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Top Ten Trends in Healthcare Technology

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INTRODUCTION

While public debate has centered on the Affordable Care Act and its potential replacement, other long-term trends have continued unabated, marking this period as the most innovative time in the history of healthcare. As was highlighted at the 2017 Healthcare Technology Conference hosted by the Healthcare Information and Management Systems Society (HIMSS), technologists are moving rapidly regardless of the political environment. The results show significant trends in healthcare technology, both short and long-term. Since these innovations impact the quality, availability, and costs of healthcare, they require the attention of all corporate executives.

Fuld + Company consultants examined the findings that have arisen during our client engagements, exhibits and presentations at HIMSS, and commentary from comprehensive interviews with health industry executives. The analysis by our industry experts has highlighted the ten most impactful trends in healthcare technology.



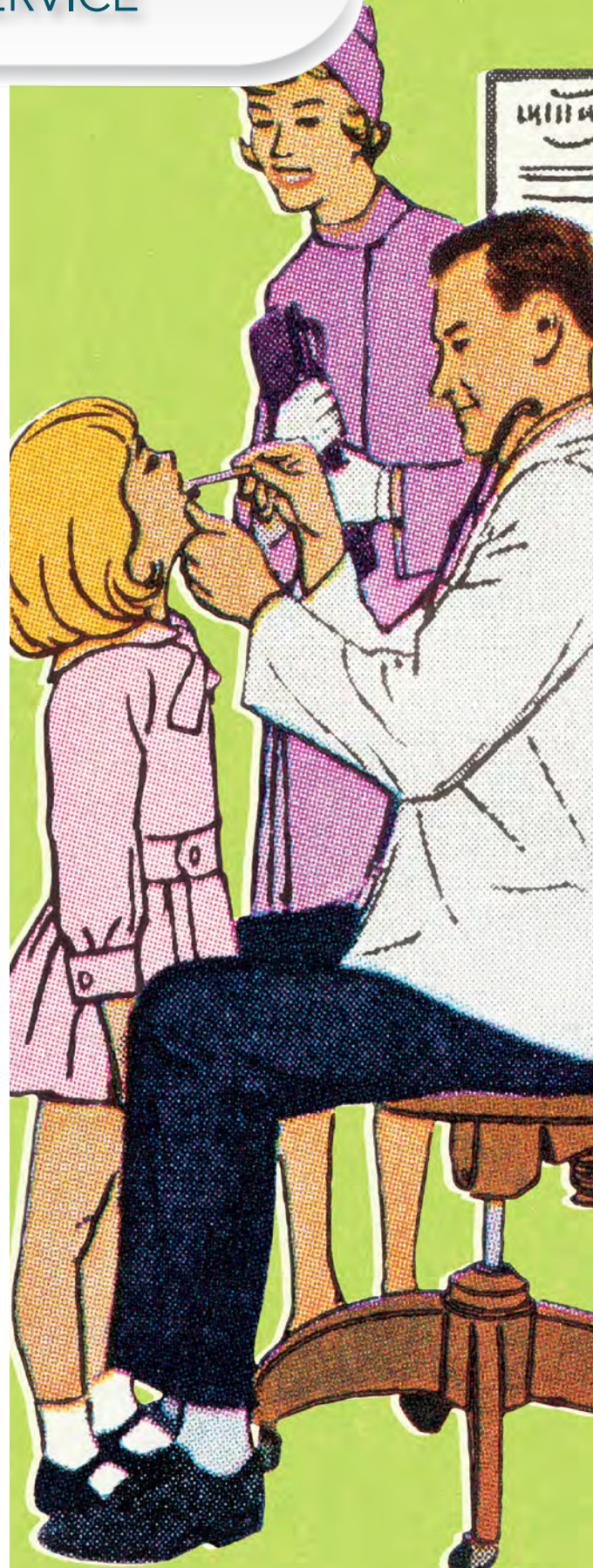
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VALUE-BASED HEALTHCARE WILL IMPROVE SERVICE

The traditional model for healthcare pricing has been structured as fee-for-service. This model, however, as acknowledged by many executives and politicians of both major parties, doesn't account for quality of service nor motivate those involved to consider costs. A family physician, under this construct, faces no reproach if she orders redundant or unnecessary tests or procedures. Value-based healthcare corrects this concern. Payments are provided for necessary services and are based on patient outcomes, thereby addressing superfluous medical testing and clinical inefficiency, fundamental factors in rising health care costs. This approach, quickly but still evolving in the U.S., is based on a patient-centric preventative care philosophy.

