is changing our responsibilities and contractual relationships. In robotics, there is a similar paradigm to Neumeier's robotic curve called the five D's of industry. These D's are the initial and appropriate tasks for automation and robotics: dull, dangerous, dextrous, dirty, and domestic. As my commute moved from a joyous activity to one of dullness and drudgery, I began longing for autonomous driving. Considering the five D's in our own work might simultaneously help us to consider aspects of automation in design and construction but also help us identify where the truly creative activities reside.

As an interesting case study, I had a recent opportunity to tour a dairy farm in the thumb of Michigan that has been operated by the same family for more than three generations. A recent change on the farm is the four robots that milk the 350+ cows. Cowbells have been replaced

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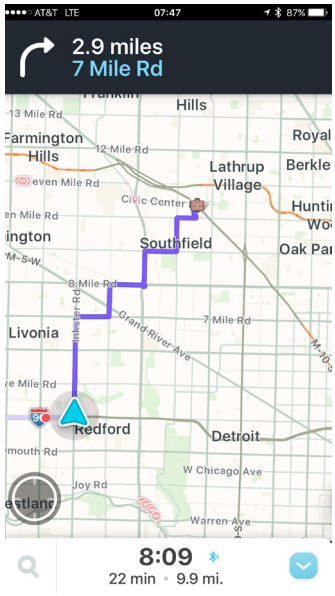
by "fit-bits" and as the cows line up to be milked, the robot uses a laser scanner to locate and position the 4 individual suction cups. Now the cows also line up themselves when they want to be milked. While this robotic application certainly demonstrates the application of the five D's, it also highlights the way that various industries are making use of technology. We've known about robots in the automotive industry for some time, but I was surprised by the level of complex technology this dairy farm incorporated. Beyond milking, the farmer has a digital dashboard that tracks data on the activity, health, and milking characteristics of each cow. The farmer is able to tweak the numerous inputs in response to feedback. Beyond the clear parallels to a design process, the transformation to a high-tech farm brought new opportunities to the overall business model. New technologies might allow us to change long-held business models in our industry and rethink contractual relationships in hopes to provide better products or a higher level of services to our clients.

We've become accustomed to an onslaught of data and we rely on data to make decisions. I follow two sports and I'm amazed at the amount of sensors and terabytes of information generated by the individual "boats" in the America's Cup and the "cars" in Formula 1. The data is streamed live to engineers around the world who are helping to make split second decisions during a race. The collection of data in these industries is inexpensive while the interpretation is high-level and carried out by those with experience. Many architecture and engineering firms are collecting data from their finished projects to offer feedback during the design of future projects. This approach will become more commonplace and should begin finding its way into BIM software packages. As a designer places, a smart part in BIM it should be able to tell you the cost and energy implications of doing such. On a broader scale, Helsinki in Finland has a city-wide digital planning platform that allows decision makers to simulate the energy impact of future construction on neighboring buildings. Imagine the types of data that would be helpful to you to make design or business decisions.



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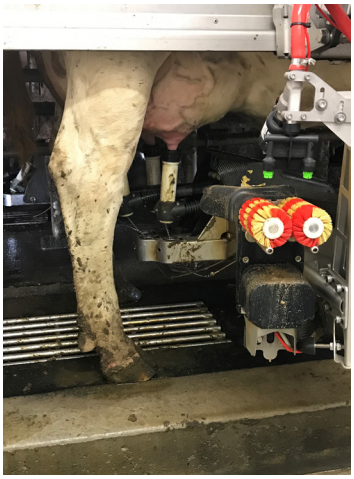
Another key phenomenon that I understand much better because of my commute is the network effect. This comes from economics and is when a product or service gains additional value as more people use it. If I drive home late at night, the data available to my traffic app is not as robust as it might be when there are more people on the road. I trust the traffic app more when there are more people feeding it input and as a result it is more valuable. Rhinoceros (or Rhino for short) is an example of design software that has advanced because of its open approach taking advantage of the network effect. Tapping into advanced users and letting them write scripts and develop plug-ins has pushed the capabilities of the program into many interesting new places and added incredible capability beyond what the developers imagined. As these ideas become more widespread designers will be responsible for the design of buildings and the tools they use.

For those designers educated before computers, the phrase "drawn-by-hand" has a meaning of working with pencil and paper. Lately, I've heard young designers using the same term—but with a different meaning. They are using the computer. To them, "drawn-by-hand" means the act of drafting in software where there is a one-to-one correlation between a movement or click of the mouse with that which they view on the screen. This drawn-by-hand approach is in contrast to automation, macros, scripts, or plug-ins that generates the geometry by leveraging the processing power of the computer. While I would never consider design to fall prey to the five D's, there are aspects that are taking advantage of digital automation.



I don't always follow the directions of my traffic app or my GPS. When I don't follow it, I know something that it doesn't or I have a preference about a particular route. The nice thing is that it adapts and re-routes based on my decisions—we have an understanding. I'm curious how you might be leveraging different forms of technology to advance the design in your office, to bring increased efficiency on site, or to open up new avenues for new types of work. Given my role as Education Director on the AIAMI Board, Dean of the College of Architecture and Design at LTU, and technology thought leader, I would like to find ways that the profession and education might advance these ideas and identify new areas for design, construction, and research collaborations.