The Slow Automation of Knowledge Work

By Thomas H. Davenport

Today I was sitting in my office (well, Starbucks to be precise) writing the first chapter of a new book on "knowledge work automation" and "automated decision-making." I've been gathering content on those topics for a few months, and so I searched my computer for those phrases to find all the documents I had collected. The result was depressing, in that the search turned up some documents from a previous writing effort. About a decade ago, I was apparently sitting in my office writing about "knowledge worker automation" and "automated decision-making." It was for a book called Thinking for a Living.

That book came out in 2005. Here are a couple of excerpts, in case you missed it (and given the only middling sales of the book, many of you apparently did).

The shortage of managerial time and analytical expertise that hindered the rise of decision support may be behind the rise of a new trend that holds the promise of realizing that dream, at least to a greater degree. With today's lean organizations, few knowledge workers have the time to delve deeply into data analysis, or to learn the intricacies of a decision support system (DSS). Instead of employing a DSS, many organizations are beginning to ask the system to make the decisions for them. Automated decision-making systems are penetrating a wide variety of industries and applications, and are taking over previously human decisions at least up to the middle management level. As I mentioned above, they also tend to be appropriate for middling levels of expertise and collaboration. With this approach, organizations can speed decision-making, and lower the requirements for highly-educated and expensive decision-makers. This is not a new idea—it first took hold, for example, in "yield management" systems in airlines that made automated pricing decisions in the early 1980s—but the applications for the idea are expanding significantly. Sometimes called "in-line" or "embedded" decision support, the concept might be described as the intersection of decision support and artificial intelligence, or the "industrialization" of decision support….

…[a few pages later] But the same constraints of time and expertise that limited decision support's rise will probably mean that few humans will be looking over the shoulders of automated decision systems. This will undoubtedly lead to considerable changes in how organizations view knowledge-intensive activities, and in the labor market for analysts and mid-level managers. Thus far automated decision-making has been largely invisible to the public, but it may lead to a quiet revolution in organizations and societies.

Let's first say that I was a little overly optimistic. In the 10 years since I wrote these words, it doesn't seem that a "quiet revolution" has taken place—or if it has, it was too quiet for me to catch it. If "highly-educated and expensive decision-makers" have been reduced in number, I haven't noticed. I would say that the "labor market for analysts and mid-level managers" isn't growing, but

it isn't shrinking fast either. What is the problem? Or maybe in fact it is a good thing that the need for us knowledge workers and decision-makers seems to be relatively persistent.

This issue is of great importance for organizations like IBM Corp. that are pursuing "cognitive computing" (in their case, Watson) to a large degree. There are many lessons that could be abstracted from Watson's success with the Jeopardy game, but to me the primary one is that if we set our minds to it, we can make a machine that is better than humans at almost any knowledge-intensive task. If we can make a machine that beats the best humans in answering the clever questions (actually answers) written by Jeopardy's writers, we could do the same for cancer diagnosis, equities trading, selling consumer goods, and the many other uses to which cognitive computing is being put.

IBM is expecting $10B per year in annual revenues from Watson, but what if the same factors that prevented my decade-old predictions from coming true still apply? There are many behavioral and cultural issues that might explain why knowledge work automation and automated decision-making have been so slow to take off, such as:

- We haven't had good measures of knowledge work productivity and performance (another point in my decade-old book), so we don't know how much it's worth to invest in improving it with automation;
- Knowledge workers' jobs may be too contextual and variable for a computer system to do all they need to do;
- Knowledge workers may resist using or cooperating with machines that could take away their jobs or important tasks within them;
- Companies are worried about putting important decisions into a "black box" that can't be easily understood or changed;
- The knowledge necessary to perform a job or make a decision may change too rapidly to be successfully embedded in a computer (a common problem with earlier artificial intelligence applications);
- Knowledge workers and decision-makers are too important and powerful for their employers to risk fooling around with their jobs.

Some of these impediments are probably factors in Watson's slow takeoff, as described in this WSJ article. But it's not just Watson; there are a variety of other cognitive and analytical technologies that are focused on automation of knowledge work, and a 2013 McKinsey Global Institute report suggests that they will lead to "sweeping changes in how knowledge work is organized and performed…it is also possible that some types of jobs could become fully automated."

The IT industry is clearly betting on knowledge work automation in a big way. But if my recent discovery of the slow pace of such change is any guide, it will take a lot more than technology to put knowledge workers out of business. We may have better technology for cognitive computing than ever before, but we seem to need more than that to feel confident in putting the computers completely in charge.

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