



How to Capture the Vast Amounts of Personal Health Data

Developing and scaling an open mHealth data format

SUMMARY

The development of mobile health (mHealth) applications for smartphones and wearable electronic devices has created vast amounts of personal health data that could be of tremendous value to physicians, nurses, and other health care professionals. To date, however, fragmentation of the mHealth ecosystem—fed by economic incentives for proprietary devices and their software, and lack of data standards—has prevented its rich potential from being realized.

Beginning in September of 2011, a team of computer and clinical professionals worked to establish a nonprofit technology initiative called [Open mHealth](#) aimed at bringing clinical meaning to digital health data.

The project is ongoing and has received funding from the Robert Wood Johnson Foundation (RWJF) through December of 2015.

Key Results

As of July, 2014, the Open mHealth team had:

- Assembled a team of expert advisors from the programming and health communities to help develop a practical open platform for mobile health applications (almost universally known as apps)
- Built a specification for how data can be exposed to support integration, and released a software implementation of that specification for developers to get started
- Held a contest in which more than 40 developers created apps using the Open mHealth platform, competing for a prize of \$100,000 provided by the Heritage Provider Network
- Used the Open mHealth architecture and software to develop test apps to address problems related to post-traumatic stress disorder (PTSD) and type 1 and type 2 diabetes

- Collaborated with clinical experts from around the country to understand their needs for how they want to see and use digital health data, then collaborated with toolmakers to understand how they expose data and working with them to translate that information to serve clinical needs in an Open mHealth compliant way

Funding

Beginning in October of 2011 and extending through December of 2015, the Robert Wood Johnson Foundation (RWJF) provided three grants to the Tides Foundation of \$225,000, \$547,134, and \$2,051,960, respectively, to support the project.¹ The [Tides Foundation](#) provides administrative, accounting, and legal support.

This report covers the results of the first two grants and describes work under the third grant in the final section, [Taking the Project Forward](#).

CONTEXT

Why mHealth?

In 2010, *Science* published an article² that answered that question. Its authors were Deborah Estrin, PhD, and Ida Sim, MD, PhD, who would become the co-founders of Open mHealth.

“Development and treatment of chronic disease take place in daily life outside of traditional clinical settings,” they wrote. “To determine and adjust treatment for these diseases, clinicians depend heavily on patient reports of symptoms, side effects, and functional status. Typically, patients report at clinic visits that are months apart, and recall accuracy can be highly variable. mHealth makes it feasible for patients to collect and share relevant data at any time, not just when they happen to visit a clinic, allowing more rapid convergence to optimal treatment.”

The Use of Personal Devices

According to a [2012 study by the Pew Research Internet Project](#), 85 percent of U.S. adults own a cellphone, and of those 53 percent own smartphones. More than half of those smartphone users (52%) have used their phone to gather health information, and this proportion has been increasing dramatically (an increase of 17 percent between 2000

¹ ID# 69215 (\$225,000, September 1, 2011 to May 31, 2012); ID# 69997 (\$547,134, July 15, 2012 to December 31, 2013); ID# 71540 (\$2,051,960, January 1, 2014 to December 31, 2015)

² Estrin D, Sim I. “Open mHealth Architecture: An Engine for Health Care Innovation.” *Science*, 330(6005): 759–760, November 5, 2010. Abstract available [online](#). See also, Chen C, Haddad D, Selsky J, Hoffman JE, Kravitz R, Estrin DE, Sim I. “Making Sense of Mobile Health Data: An Open Architecture to Improve Individual- and Population-Level Health.” *Journal of Medical Internet Research*, 14(4): e112, 2012. Available [online](#).

and 2012). The percentages are higher for those who have recently faced a medical crisis or experienced a significant change in their physical health.

The survey also found, however, that when it comes to using cell phone technology to improve health, there is room for growth. The vast majority of cell phone owners send text messages on their phones, but only 9 percent of those say they receive text updates or alerts about health or medical issues.

Why Is Personal Health Data Not More Usable?

Much of mHealth's vast potential remains untapped because its rich streams of data are not being collected and processed in ways that clinicians can use effectively. Technical specifications used by various applications vary widely, as do the types of data they measure. One diabetes app, for example, might measure a patient's fasting glucose levels, while another app takes its measurements two hours after meals. A guideline from the American Heart Association recommends that individuals get 150 minutes of "moderate activity" a week, but clinicians have no way of knowing how different apps define "moderate activity" because the latest apps and devices report activity in 'steps.'

