Harnessing 21st Century
Technological Innovation to Promote Health

COLIN PEKRUHN, M.P.P., *Grantmakers In Health*

Technology has progressed by leaps and bounds since the turn of the 21st century, especially for consumers. With the advent of the smart phone and near-ubiquity of online social networks, people are connected to resources, information, and each other in new and exciting ways. These developments open novel opportunities to improve personal and population health. Digital health (dHealth) innovations are rapidly being imagined, developed, and explored worldwide, whether it is a text message training program for midwives in Nigeria, or Apple connecting physicians with mobile health (mHealth) apps through HealthKit (Apple 2014; Mechael 2014).

In communities of color, where reliance on mobile technology to access the Internet is high, digital innovation has the potential to address equity issues in creative ways (Lopez et al. 2013; Mechael 2014; Smith 2014). Investment in dHealth also presents opportunities to advance the person-centered model of health care. The Internet and digital technology are democratizing tools that make information easily available. With health information personalized and accessible through a variety of digital tools, patients can be more involved in their self-care and empowered to be their own health advocates.

While the potential of these technological tools is exhilarating, many questions remain regarding their development, efficacy, implementation, and place in the larger scheme of health grantmaking. With the support of the Aetna Foundation, a national grantmaking leader of dHealth programs, Grantmakers In Health convened health funders and experts earlier this year to explore these issues. The following considerations and recommendations for funders are the result of their discussion.

BEGIN AND END WITH THE COMMUNITY

Communities engage with technology based on their unique preferences and cultures. To be successful, dHealth technology must reflect awareness of the intended users. Ideally, technology will help people in these communities overcome and disrupt barriers to wellness.

Integrating community preferences into dHealth technologies requires direct community involvement in the development and testing process. This strategy will help ensure that content and design meet perceived community needs and are socioculturally appropriate (Mechael 2014). Considering the resources and tools available during the engagement process can positively shape a dHealth intervention and further

The convergence of the digital and genetics revolutions with health and health care, **dHealth** encompasses wireless devices, hardware sensors and software technologies, microprocessors and integrated circuits, the Internet, social networking, mobile and body area networks, health information technology, genomics, and personal genetic information. It also incorporates all or many elements of mHealth, wireless health, Health 2.0, eHealth, big data, health data, cloud computing, e-Patients, quantified self and self-tracking, wearable computing, gamification, telehealth and telemedicine, precision and personalized medicine, and connected health (Sonnier 2014).

empower a community. For example, knowing which online social networks a community uses, how they are used, and with whom information is shared can improve the technology or even alter the approach.

One example of this is the EatWell project in Atlanta, developed by Andrea Parker of Northeastern University. Parker advocates for user-centered design that supports health equity, as well as produces technology that people will want to use on a sustained basis. She asked EatWell's predominantly African-American participants to use cell phones to record and share their eating and nutrition experiences in various settings and found that people readily used the recordings to talk about aspects of their lives. Even though the audio clips were anonymous, they resonated with other participants. From these results, Parker concluded that audio recordings are an underutilized resource for health communication (Parker 2014).

One of the challenges inherent in this type of strategy is that the content and design of the dHealth technology will be specific to a local community and not easily replicated or brought to scale. This issue is directly addressed by a middle school health e-curriculum developed by My Healthy World (MHW) and its former director, Nelson Rosenbaum. Supported by several funders, MHW is a health e-platform that leverages digital technology to engage youth and families in health education and healthy behavior change through experiential learning and social networking. The platform's curricular content is heavily informed by theory and is culture-neutral; teachers and peer interactions are responsible for placing the content into

PRINCIPLES OF DEVELOPMENT

Grantmakers and grantees should consider the following questions when investing in a digital innovation:

Is it useful? It must meet a perceived need of the community. An objectively well-designed and innovative technology will likely fail if it does not consider the lived reality of the user.

Is it useable? It needs to be understandable and accessible to the user, and it needs to be appropriate to the task.

Is it used? It can be useful and useable, but if the subjective experience is not compelling to the user, it will not be adopted (Parker 2014).

context. It is therefore easier to bring the MHW platform to scale (Kristin 2014).

Whichever type of approach is used, putting people first helps ensure that dHealth respects user privacy. Whenever personal data are being proffered and collected, there will be concerns about who has access and how it will be used. Many technologies, such as Google's suite of products, amplify this risk by using personal data to tailor their services without express user input. If community members are not properly engaged, they can quickly become suspicious or even hostile. Soliciting direct community feedback early on is a way for dHealth interventions to avoid generating these concerns.

INCLUDE THE RIGHT STAKEHOLDERS

It is important for funders to consider which stakeholders are involved in creating new dHealth innovations. The development team needs to have the skills and background to design an effective technology and work with the community. Another concern is the provider-community relationship. When hospitals and clinicians are involved, the community's perception of and history with them are critical.

Funders should also look at a broad set of multisectoral stakeholders who may directly or indirectly benefit from a dHealth intervention. MHW is an example of a successful multisectoral approach. The MHW team worked directly with teachers and administrators to develop the middle school health e-curriculum and worked to connect specific health behavior changes with academic outcomes. In doing so, the e-curriculum increased teacher buy-in and empowered school staff to view themselves as health change agents (Kristin 2014).

Multisectoral involvement is also important to sustaining dHealth. Patricia Mechael (2014), a leading international advocate for mHealth and its potential to expand the coverage and reach of health information and services, emphasizes that

public-private partnerships and strong leadership linking technology with health priorities are vital to moving programs to scale and sustaining them.

RESEARCH AND EVALUATION REMAIN CRITICAL

The field of dHealth is still young. Research, especially formative research, needs significant investment, which includes building on current work and identifying best practices. A stronger research base will help reduce duplication of efforts and "reinvention of the wheel," which remain a problem. With regard to evaluation, the identification of proper data collection methods and metrics is an important area of inquiry. In general, researchers have focused more on user satisfaction and less on health outcome data, which has hindered the field's ability to assess its health-related benefits (Mechael 2014).

TECHNOLOGY IS NOT A SILVER BULLET

Perhaps the most important thing grantmakers must remember is that dHealth is a means to an end, not the end itself. It is easy to get caught up in the hype of a new innovation, but grantmakers should be realistic and patient when considering these types of investments (Mechael 2014). Technology can add value to the work of partners and grantees in communities, but technology cannot nor should not aim to replace them.

The Double Up Food Bucks (DUFB) program in Detroit has taken this message to heart. Developed by Oran Hesterman of the Fair Food Network, and supported by several foundations, DUFB provides matching dollars for Supplemental Nutrition Assistance Program enrollees to purchase healthy foods at farmers' markets. At the outset, Hesterman and his team relied upon a relatively simple token system. When the state required the use of an electronic benefit transfer (EBT) system for food assistance programs, DUFB adapted and moved to a new digital platform that integrated with the EBT system. But rather than simply pushing out the new technology, Hesterman and his team worked to add value by designing it to put less administrative burden on farmers' market managers and help farmers get reimbursed faster. Thus, while advancing the technology became a focus, the core mission to help increase consumption of fresh food remained the same (Hesterman 2014).

Ultimately, funders need to consider whether or not specific technological investments will add value to the work of their partners and grantees and advance the goal of health equity. If the answer is uncertain, dHealth innovations may not be the right investment for the time being. If, however, the answer is yes, then be creative, be collaborative, be inclusive, and be focused on how dHealth can be used to optimize community assets to achieve health equity and improve population health.

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