Value-based healthcare is here to stay. Industry leaders, focused on the market-based benefits; economists, attracted by the motivational and behavior-based elements; and politicians, centering on the cost benefits are coming to a consensus. Cabinet-level commentary touting a fee-for-service paradigm is not likely to alter the long-term trend toward value-based healthcare.

This trend will deliver enhanced investment from both payer and provider in technological solutions that will manage costs and optimize patient care. Data and sophisticated analytics are central to optimizing value-based healthcare: 2016 was the first year that payers and providers were federally mandated to report quality measures to the Center for Medicaid and Medicare Securities. These and other data sets are primary outcomes of, and inputs to, value-based healthcare. Investments are already being seen in a vast number of healthcare information technology startups.



2

INTEROPERABILITY CONTINUES TO BE THE GREATEST CHALLENGE

Interoperability, or seamless interface and information exchange between disparate healthcare systems, remains one of the most burdensome issues facing the industry. Payers and providers are unable to implement electronic quality measurement systems as little progress has been made in the sharing or transfer of data. Major obstacles exist at the micro level with syntax and patient matching challenges, and at the macro level across the Health Information Exchanges (HIE).

Interoperability is such an important issue that HIMMS 2017 created the Interoperability Showcase, dedicated to resolving these constraints. Highlighting healthcare data sharing collaborations between technology companies—including Cerner, Epic, NetSmart, Meditech, eClinicalWorks, Surescripts – the Showcase featured private and public efforts to solve the lack of connectivity. The inability of the U.S. healthcare information technology industry to create a federally backed unique patient identifier hampers technologists' ability to create interconnected systems. Working around this obvious challenge has created innovation, yet not enough to resolve the matter.

Competing Health Information Exchanges have tried to solve this connectivity issue, only to exacerbate the problem by creating a multitude of dissimilar systems. Differences in regulation, implementation, and business practices across the fifty states have been challenges. Complex state and federal payment structures only compound the issue. There are many up and coming technology solutions that may compensate for these inconsistencies, however there is no clear flexible solution at this point.

Resolution of this vexing challenge would be found in a unified federal healthcare system, although that option is unlikely in today's political milieu. A national or even state patient identification system, implemented with federally mandated data sharing and syntax standards, would also vastly improve information sharing and prevent potentially serious medical errors.



3

NEW DATA SHARING STANDARD REMAINS ELUSIVE

Health Level Seven International (HL7), a standards organization, launched its Fast Healthcare Interoperability Resources (FHIR), a solution built from modular components that can be assembled into systems accessed through mobile phone apps, cloud communications, and organizations' servers.

FHIR, an open-source application, addresses data privacy, security, and secure sharing problems. It allows for gathering real-time data, providing insight into cost-heavy issues such as the tracking of epidemics, prescription drug fraud, and emergency room wait times. Several high-profile players in the healthcare information technology field are experimenting with FHIR, and in 2014, the U.S. Health IT Policy and the Health IT Standards committees endorsed recommendations for more open-source applications.

FHIR may not be able to garner exclusivity within the industry due to competing applications, both current and anticipated. Whether FHIR or another single framework will be broadly adopted is a matter of considerable time – consensus on a universal data sharing methodology is lacking. If, or perhaps when, FHIR or another framework is broadly adopted it would set the stage for a major shift in the way healthcare data is exchanged.



4

NON-TRADITIONAL DATA SOURCES WILL DRIVE NEXT GENERATION TECHNOLOGY



Social determinants, biometric and medical devices, and wearable technologies are future standards. Evaluation of the value of these data inputs is burgeoning and we anticipate seeing increased investment in their development.

