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Building Your Cognitive Technology Architecture

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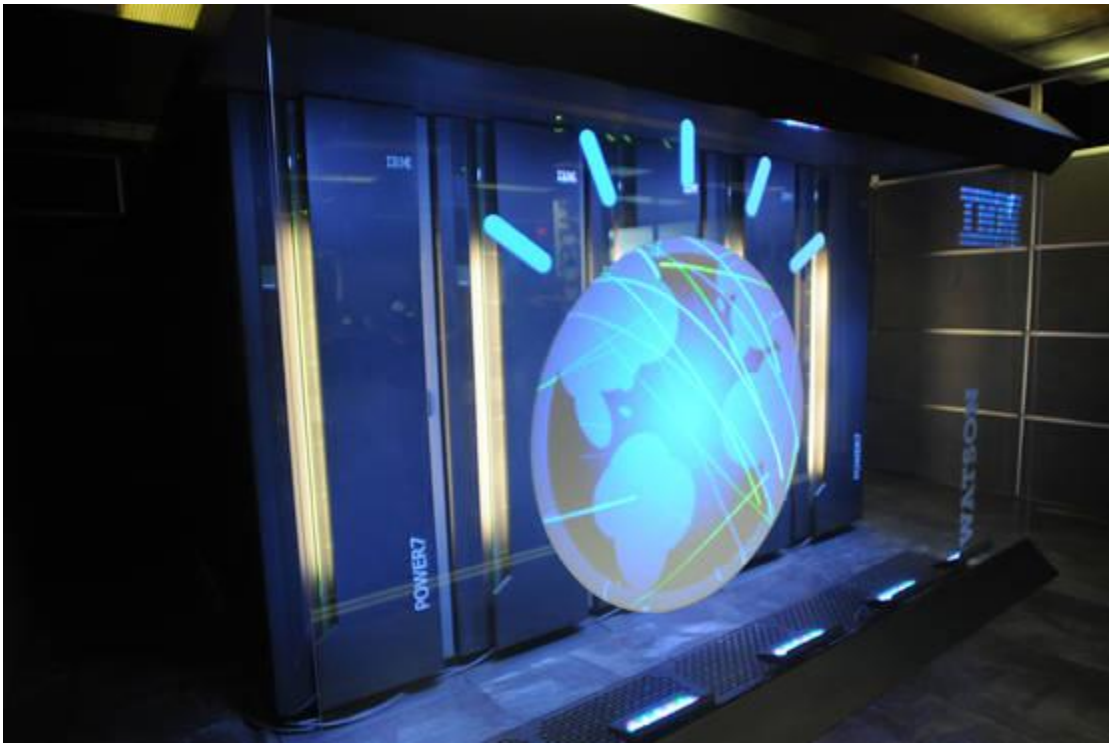

A 2011 photo ot the IBM computer system known as Watson. Associated Press

Most organizations that are exploring cognitive technologies—smart machines that automate aspects of decision-making processes—are just putting a toe in the water. They're doing a pilot or "proof of concept" to explore the technology and how it fits into their business. Rajeev Ronanki, a Deloitte consultant who works with IBM Corp.'s Watson and other cognitive technologies, told me recently that virtually all of his clients want to start with a small step:

They want to make sure that it's not science fiction before they really commit to the technology at full scale. So the first project is typically a pilot that takes four to six months to develop.

The good news is that this technology is not science fiction, but rather something from which organizations can benefit today. Chances are good, then, that organizations will want to create architectures for cognitive technologies that support more than a single application. In fact, I believe that it won't be long before sophisticated organizations set out to build "cognitive architectures" that interface with, but are distinct from, their regular IT architectures.

This is the way that key vendors in the area are moving. IBM, for example, has disaggregated Watson into a series of modular services—a "cognitive platform"—that are available by subscription in the cloud. The original text analysis services of Watson have been augmented

by Watson Analytics for analysis of numbers, “Personality Insights” for analysis of human behavior, “Visual Recognition” for image identification, and so forth. Watson doesn’t have all the cognitive services that an organization might want—a rules engine, for example—but I would guess it would be available over time (especially since IBM owns a good one in ILOG—it’s just not a Watson service yet).

Other vendors are taking this modular approach as well. Cognitive Scale, an Austin-based cognitive technologies company founded by several former Watson developers (including Manoj Saxena, the first general manager of the Watson business unit at IBM), offers a “cognitive cloud” that integrates a variety of cognitive applications. It views this capability as a “cognitive operating system” that would function like Windows for a variety of cognitive apps. All of these apps employ machine learning to improve the quality of the output.

Some other vendors are combining cognitive technologies with other common tools. RAGE Frameworks Inc. is focusing on the combination of cognitive and application development tools. Their belief is that companies will need to rapidly develop applications that integrate cognitive tools and data with other functions (even including extracting information from paper files) within a business process. There are 20 different “engines” to choose from, and I gather it’s pretty straightforward, for example, to combine a data access engine, a computational linguistics engine, and a messaging engine in one application. RAGE has been a quiet success story, with blue-chip customers in several industries like financial services.

Given that the world is moving in this direction, what should users of these technologies look for in developing an architecture? It seems to me that it should have the following attributes:

- Able to handle a variety of data types—Cognitive insights don’t just come from a single data type—text, for example. In the future we will be combining text, numbers, images, speech, genomic data, and so forth to develop broad situational awareness.
- Capable of learning—This should be the essence of cognitive technologies, but some systems today (e.g., rule engines and robotic process automation) don’t improve themselves. If you have a choice between a system that learns and one that doesn’t, take the former.
- Transparency—Humans and cognitive technologies will be working together for the foreseeable future. Humans will want to know how the cognitive technologies came up with their decision or recommendation. If they can’t get into the black box, they won’t trust it as a colleague.
- Offering a mix of human roles—Today some cognitive technologies, like most industrial robots, assume that they are in charge once programmed. Others, like surgical robots, assume that the humans are in charge. In the future I think we will need a variety of control modes. Just as in autonomous vehicles, there needs to be a way for the human to drive at some key points in the road.
- Ease of updating and modification—One of the reasons why rule-based systems have become successful in insurance and banking is that the rules can be modified by business users. But modifying and updating most cognitive systems is a task only for experts. This needs to change over time.
- Strong reporting capabilities—Whatever companies do with cognitive technologies, they will need to inform the rest of the organization about it. I’ve talked, for example, with several “programmatic buying” companies that buy and place digital ads, and they say their customers insist on high-quality reporting, and want to slice and dice their data in many different ways.

- General IT hygiene—Cognitive technologies will need all the attributes of modern information systems, including a strong user interface, good data security, allowing multiple simultaneous users, and so forth. Companies will feel little desire to sacrifice these objectives in the cognitive space, and they won't have to.

The emergence of cognitive architectures is an indication that this new technology has general utility and is being taken seriously by the market. Someday perhaps even the most prosaic transactional systems will also have cognitive capabilities. For the next decade or so, however, companies will have to build separate—but connected—architectures for truly intelligent computing.

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