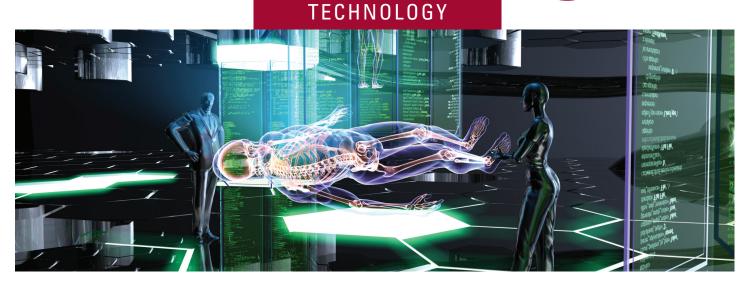# Trustee Insights

Artificial Intelligence: The Next Revolution in Information Technology

Boards need to understand artificial intelligence to evaluate its evolving benefits and risks

BY JOHN GLASER

Artificial intelligence (AI) is coming to every health care organization – or most likely is already there in multiple forms. What does a hospital or health system board need to understand about AI in order to make informed decisions?

Those who have served on boards long enough may recall similar discussions when the internet first came up. What is this new technology? What benefits and risks does it carry for our organization? How about this "website" that the marketing department wants funding for? Almost a quarter-century later, the internet has permeated every facet of every organization's business, bringing benefits and risks that no board could have begun to comprehend the day it first became aware of the term. (Anyone want to go back in time and try to explain patient portal apps, health information exchanges, or ransomware to a health system board circa 1994?)

AI is at a similar point now – just beginning to make noticeable inroads on everyday life, but poised to transform every aspect of medical care and the health care

field in ways that no one can truly anticipate or plan for. Aspects of AI may already be built into your building controls, medical devices and equipment, billing systems, and electronic health records. Each new generation of products will bring new capabilities and new vulnerabilities.

Most board members probably use AI more than they think. Perhaps they have commanded Alexa to call them an Uber or turn up the heat, or asked Siri where to find the nearest

steakhouse. Or their Subaru has slammed on its own brakes to keep them from a rear-end collision. Or Amazon has made helpful, spookily accurate shopping suggestions.

AI is everywhere, but at the same time it's nowhere in particular. Boards may not need to develop a formal "AI strategy," or approve a purchasing decision for AI as such. But they will have to understand enough about how it works to be able to evaluate its benefits and risks – both of which will evolve as AI becomes more sophisticated and ubiquitous. To that end, here is a primer.

AI 101

AI is formally defined as "the study and design of intelligent agents," or computer systems that perceive their environment in some manner and respond with actions to maximize their chance of success – activities generally associated with intelligent beings. "Success" can be parking within the lines, appropriately identifying impending equipment failure, or correctly interpreting a radiology image.

AI is an umbrella term that can cover a range of capabilities: voice recognition; contextually aware interactions (for example, "people like you bought these products"); pattern identification (for example, modeling traffic-light sequences to minimize rush-hour slowdowns); or complex process automation (for example, extracting information across multiple systems and documents to create an accurate bill).

The idea of AI has been around since the mid-1950s, initially as a sci-fi conceit and then as an ever more sophisticated Holy Grail for computer scientists. Only now is it starting to play a noticeable role in daily life, however. Why? Because we finally have an "ecosystem" that can support it.

All new technologies need an ecosystem to give them traction. Cars needed roads, gas stations, traffic laws, and people who wanted to go places. Mobile devices needed small but powerful chips that wouldn't overheat, as well as high-speed wireless networks, location awareness, long-lasting recharge-

able batteries, and an abundance of easily accessible apps.

AI needed and now has:

● **Processing power.** Computers keep getting more powerful and efficient, and programming techniques like deep learning are enabling them to handle information the way brains do. Millions of computers can work together to tackle the most complex computations. Cloud services allow any individual or enterprise to tap extraordinary amounts of storage and processing capability on demand.

● **Environment-awareness technologies.** Highly miniaturized and specialized sensors and the "Internet of Things" can generate data for, and execute instructions from, AI-enabled systems. Advances in packaging can place them almost anywhere, from outer space to inside the body.

● **Staggering amounts of very diverse data.** From the human genome to web browser cookies to cellphone traffic to CT and MRI scans, we have more information than we can understand unaided. We currently generate 2.5 quintillion bytes per day – and that number is not going to shrink.

● **A demand for insight.** The more we realize we can know, the more urgently we need to know it. Is our car going to break down? Can our network be hacked? Is this a stolen credit card? Am I going to enjoy this movie? Or my upcoming date with this new person? As a society, we have moved from being slightly suspicious of AI to being impatient that it can't do more, and more quickly.

● **Maturity of business models.**

Across all sectors, organizations that provide products and services are beginning to understand how to leverage AI to improve their offerings and make them more competitive. AI adds value in all kinds of ways, from equipment that alerts users of impending failure to shopping recommendations for a spouse's upcoming birthday.

