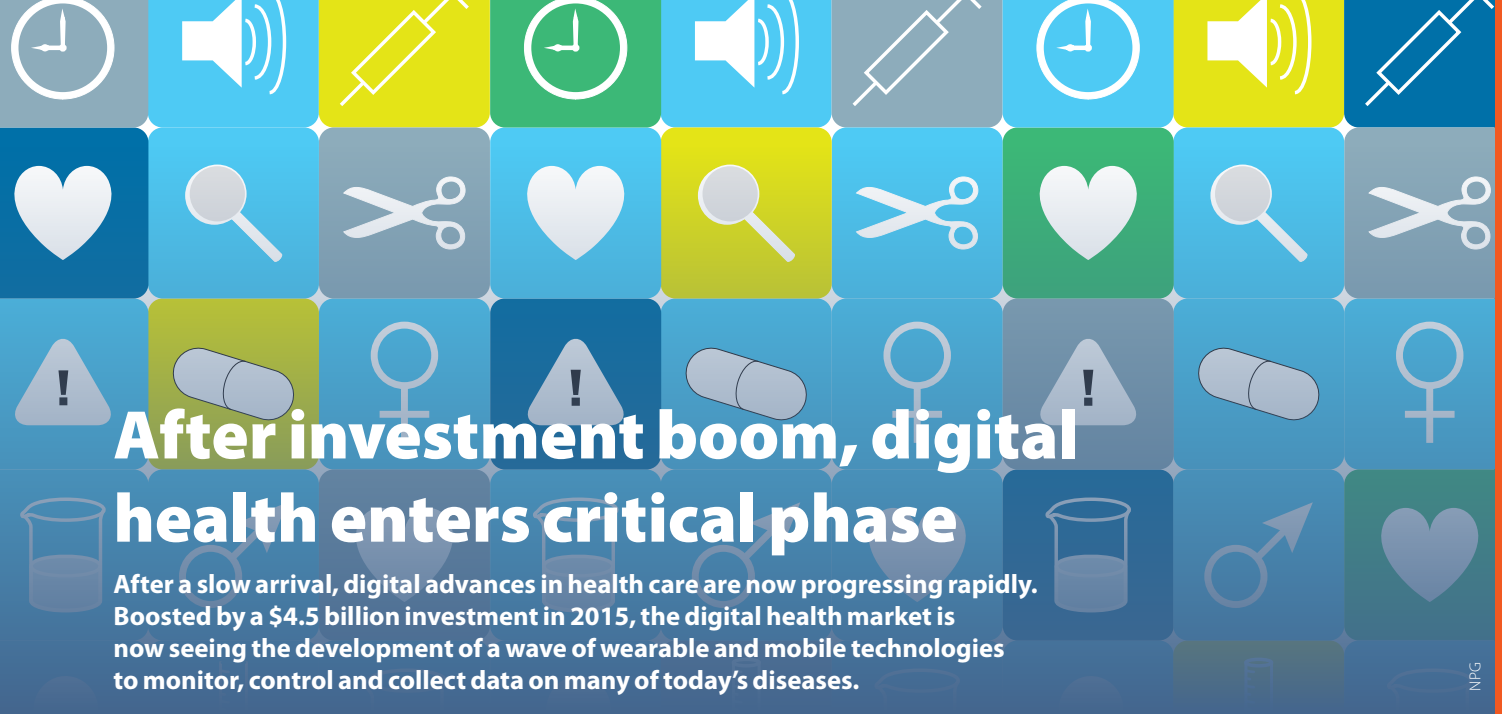

After investment boom, digital health enters critical phase

After a slow arrival, digital advances in health care are now progressing rapidly. Boosted by a $4.5 billion investment in 2015, the digital health market is now seeing the development of a wave of wearable and mobile technologies to monitor, control and collect data on many of today's diseases.