A clinician looking at a patient's self-collected data, therefore, faces a daunting task of translation and collation before the data can be applied, especially considering the rapidity with which devices and services come and go.

The complications worsen when multiple conditions are involved. A patient with diabetes, hypertension, and depression, for example, may use devices that collect data relevant to each condition, but each of those devices may use different software and measurement standards, making data sharing and evaluation difficult or impossible.

RWJF's Interest in This Area

Open mHealth is one of numerous ways in which RWJF has supported the use of consumer technologies to improve health. Two of RWJF's other funded initiatives are described online: [Project HealthDesign](#) and the [Quantified Self](#).

THE PROJECT

Aiming to integrate the fragmented, or siloed mHealth ecosystem, the Open mHealth team set four basic goals:

- Develop an open (as opposed to proprietary) software architecture that developers can incorporate directly into product development and design. Achievement of this goal would allow clinicians and other health care professionals to access and combine data streams from a wide variety of mobile apps and wearable devices.

- The architecture would emphasize modularity and reusability of common functions, and the simplicity and legibility of application program interfaces.
- The architecture would be available to applications from profit and nonprofit providers.
- The Open mHealth team would take initial steps toward experimental product initiatives involving specific clinical conditions within specific settings.
- Reach out to a community of software developers and health care professionals to communicate needs and share ideas. Such collaboration could encourage widespread adoption of an Open mHealth system once it is developed.
- Develop a set of measurement standards and guidelines that will allow self-collected data to be readily translatable into a clinically useful form.
 - Clinicians would be able to use data from different devices to evaluate patient response to medications, diet, and other treatment interventions and recommendations.
 - Data sources would include passive collection devices that collect data automatically, and data that is actively recorded by patients.
 - When combined with the open software architecture, a common language that could translate data from a variety of sources would open a wealth of other opportunities, including:
 - With appropriate privacy protections in place, clinicians, hospitals, and other health care organizations could mix and match data sources to build custom apps and connect that data to patients' electronic health records.
 - With appropriate privacy protections in place, national and international health care organizations could use mHealth to gather epidemiological information and conduct research on a scale that had previously been prohibitive.
- Develop a self-sustaining business model that will allow Open mHealth to continue operation as a nonprofit, public-interest organization that provides its services to commercial and noncommercial users alike.

Open mHealth is based in San Francisco. Co-founder Deborah Estrin, PhD, is a professor of computer science at [Cornell Tech](#) in New York City and a professor of public health at Weill Cornell Medical College. Co-founder Ida Sim, MD, PhD, is a professor of medicine and co-director of Biomedical Informatics of the Clinical and Translational Science Institute at University of California, San Francisco.

Numerous subcontractors have contributed to the project at various stages of its development, among them IdeaSphere for software development, website design, and

website maintenance; Gobe Group for community engagement, and Stat-Dev, for software development.

RESULTS

In a series of project reports and interviews for this report, staff members of Open mHealth described the following results through July 2014:

Building the Technical Architecture

In order to build an effective technical infrastructure, the Open mHealth team:

- **Formed an architecture working group.** It worked to define—and implement, where possible—an open-source software architecture. Its designers tried to create a simple, modular architecture that would allow outside suppliers to easily adapt their systems to Open mHealth’s specifications. For membership of this working group, see [Appendix 1](#).
- **Established relationships with a number of technical partners**, including Ginger.io, GreenDot Diabetes (now Tidepool), Microsoft HeathVault, MindMyMeds, Entra Health Systems, and Intel’s Mood Map.
- **Established a developer Wiki,³ a Google forum, and a software registry of application programming interfaces to provide specifications for developers wishing to develop apps using Open mHealth’s architecture.** Links to these are available at the Open mHealth [website](#).

Test Projects

In order to test its technical architecture and its ability to integrate a variety of data sources, the Open mHealth team developed several test projects. These included:

- **A test project with Kaiser Permanente Southern California to monitor and manage depression in patients with type 2 diabetes.** More information is available [online](#). It was unclear at the time this report was written whether or not this project was going ahead.⁴
- **A test project with a type 1 diabetes patient and her doctor to incorporate and integrate data from eight monitoring sources into the Open mHealth architecture for easy visualization and analysis.** The project successfully provided

³ Wikipedia [defines a “wiki”](#) as “a web application which allows people to add, modify, or delete content in collaboration with others.”