How AI Transforms Health Care

As a field awash in information with a life-or-death need to understand it, health care is ripe to benefit from AI. Certain forms of AI have been built into EHRs and other clinical computing systems for years, under less sexy names like "decision support." Predictive algorithms can identify patients at high risk of readmission, or give early warning of impending sepsis. Care guidelines and protocols trigger reminders for clinicians to order certain tests or schedule follow-up appointments.

We can expect AI's abilities to develop rapidly in the following realms:

● **Extraction of data and structures.** The ability to "understand" natural language, images, and video will allow AI-enabled systems to extract quality measures from clinical data; make treatment suggestions; and auto-reconcile inconsistencies, gaps, and errors in clinical data. For example, machines can read the bits from digital imaging directly, without the need to generate an image that a radiologist could read.

We are in the early stages of these capabilities; computers still make significant errors when trying to distinguish signal from noise, or

an organ from a tumor. But AI could potentially catch details that elude human readers. AI can look for patterns in data and identify whether a patient's medication should be changed, which patients might be candidates for a beneficial off-label use, and how social factors may be affecting a patient's health and the effectiveness of a care plan.

● **Cognitive interaction.** AI-enabled EHRs will understand context. They will tailor the presentation of patient data and care recommendations, based on an analysis of the patient's conditions, the caregiver's preferences, the patient's preferences, the evidence, and insurance requirements. This tailoring eases the cognitive burden on the clinician. Contextual awareness will also improve the systems that patients and consumers use directly, so that they offer the most appropriate information in an easily understandable form.

● **Operational process models.** AI-enabled systems will take population health planning to the next level, tweaking care plans on the fly based on individual and community changes – events such as the death of a patient's spouse that might trigger a depression, or a jump in pollen count that increases the risk of attacks for all the neighborhood's asthma patients. AI-enabled systems will also monitor the flow

of patients through the hospital and streamline activity: for example, delaying the transportation of a patient to radiology until the phlebotomist, one floor below, can complete his rounds.

● **Clinical models.** Predictive analytics will increasingly be used

across a range of situations – readmissions, transitions of care, financial clearance, and medication compliance – and AI will allow analytics to learn and improve. Best practices for patient care will be refined through machine learning (based on EHR, claims, and device data), which will identify what works and what doesn't. Constant monitoring of the data will keep the best practices current.

Health care AI will also show up in more mundane forms: for example, in medical equipment and devices that can monitor their own health and let technicians know

when they need maintenance, replacement, or reconfiguration.

AI and the Board

Hospital and health system boards will have to walk the same thoughtful path with AI that they did with the internet and its related technologies: open-minded enough to seize the benefits and not be left behind, but not so credulous that they fall for every AI sales pitch that comes along (and there will still be many).

Several core observations can guide the board's assessment of the impact of AI on the organization's strategies and plans:

First, AI as a human-like, general-purpose intelligence is over-hyped and years away. As a recent article in the *Harvard Business Review* observes, IBM's Watson was supposed to be the oncologist's best friend, diagnosing cancers and choosing the best treatment path from hundreds of options. More than $60 million and four years later, test site MD Anderson Cancer Center put the project on hold for lack of satisfactory progress and tangible results. However, AI for very targeted purposes is real. Risk-predictive algorithms have averted unnecessary hospitalizations, and sepsis detection algorithms have saved lives.

Second, AI enables products and services to be more efficient and effective, but it is not something that the vast majority of health care organizations buy directly. Hence, the board must assess how AI improves the performance of something else: EHRs, medical equipment, or building controls.

Third, as with the internet and mobile devices, the impact of

AI will play out over years, even decades. The board must ask the same types of questions that it asked about the internet – and must keep asking them as the technology evolves.

Fourth, boards must be cognizant of AI-related risks, even if they can't understand or anticipate each one. Just as the internet brought hacking, viruses, and ransomware, AI will present new challenges to health care.

For example, AI is always based on some underlying logic or rules. If those are faulty to begin with or not kept current, what dangers might they present to the organization or its patients? And whose fault is it if the systems cause an adverse event? It may seem as though the supplier of a system ought to bear

the liability, but the "supplier" of the underlying logic may be several steps removed from the vendor who sells the product. And it might also prove difficult to distinguish consistently between system failure and user behavior.

Board Discussion Questions

Just as it did with the internet, the board can ask management to present an overview of AI and its potential role in furthering the organization's strategies and plans. During the discussion, here are some questions to ask:

- Will AI cause us to alter any plans for our major initiatives and, if so, how?
- What new opportunities will AI-enabled products or systems present?
- What are the risks? Who is responsible if the AI behaves unexpectedly or is hacked?
- How have these capabilities been tested, and by whom? What was the result?
- How do we need to educate our clinicians or other staff?
- How will the board be kept informed of new developments and issues as the technology evolves?

AI will have the same profound impact on our lives as the internet and mobile devices. Boards need not understand the technology in depth to ask, on a regular basis, how it can be used to advance the organization's mission, strategies, and plans.

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