NPG

Nick Taylor

Health care is at a pivotal juncture in its adoption of digital technologies. Having languished for years as a digital backwater, health care is now a major battleground for technology companies, each of which claims it can reshape disease management. The coming years, in which the technology is poised to enter mainstream health care, will go some way toward revealing how closely reality mirrors the hype.

Leading firms from multiple industries are generating that hype, either through the potential of their nascent products or simply by showing an emerging interest in the sector. Apple, Google's recently created parent company Alphabet, and other members of Silicon Valley royalty are moving into health care, and General Electric, IBM and other companies spawned in earlier eras are also investing heavily. At the same time, a slew of startups, each a potential acquisition target for its larger rivals, are being created.

The surge in interest is a reflection of the as yet untapped potential for digital technology to deliver gains in quality and productivity. "When I look at health care from a digitization perspective . . . it's 10, 20 years behind other industries," said Jan De Witte, CEO of GE Healthcare IT.

Although digital technology is arriving later in health care than in other industries, it is now advancing quickly on many fronts. At one end of the industry food chain, a broad pool of investors are committing billions of dollars to digital health startups. In 2015, venture capitalists invested $4.5 billion in digital health firms, according to Rock Health, a seed fund that tracks the industry.

An ecosystem of data-gathering devices

Startups active in wearables, biosensors and personal health tools are among the main beneficiaries of the boom in digital health investment. Such businesses attracted a proportion of the $4.5 billion venture capitalists invested in the sector last year, and the $732 million raised by activity-tracking pioneer Fitbit made its initial public offering (IPO) the standout in digital health.

The commitment of public and private investors to wearables and other personal health tools, which is mirrored in the spending of companies such as Alphabet and Apple, stems from the potential for miniaturized electronics to reshape how wellness and diseases are managed.

Today, health is primarily assessed during visits to physicians. Champions of wearable devices see this model as flawed. "If you think about the things that affect somebody's health and wellness, the large majority is really the stuff that happens when you're not at your doctor's office," said Kathy McGroddy-Goetz, vice president of partnerships and solutions at IBM Watson Health. "It is things like how well you sleep, and what you eat, and how active you are, and are you stressed."

Doctors' inability to assess these metrics is one of the reasons that today's health care system is more about managing disease than promoting well-being. Wearables could tip the balance between these two roles of the health care system by giving individuals and their physicians access to a continual stream of data on heart rate, blood glucose levels and other health metrics.

Analyzing these data alongside information from other sources could yield insights into health risks faced by individuals, potentially enabling them to proactively prevent problems from arising.

Dealmaking in diabetes

This concept is closest to being tested in the real world in diabetes, a disease that is the focus of many of the first-wave digital health devices and related deals.

As a common disease that is best managed through rigorous self-care behaviors, such as adhering to treatment regimens and monitoring blood glucose levels, diabetes is an ideal proving ground for digital health. If technology can make it easier for patients to control the disease, it could spare them—and the health care system—from complications such as stroke and kidney failure.

This concept has attracted leading names in technology and life sciences. Verily, the firm formerly known as Google Life Sciences, is working with Novartis on a blood glucose–tracking contact lens and with Sanofi and Dexcom on other digital diabetes tools. The contact lens is designed to free diabetes patients from the need to manually monitor their blood glucose, a task patients find burdensome.

Other companies are using different tools to work toward similar goals. Medtronic and Samsung are combining their respective expertise in medical devices and mobile technology to make it easier for diabetes patients to monitor blood glucose levels. A mobile app designed to display data from insulin pumps and continuous glucose monitoring is at the top of the partners' development roadmap.

In an increasingly congested sector, Medtronic is also working with Sanofi and IBM, and Royal Philips is collaborating with cloud services pioneer Salesforce. Many of the alliances pair drug and medical device experience with expertise in software and mobile technology, a blend that reflects the broad skill set needed to succeed in digital health.

Some of the same players are starting to branch out beyond diabetes. For example, Medtronic and Samsung are working on mobile apps for neuromodulation implants, and Novartis is collaborating with Microsoft on a video system to track disease progression in people with multiple sclerosis.