⁴ According to Open mHealth’s Sim in August 2014, the test was suspended by Kaiser, after initial planning work. However, John Mattison, MD, assistant medical director and chief medical information officer at Kaiser Permanente Southern California, wrote on August 13, there was “no real suspension, some great early results already.... We remain very supportive of OMH [Open mHealth] work.”

the patient and her doctor an integrated view of the patient's condition, increasing their ability to monitor her symptoms and gauge the results of treatment. More information is available [online](#).

- A [YouTube video is available](#) in which the patient involved in this project (Alex Freeman, a pediatric acute care nurse) describes her experience with the Open mHealth project.
- **A test project in cooperation with the U.S. Department of Veterans Affairs to incorporate into the Open mHealth software architecture data from an app previously developed for veterans with post-traumatic stress disorder (PTSD).** The app was then tested on an individual PTSD patient, incorporating data from five sources in such a way that his condition could be more easily and more thoroughly monitored by his physician.
 - More information on the initial phase of the test is available [here](#).
 - More information on the second phase of the test is available [here](#).
 - A case study of “Joe,” the PTSD patient who participated in the second phase, is available [here](#).

Community Building

In order to establish a community of advisors and supporters to help shape and support the Open mHealth concept, team members:

- **Formed a board of advisors.** See [Appendix 2](#) for its membership.
- **Established contacts with representatives from a wide variety of institutions and companies with technical or health care expertise.**
 - These included MIT, Harvard, Georgia Tech, Microsoft HealthVault, Google, OpenMRS, Dimagi, Open Health Tools, and Carnegie Mellon University Silicon Valley.
- **Regularly made presentations at various industry conferences, including the mHealth Summit, the Health Innovation Summit, TEDMED, NASA's mHealth Workshop, Stanford Medicine X, and the O'Reilly Foo Camp.**
- **Established a presence online with a website, an email list, Twitter, Facebook, and Google+.**
 - As of December 2013, Open mHealth had close to 1,000 members on its email listserv. As of July 7, 2014, it had 1,810 followers on Twitter and 196 people in its developer group.
- **Co-sponsored, with the [Heritage Provider Network](#) and the University of California, Los Angeles, the “Heritage Open mHealth Challenge.”** Developers

who entered the contest submitted health apps they'd designed using the Open mHealth architecture. More information is available [online](#).

- More than 40 developers competed for the \$100,000 prize, supplied by the Heritage Provider Network.
- A team from Cornell University, the University of Pittsburgh, and Dartmouth College submitted the winning app. Called MoodRhythm, it tracks the sleep and social activity patterns that bipolar patients maintain in their daily lives, with the goal of helping them maintain a healthy balance. The app can be used on both Apple's iOS and Android smartphones. More information is available [online](#).

Building a Sustainable Business Model

In order to establish itself as a self-supporting nonprofit enterprise, staff members of Open mHealth:

- **Solicited and received contributions from organizations that support the need for an open source platform capable of integrating the various mHealth applications.**
 - Supporters contributing donations of \$5,000 included Johnson & Johnson, Vodafone Americas Foundation, and WebMD. The McKesson Foundation contributed \$10,000. The University of California, Davis, also made a contribution.
 - A [YouTube video](#) is available in which WebMD's executive vice president and chief technical officer, William Pence, explains why his company believes Open mHealth is important.
- **Recast the project's business model.** Open mHealth initially focused on revenue from sustaining contributions and licensing or other agreements related to open-source software that it developed. However, by the time the project embarked on its third RWJF grant in January 2014, its leaders had decided to focus instead on a more product-oriented strategy, designing applications that could be of use first in specific settings and then adopted in similar settings throughout the health care industry. For more on this change of direction see [Challenges](#) (below), and [Taking the Project Forward](#).

Challenges

Over the course of its first two and half years in existence, the Open mHealth project has encountered numerous challenges that have required some basic shifts in its technical, community-building, and self-support strategies. Most of those challenges involved coping with the rapidly evolving and highly disparate mHealth ecosystem, including the entrance of several for-profit companies who promised to offer consolidated platforms for health care apps. These included such heavyweights as Apple and Samsung.

A New Path...