Conduent Business Services, recently divested by Xerox, is pioneering the use of social determinant data in algorithms to create a holistic patient view. This field, globally advocated by the World Health Organization, seeks to explore how key matters affect individuals' health. Each of these five areas reflects critical components in health and healthcare:



This broader view into healthcare demand and supply will, through promotion by both for-profit and not-for-profits, become increasingly adopted across the healthcare industry and throughout society.

Biometric and Medical Device Data Systems (MDDS), hardware and software products that transfer, store, and display medical data, may, in time, become universally used to monitor patients. Both are increasingly seen in doctors' offices and hospitals. Although current price points remain high, we project decreased costs during the next several years.

Wearable healthcare technology come in many forms: smart watches, clothes, caps, eyeglasses, necklaces, among others. Most contain sensors that gather and report data to the patient or physician. Soreon Research, in a 2014 report, cited wearable healthcare technology as being indicative of a "deep transformation of the healthcare sector," and noted four factors:

- A shift to prevention from reactive disease treatment
- Greater personalization of medical care
- The critical role of analytics in the interpretation of continuously measured physiological data
- Shifts in the healthcare technology industry to new software and hardware companies

Each of these elements – social determinant analysis, biometric and medical devices, and wearable technology – will dramatically change the way that health is monitored, and the way that care is delivered. The evolution of these technologies will have a dramatic impact on healthcare costs.

5

ELECTRONIC HEALTH RECORDS WILL EVOLVE, EXPAND, AND CONNECT

An Electronic Health Record (EHR) houses administrative and clinical data such as demographics, progress notes, medications, vital signs, medical history, and laboratory data. Within a limited scope – the individual physician, physician group, or hospital, for example – the EHR automates access to information and can streamline clinicians' workflow. In its full potential, the EHR can support expanded activities including evidence-based decision support, quality management, and outcomes reporting.

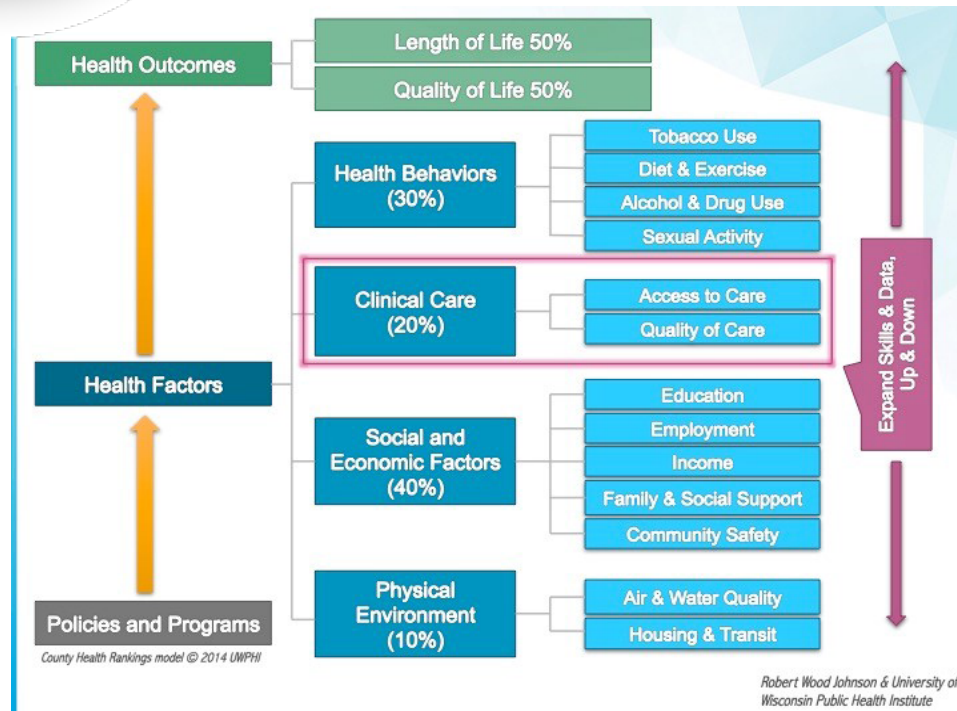
EHRs are critical in cementing the patient-provider relationship. The data, and the timeliness and availability of it, enables providers to make better decisions, and allows patients to better track their care through online records.

