The Creative Search for Metrics that Matter to Health

As we move into an era of abundant health information, our processes of measurement will be remade. Driven by an unprecedented capacity to capture data from our bodies, our social lives, and our environments, health measurement will shift from an occasional activity performed in discrete locations to become a passive, constant layer in our lives. Over the next decade, we will see a proliferation of creative ways to identify the hidden, and often surprising, metrics that matter to health. In turn, these new metrics will create new ways of quantifying health status and health interactions, while simultaneously creating new questions about who people should turn to for health engagement and why.

Metrics for anticipatory action

As people begin wearing a variety of sensor and tracking devices that passively collect information, the rapid increase in body computing will drive the creation of an increasingly rich database of indicators that precede acute health events. This information, however, will be burdensome, confusing, and even frightening for individuals, as they are presented with it in real time and must decide when an early warning sign is strong enough to warrant action. To help people distinguish the signal from the noise, we'll see a proliferation of new metrics for thresholds of "when to act" on early warning signs and when to ignore them.

Measuring invisible variables to optimize interactions

Our new measurement capacities will also give us the ability to quantify subconscious details that matter for health. Research from fields ranging from psychology to neuroscience to biology has found ways to measure details such as facial expression and word choice to reveal meaningful information about our emotions and social interactions. Already, customer service centers are using autonomous algorithms and voice recognition to improve customer satisfaction by connecting people with similar communication styles. As measurement of these kinds of details becomes increasingly feasible, we'll see an explosion of efforts to use these indicators to enhance patient satisfaction and understanding, improve clinical communications, and make health interactions increasingly personalized and engaging.

New metrics for new meanings of health

As the quantity of health data grows exponentially over the next decade, and as new entities—such as companies producing wearable technologies—become alternative and legitimate sources of authority regarding health information, individuals and networks will define new metrics and find new uses for health information. Such information could, for instance, drive us to reframe understandings of emotional health factors, such as mood, or even help us to know which indulgences are least risky, based on genetic analysis. Thus the rise in ubiquitous measurement will enable individuals and groups to begin creating a variety of new, highly personal metrics that will challenge our traditional understandings of what it means to be healthy.

These **artifacts from the future** are examples of products, services, and experiences that may play out in the future based on this forecast.

PATIENT SENSE

WHAT:

When you only have a few minutes to speak with each patient, you don't just need their health information. You need to know how to choose your words and how to interact to make sure the patient understands and internalizes the information—and has a great experience. Combining the latest in emotion measurement technology with traditional medical records, Patient Sense gives you all of the data you need to provide the best care possible.

SO WHAT:

Already, emotion recognition and language-mining software are being put to use to enhance the quality of service at call centers and similar kinds of businesses. As these tools become more robust, they will move into health settings and be integrated with biomedical measures and clinical records to give providers cues about how best to communicate and structure patient interactions to enhance health.

WHAT:

You've had a hard week at work and want to indulge—but not at the expense of your long-term health. There are libraries worth of information online on the effects of any indulgence imaginable, but they give general advice, and everyone's body processes substances differently. The Indulgence Navigator, on the other hand, gives recommendations based on your unique genetic predispositions. While it's been banned on several app markets, you've jailbroken your devices to integrate your biometric data to learn how to have the most fun you can safely have this Friday night.

SO WHAT:

In recent years, we've seen the emergence of a variety of direct-to-consumer genetic testing services. As biometric data—genetic, metabolic, and everyday activity—grows at an exponential pace over the next decade, consumers will turn to an increasingly wide array of services to help them understand these measurements and the implications that they, not the health system, care about. While somewhat extreme, the Indulgence Navigator hints at the wide variety of ways that people might look to connect their conventional health data to their highly idiosyncratic goals.

As we move into a world of abundant data, we'll see the proliferation of unexpected metrics that matter to health. The emergence of these metrics will create new prevention and upstream intervention strategies. At the same time, new questions will surface around how and when to act on new information.

CREATE CONTINUOUS CHRONIC CARE: Anticipating progression

As our bodies become increasingly quantified, innovations will focus on identifying indicators—such as sudden weight gain among heart failure patients—that precede an acute event, to enable just-in-time preventive efforts. These indicators will be augmented by new efforts to quantify how conditions progress over time so that patients can be taught self-management at the earliest stages of chronic illness, much as we've done with diabetes in the past.

ENHANCE EARLY CHILDHOOD HEALTH: Balancing protection and freedom

Children's health and lives will be richly measured and quantified from birth using both direct-to-consumer and traditional health care technologies. The benefits of gathering useful information will need to be balanced with data privacy and control; and parents' desire to protect their children based on identified risk factors will need to be balanced with giving children freedom and autonomy.

SUPPORT END-OF-LIFE CARE: Measuring diverse final desires

As values around the final stage of life shift, the metrics that matter to patients will become increasingly diverse and distant from the traditional metrics of biomedical health. Letting patients and their families set their own priorities and then use new tools of measurement to track progress can help them understand and manage end-of-life considerations on their own terms.

OPTIMIZE WORKPLACE WELLNESS: New approaches to team building

The emergence of measurement tools aimed at uncovering communication styles and emotional states—for instance, ToneCheck, an email plug-in that mines words in a message for emotional content—will create new ways of organizing collective approaches to workplace wellness. For example, matching employees based on their health goals and communication styles will create new opportunities to improve health and well-being without sacrificing productivity.

BUILD COMMUNITY HEALTH CAPACITIES: Pinpointing collective determinants of health

Wearable computing data, in the aggregate, will highlight community-level factors that harm or improve health. Efforts such as today's Air Quality Egg project, in which people put an air quality monitor outside their window to map CO_2, will be replicated to map other health metrics. These collective measurements will create opportunities to identify strategies and initiatives to enhance community health.

KEY RESOURCES

• IHS iSuppli. "Wearable Technology Market Suited for Rapid Growth." IHS Electronics & Media Market Intelligence. 2012.

• Maguire, J., and Dhar, V. "Comparative Effectiveness for Oral Anti-diabetic Treatments Among Newly Diagnosed Type 2 Diabetics: Data-driven Predictive Analytics in Healthcare." *Health Systems*. 2012; 2:73–92. www.palgrave-journals.com

• Barnato, A.E., and Arnold, R.M. "The Effect of Emotion and Physician Communication Behaviors on Surrogates' Life-Sustaining Treatment Decisions: A Randomized Simulation Experiment." *Critical Care Medicine.* 2013. 41,7:1686–91. www.ncbi.nlm.nih.gov