“Our vision hasn’t changed, but our path has, and how we’re building a community around that path,” says David Haddad, MSc, executive director of Open mHealth, who has helped lead the organization since its inception and has been the project director for the second and third RWJF grants. “With any company you have to adapt or die, and we’ve been adapting ... being as nimble as possible in trying to adapt to changes in the industry and to competitors.”

Among the specific issues the team has wrestled with has been convincing members of the community of developers that it is in their interest to support an open API (application programming interface) platform. This in turn made it difficult to find a viable business model that would allow Open mHealth to become self-sustaining, in part because many developers in the app community were unwilling to commit to Open mHealth’s path while still trying to figure out their own business models and resource constraints.

...Brings a Shift in Focus

These concerns helped convince the Open mHealth team to make two key shifts in strategy in late 2013. First, with the permission of app developers, they began taking the initiative to integrate the data from popular devices into their software system, rather than relying on the app developers to do so.

“We haven’t been able to make the business case for them to build to Open mHealth—that caught us up for a long time,” says Ida Sim. “We kept wanting them to build to Open mHealth but there was no reason for them to.”

Second, the Open mHealth team decided to focus on developing specific products that would go beyond the provision of raw data to address specific needs in the health care ecosystem. Such products would not only be able to integrate data from a number of different sources, but—just as important—translate and present the data to assure it is clinically meaningful. Clinicians will eagerly adopt Open mHealth’s systems, the thinking goes, when they can easily use those systems within their daily workflows to make practical decisions regarding patient care. Economic support would theoretically follow.

Data That Is Clinically Relevant

“We are middleware that addresses the physical silo piece,” Sim said in 2014, “but the real contribution is the representation of meaning. That fundamentally is what it is about. We are the only place to represent meaning in a clinically clear and transparent way.”

This involves working closely with clinicians and app developers to come up with measurement standards and guidelines that are meaningful to health care professionals but not so restrictive that they will discourage app developers. Such an approach recognizes, Sim says, that the programming industry is populated by individuals who resist being told what to do. Open mHealth will suggest standards that are widely accepted in the medical community. If developers prefer to go their own way instead, the Open mHealth team will ask for an explanation of the data parameters to facilitate successful translation to the Open mHealth standard.

Sim adds that some areas of mHealth data are well defined—blood pressure, heart rate—but that the standards used by applications measuring behaviors—exercise, diet—are less clear. “Our approach allows each field to go at its own pace,” she says. “Where there is scientific and clinical consensus, we have a way to be clear about what the meaning of the data is. Where we really don’t know and there are no common standards, we’ll work with the app developers to figure it out together.”

TAKING THE PROJECT FORWARD

Two New Exploration Projects

With its third RWJF grant,⁵ the Open mHealth team has embarked on two exploration projects that embody the strategic shifts described above. They are:

- **A collaboration with clinicians at the University of California, Davis, to develop an mHealth application to test alternative treatments for individual patients who are experiencing chronic pain.** The app, called Trialist,⁶ allows the patient and physician to monitor and compare the patient’s reactions to different medications, and to more quickly determine which treatment is most effective for that patient. Such an approach takes into account that different patients respond differently to different medications. More information is available [online](#).
 - The National Institutes of Health (NIH) is the primary funder for the Trialist study, which uses Open mHealth software. Funding for the first year of the five-year study is \$647,339, of which \$123,056 went to Open mHealth.
 - The Trialist app will allow patients and clinicians to compare the efficacy not only of drug treatments (Ibuprofen versus Oxycontin, for example) but also of nondrug treatments (yoga and meditation).

⁵ ID# 71540 (\$2,051,960, January 1, 2014 to December 31, 2015)

⁶ The Trialist app was developed with NIH funding starting in the fall of 2012. Its development took a year and a half.

- Patient enrollment for the study began in July 2014 and will run for 18 months. It is being headed by Richard Kravitz, MD, MSPH, of the University of California, Davis, Center for Healthcare Policy and Research.

“I think the long term potential is vast,” Kravitz says. “The approach is not for everyone, but for the right kind of patient and the right kind of clinician, this is a very effective, efficient way of identifying treatments that are likely to be successful in the long term. There’s considerable value over and above the usual trial-and error-approach to matching treatments to patients.”