To provide complete value, Electronic Health Records need advanced functionalities, mostly efficiency in exchanging data with other EHRs to create more accurate longitudinal patient views. EHR companies are starting to vertically integrate their offerings, combining functionalities from individual modules into comprehensive platforms, producing baseline EHRs with layers of additional functionality. As demand from both physician and patient increases, we are likely to see technological advances that do not simply tie components together but produce exponential advancements in applications and value.



6

POPULATION HEALTH MANAGEMENT TOOLS ARE ATTRACTING INVESTMENT



A study conducted by the Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute concluded that eighty percent of what affects health outcomes is associated with factors outside healthcare delivery.

Aggregating and analyzing these factors – behavioral, social and economic, and environmental – among a group, or even an entire society, can improve healthcare delivery and decrease costs. Population Health Management (PHM) systems are business intelligence tools to aggregate and analyze micro-level data, providing a comprehensive clinical picture of each patient. Using that data, providers can track, and improve, clinical outcomes while lowering costs.

A best-in-class PHM unifies clinical, financial, and operational data and provides actionable analytics to improve efficiency and patient care. It also integrates data analytics with risk stratification, care coordination, and patient engagement, thereby achieving value-based care.

PHMs currently on the market are designed for a fee-for-service world, making it difficult to manage the health of populations of patients—and difficult to understand the cost of care.

Health analysts are predicting growth of the population health management segment from \$13.9 billion in 2016 to \$42.5 billion in 2021, a compound annual growth rate of 25%. Anticipate more mature population health management offerings and capabilities in the years to come.

7

BEHAVIORAL HEALTH AND PATIENT ENGAGEMENT ARE SPURRING INNOVATION

Much attention in the healthcare discussion centers on delivery and costs, effectiveness and efficiency, often to the detriment of patient engagement. We expect a shift in that paradigm as more healthcare technology companies, providers, and payers seek to differentiate themselves through superior patient satisfaction.

Best in class Patient Engagement Solutions include:



Patient education resources to assist patients making healthcare decisions



An intuitive interface that easily integrates with Electronic Health Records.



A secure, online message center through which patients and clinicians can easily engage