Yet despite all this dealmaking activity, digital health has yet to overcome some fundamental barriers to adoption. "While the digital era has brought us powerful new ways of measuring and influencing [health] outcomes in theory, there have been some pragmatic hurdles to this in the market, including significant technology fragmentation and a minimal understanding of links between patient behavior and outcomes," said Deborah Kilpatrick, CEO of digital health tool evaluator Evidation Health.

The health care IT glue

Greater understanding of the links between behavior and outcomes could emerge as data from wearables are analyzed alongside other sources of health information. Multiple companies are trying to facilitate such analyses. At a consumer level, Apple Health, Google Fit and Samsung S Health are enabling people to combine and analyze health and fitness data from multiple sources with a view to driving changes in behavior.

Although these platforms are being used primarily to help people track their personal health and fitness goals, health care professionals see value in the data they are aggregating. The 80,000 patients at Cedars-Sinai Medical Center in Los Angeles can now share data collected by Apple Health with their physicians, who view the information alongside traditional health records. Access to such data could enable physicians to spot a health risk before the problem becomes acute.

Having teamed up with Apple to support health data analysis, IBM is among the companies trying to facilitate this proactive pathway. The deal with Apple is one of many IBM has formed since adapting its *Jeopardy!*-winning computing system Watson for health care. "It takes an ecosystem to transform health care," McGroddy-Goetz said.

IBM is trying to position itself at the center of this ecosystem, as are GE Healthcare, Intel, Salesforce and other companies with cloud data storage and analytics capabilities. All the services are designed to gather data from multiple sources on a cloud-based platform that carries out complex computing tasks quickly and enables geographically disperse caregivers to view and collaborate on materials.

The potential of the approach is perhaps best illustrated by an example about stroke patients from De Witte. Patients need to be treated within four hours of a stroke to prevent serious damage, but it can take that long for "a very meaty desktop server" to turn scanner data into a 3D diagnostic tool. Cloud computing changes the timeline. "It can be done in five to ten minutes," De Witte said.

Although hospitals have traditionally been wary of moving information to the cloud, fearing it could compromise the security and uptime of their systems, attitudes are changing. Garen Sarafian, an analyst at Citigroup, surveyed 82 hospitals from across the United States and found that 11% of respondents plan to cut spending on IT hardware over the next two years. "The biggest beneficiaries of the reduction in IT hardware spending will accrue to vendors operating remote hosting," Sarafian wrote.

In racing to capture this spending, cloud data analytics companies have been the biggest spenders in digital health deals. IBM was a major contributor to the $6 billion in digital health acquisitions tracked by Rock Health last year, with its $1 billion takeover of imaging company Merge Healthcare being its single biggest deal.

venimo/iStock/Thinkstock

IBM has taken an early lead this year, too. The veteran technology company started 2016 by acquiring data analytics company Truven Health for $2.6 billion, moving its spending over the past year beyond the $4 billion mark. IBM says its deal spree is now over. "We're very busy integrating," McGroddy-Goetz said.

Overcoming obstacles

The exit of a previously prolific dealmaker from the arena of mergers and acquisitions is one of several factors that suggest digital health could face some headwinds. Having jumped in 2014, venture capital investment was essentially flat last year. Equally, shares of many recent IPOs are well below their offering prices.

At the same time, the sector is still dealing with interoperability issues, which, if the precedent of electronic health-record systems is repeated across digital health, could take many years to resolve.

Yet, although the sector could face near-term financial turbulence and be held back by some of the outstanding issues with interoperability, the level of investment and the pace of advancement mean the role of digital technology in health is assured.

"These are not 'if' questions, they are 'when' questions. They will get solved," Kilpatrick said. "And, as with everything digital, don't be surprised if all of this happens faster than we expect."

Nick Taylor is a freelance journalist specializing in the global biopharma industry.