The Elusiveness of Smart Healthcare

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TWELVE YEARS AGO I noticed something remarkable on a maternity hospital administrator’s desk. It was a paper with handwritten names, which she highlighted in yellow as each parent submitted a form. This caught my attention because in front of her was a PC connected to a feature-rich, widely used enterprise resource planning (ERP) system.

Fast forward to 2017. I again find myself in a hospital room, where I see a nurse carting a slick-looking portable diagnostic station. She uses it to measure a patient’s blood pressure, temperature, and blood oxygen saturation. The station, featuring a touchscreen on the front and an Ethernet port on the back, obviously has more communications bandwidth, CPU power, and storage than NASA’s entire Apollo moon-landing program. Yet, to my amazement, the nurse scribbles the numbers on a paper scrap for later filing.

Mind the Gaps

Beware of the gap between what works in a research lab and what delivers beneficial clinical results in practice. Medical researchers are intimately familiar with this disparity, and good reporters are always careful to present the caveats of health research advances. In software engineering, the chasm between research and practice isn’t internalized. An important reason for this is that the commercialization of research ideas typically happens through startups or large enterprises that rarely keep close contact with academic labs. Also, although medical researchers have decades of experience in conducting rigorous clinical trials, such a culture is not widespread in the software technology field.

Beware of the gap between the results of well-funded research and the implementation capacity of cash-strapped governments. In pure software deployments, the marginal unit cost can be almost zero, and early adopters can easily fund a product’s establishment. The situation in healthcare is different. Smart healthcare systems often require costly hardware. When this cost is multiplied to cover a large population, governments that fund healthcare might balk at it. Managing demand for smart-healthcare solutions by restricting access to them can be political suicide. So, politicians might regard smart healthcare’s promises as a mixed blessing at best.

Beware of the gap between the success of a trial demonstration and what a large bureaucratic organization can implement in a heavily regulated environment. The complexity of a typical healthcare system is staggering. It includes millions of
FROM THE EDITOR

care receivers, large and small hospitals, armies of healthcare professionals, healthcare management organizations, insurers, and regulators, all with disparate and often conflicting interests. This complexity can make the introduction of new technologies and processes devilishly hard. In the words attributed to Wernher von Braun, who helped run the US moon-landing program, “We can lick gravity, but sometimes the paperwork is overwhelming.”

Beware of the gap between technological marvels and healthcare recipients’ actual behavior. We humans often behave irrationally, even more so when we become sick or as we age and our cognitive abilities take a hit. As millions of smokers demonstrate, our health isn’t always our first priority. Consequently, don’t expect that smart-healthcare technology will be wholeheartedly adopted by the individuals it targets or that their behavior will match their best interests.

Beware of the gap between the demands of IT and medical professionals’ willingness and ability to meet them in a highly demanding and stressful workplace. Smart healthcare’s promises for improved outcomes don’t come for free. They often call for the heightened involvement of medical professionals to establish a holistic, context-dependent view of the patient. The time and training required to see patients in this new light are often a luxury. Moreover, professionals might resist changing their long-established ways, which they trust daily to make life-or-death decisions.

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IEEE SOFTWARE NOVEMBER/DECEMBER 2017
For example, medical doctors often prefer the flexibility and richness of natural language over expressing themselves using rigid ontologies. Beware of the gap between the requirement to protect sensitive medical data and the need to distribute those data to gain the maximum benefit from them. Smart healthcare starts by gathering mountains of data from diverse sources, such as wearables, distributed sensor networks, and the Internet of Things. It then aims to transform that data into information, knowledge, and finally wisdom. Impeding this dataflow are the many requirements and regulations regarding the handling of sensitive data and the protection of medical privacy, such as the US Health Insurance Portability and Accountability Act of 1996 (HIPAA) and the EU General Data Protection Regulation (GDPR). Complying with such regulations without stemming the flow of data is a thorny, expensive task.

In summary, researchers and practitioners must overcome significant hurdles to realize smart healthcare’s many benefits. The problems they face mirror our field’s challenges in a world gradually eaten up by software.