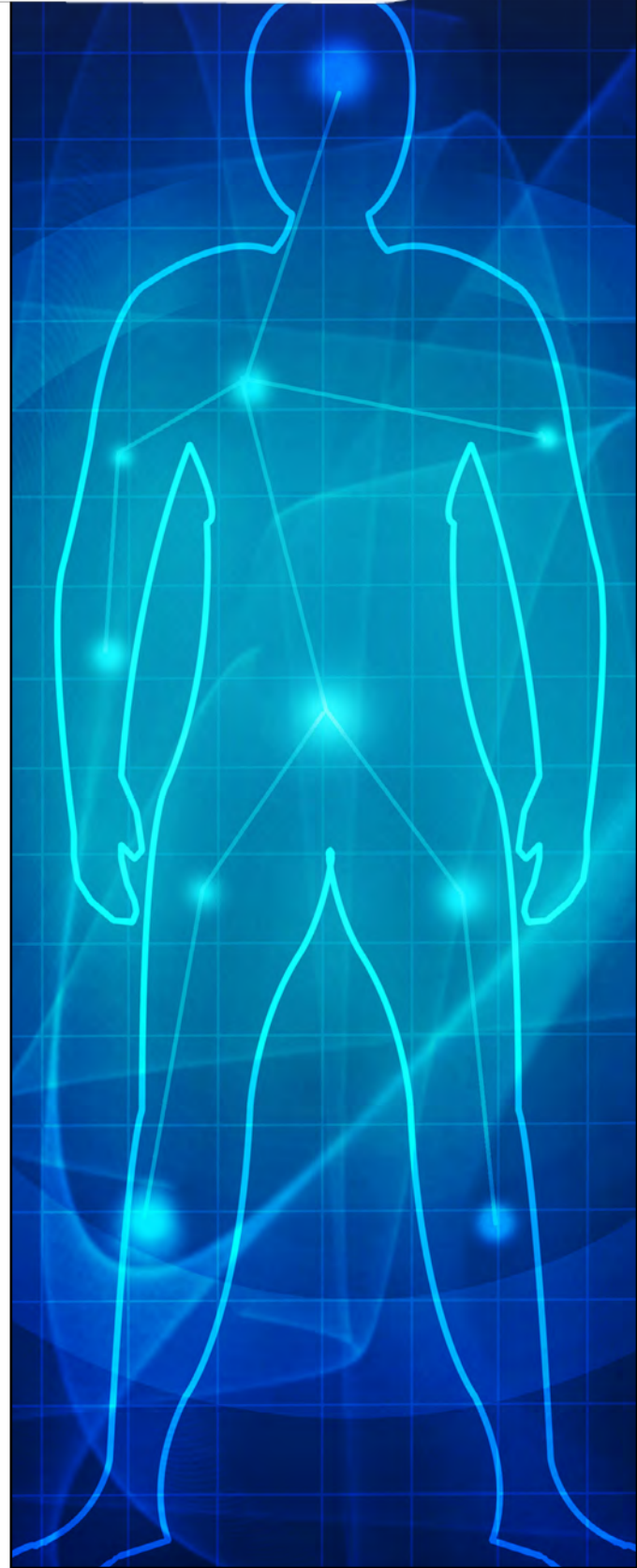


A searchable database of healthcare resources be found throughout the community

At HIMSS 2017 companies like Wellpepper outlined patient engagement functionalities that allow hospitals and doctors to survey patients in a matter of minutes by smartphone, tablet, or desktop. Dashboards enable hospital administrators to compare patient results by physician and by patient demographics. Analytics track pain medication usage to ensure patient compliance and to mitigate the potential for overprescribing.

A couple challenges arise to what may seem an intuitive element. First, many patients and physicians are not open to broader patient-doctor interface. More decisively, scarce resources hinder the development of new patient engagement measures as other gaps call for attention.

Nevertheless, success in advancing our healthcare system requires a true partnership between patient provider, and payer.



8

VIRTUAL CARE TECHNOLOGY IS APPROACHING CRITICAL MASS

New innovative operations such as virtual care are gaining traction, using channels such as text messaging, telemedicine, video conferencing, and social media.

Gavin Helton, medical director at Mercy Hospital in Missouri, says that virtual care is a critical resource for patients with chronic illnesses. Equipped with a tablet and medical devices such as a blood pressure monitor and scale that stream vital signs from her home to the Mercy Virtual “command center,” a patient and her providers can detect subtle health shifts in time to avert any deterioration.

Mercy Virtual, a \$54 million, 125,000-square-foot facility, has no hospital beds. Instead, the building houses more than 300 medical professionals who monitor and treat patients in 38 hospitals across seven states. The first of its kind, Mercy Virtual demonstrates the potential of virtual care, especially beneficial for patients in rural and underserved populations.

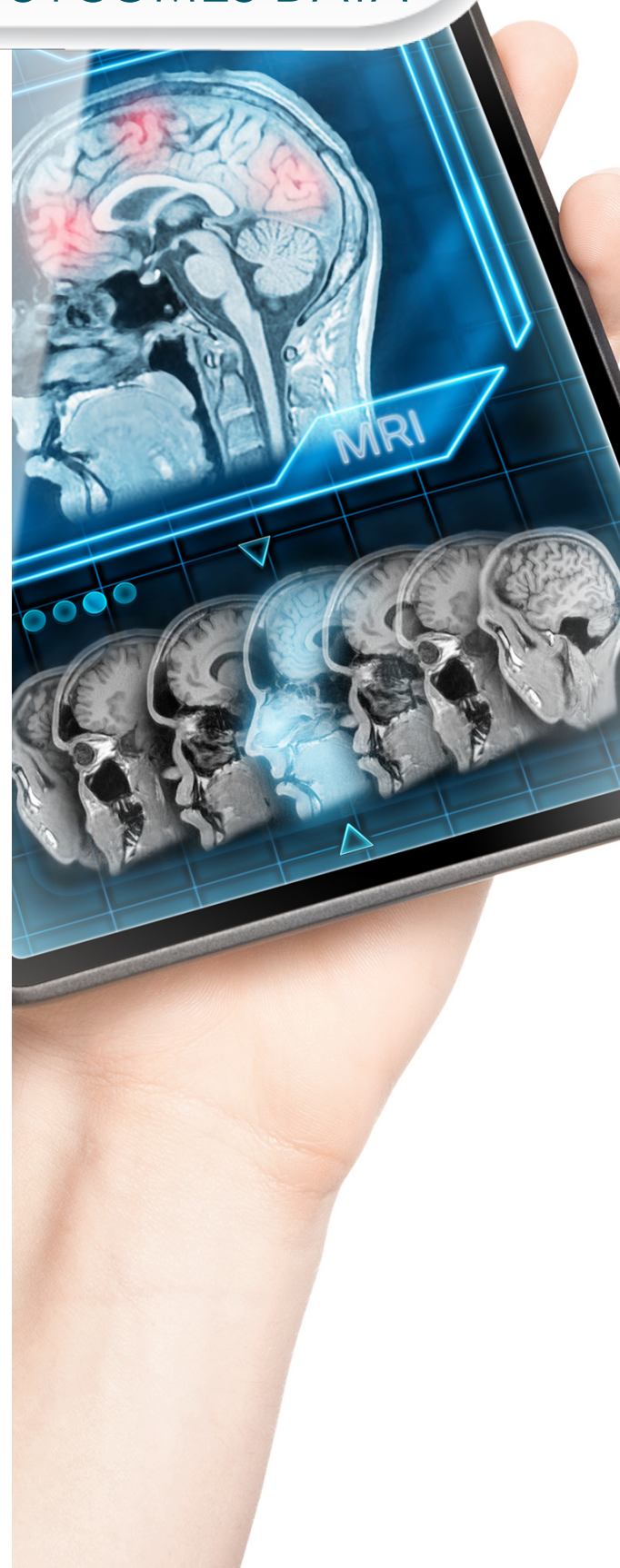


9

TECHNOLOGY PILOT PROGRAMS ARE PRODUCING COMPELLING OUTCOMES DATA

Innovation entails risk, and we are seeing increasing evidence of healthcare organizations taking risks with technology through pilot programs. Demonstrated at HIMSS 2017, the Mayo Clinic is using video telemedicine to assist community hospitals with newborn resuscitation interventions during high-risk, complex deliveries. During a 20-month pilot, Mayo Clinic's Division of Neonatal Medicine conducted 84 telemedicine consultations across six health facilities, improving outcomes.

Full scale implementation of innovation is a challenge as these pilot programs are not coordinated. Scarce resources again prove troublesome as hospitals address critical challenges within the building before extending outward. It is critical that outcomes of healthcare technology pilots continue to be shared, discussed, and evaluated broadly.



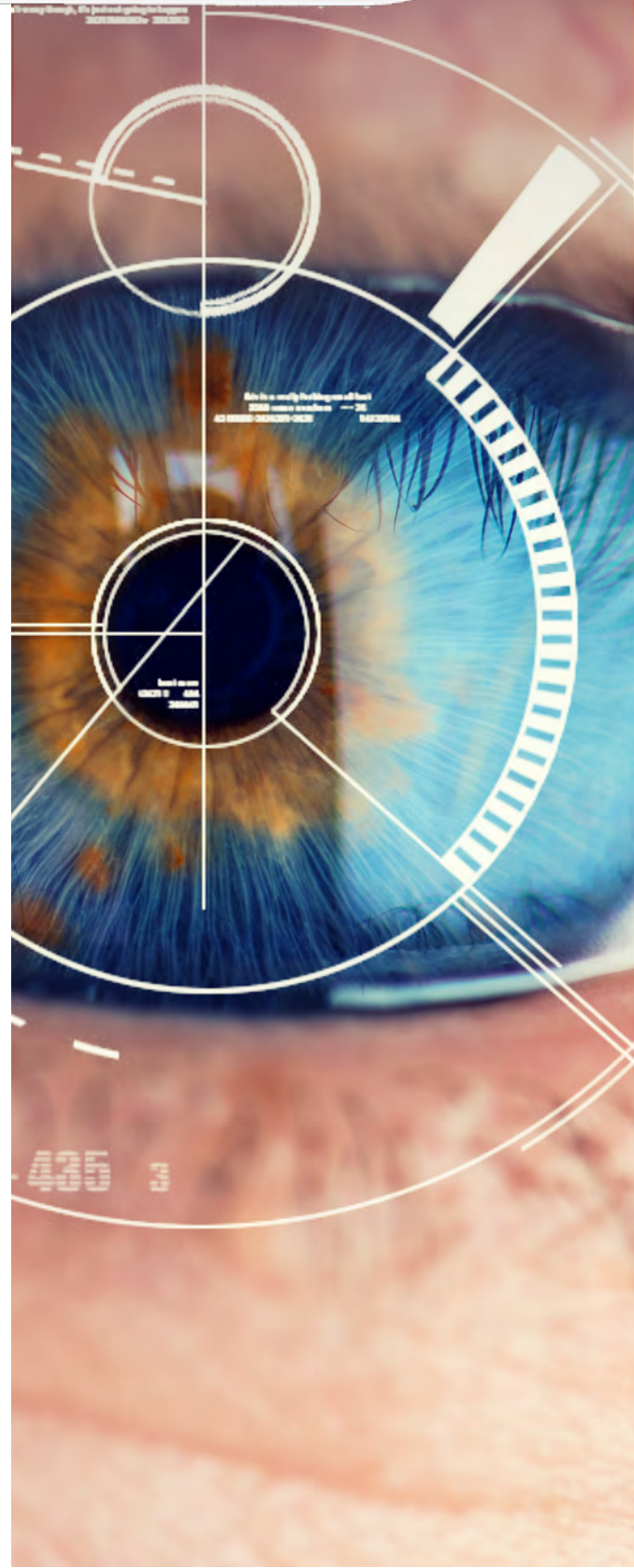
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ARTIFICIAL INTELLIGENCE WILL FUNDAMENTALLY CHANGE THE INDUSTRY

Healthcare technology, such as that demonstrated by The Mayo Clinic and Mercy Virtual, point to the reliance this industry has, and will increasingly have, on technical applications, platforms, and frameworks. Artificial Intelligence, Machine Learning, and Cognitive Computing are not yet standards but have shown sufficient potential to be considered real and impactful. Through advanced diagnostics and sheer speed, these functions will provide clinical decision support to exponentially improve outcomes. These capabilities will help healthcare professionals, such as staying current with research and therapies. And through rational systematic strengths these technologies will optimize resources and minimize costs.

Professor Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, anticipates a revolution that will fundamentally change the way we live, work, and relate. In his book, *The Fourth Industrial Revolution*, he describes the new technologies that are fusing the physical, digital, and biological worlds. Healthcare is ground-zero for this new environment.

Population health analytics and predictive analytics currently exist, and play a positive role. Artificial Intelligence and its derivatives are the next generation, advancing benefits to all stakeholders. So fundamental are these tools, they will bring revolutionary change to the healthcare industry of today.



HIMSS hosts an impressive and important group of players in the U.S. Healthcare Information Technology (HIT) space annually. During the 2017 conference, CEOs, CIOs, and CMOs from nearly all the major Providers and Payers attended, and over 43,000 attendees showed up to walk the floor. Organizations participating included athenahealth, Teledoc, American Well, IBM Watson Health, CMS, The Joint Commission, NCQA, Summit Healthcare, Siemens, Quest Diagnostics, Phillips, Oracle, Optum, Microsoft, McKesson, Kaiser Permanente, Humana, GE Healthcare, Epic, Cerner, Anthem, Allscripts, Accenture, and many more industry giants.

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