- **A collaboration with the [Preventive Cardiology Clinic at Stanford Medicine](#) to develop a tool that would help doctors and nurses treat patients who are at risk of heart attack.** Data from at least 10 data sources (both passive and active) will be collected and translated to keep track of such key indicators as blood pressure, exercise, weight, diet, and medications. Between 10 and 30 patients are to be included in the initial trial.
 - The translation of data into clinically useful standards is being handled by Ida Sim and her staff at the University of California, San Francisco, in cooperation with Michael McConnell, MD, MSEE, co-director of Stanford University’s Preventive Cardiology Clinic. Clinicians from Columbia University’s [Center for Behavioral Cardiovascular Health](#) and Arizona State University’s [School of Nutrition & Health Promotion](#) are adding their expertise on medication adherence and activity monitoring, respectively.
 - The project, called Linq, is set to begin at the Stanford clinic in November 2014, with hopes to integrate other clinical sites into the test during 2015. The Open mHealth team is using RWJF funds to support its part of the project; Stanford is covering its own expenses.

An Uncertain Future

The volatile nature of the mHealth ecosystem means that the future of Open mHealth continues to be uncertain. Team members have been encouraged by the response to the Trialist and Linq projects; both, they say, have attracted the attention of other institutions and organizations.

“I think the overall project is going very well,” says Sim. “We have learned a lot, we have established a good and coherent understanding of the problem, we have defined a solution that really pulls on what we can uniquely contribute, we have a plan to execute that, and the team is onboard to execute it. So I think we’re on a very good trajectory. I’m very happy with where we are.”

The question of financial sustainability continues to trouble some observers. John Mattison, MD, of Kaiser Permanente, who is a member of Open mHealth’s board of advisors, says the project cannot continue to rely on foundation support indefinitely, and

he is concerned that the pressure to generate revenue may cause the nonprofit's leadership to begin thinking of other players in the mHealth marketplace as competitors rather than collaborators. If the currently fragmented mHealth ecosystem fails to find a way to become integrated, he adds, consumers will be the losers.

Those concerns are shared by Stephen J. Downs, SM, RWJF's chief technology and information officer, who has helped oversee the Open mHealth project from its outset. It's always been clear, he said, that Open mHealth would have to be adaptable in order to cope with changes in the marketplace—that is the nature of how things develop in the volatile world of the Internet. That volatility makes it difficult, Downs says, to know how successful the Open mHealth project has been at adapting its approach, and how successful it will be in the long run.

“This [project] is ever-shifting and we'll probably only understand how well it worked in hindsight,” he says. “In the end the market decides. The market can say, ‘Yes, it's good to have a nonprofit and a for-profit alternative.’ But if 99 percent of people choose the for-profit alternative, then the role of the nonprofit is not so significant.”

Downs adds, “There are two ways of looking at the future: on the one hand, their work with important companies is encouraging and shows its potential value. Looking at it in a different way—in terms of what percentage of mHealth apps use Open mHealth—you realize that they have a long way to go.”

Downs makes it clear that, after three grants, RWJF has probably committed as much support to Open mHealth as it intends to. After that, he says, the project will either gain sufficient traction to continue independently or it won't. Whatever happens, Downs emphasizes that the Foundation would like to see an integrated mHealth system develop for the benefit of patients, whether or not Open mHealth becomes the base on which that system is built. “In the end what really matters is that the idea becomes a reality,” he says.

A larger question remains as to the future of the mHealth marketplace as a whole. In June, 2014, Aaron E. Carroll, MD, MS, a professor of pediatrics at the Indiana University School of Medicine, published [an opinion piece in the *New York Times*](#) arguing that the potential of mHealth has been vastly overblown. Patients are often reluctant to provide personal information to their doctors, he said, in part because they're embarrassed by the inconsistency with which they comply with their doctor's advice. Meanwhile, physicians are already overwhelmed with more data than they can possibly handle.

Asked to respond, Richard Kravitz, MD, MSPH, director of the Trialist project, says he agrees that physicians are drowning in data already, and that patients often prove reluctant to share information about their health. Nonetheless, he still believes that Trialist is an mHealth application that has significant, potentially revolutionary,

potential—in part because it is so specifically focused, in part because it is one to which both physician and patient commit themselves from the outset.

Ida Sim feels that many of the problems cited in the *New York Times* article are problems Open mHealth is consciously addressing. The point, she says, isn't to supply physicians with more data, but to supply them with better, more clinically useful data. She adds that some of the data Open mHealth seeks to provide is data that health care providers have never had, such as information about a patient's physical function between clinic visits.

Sim is confident that doctors will make use of data that truly adds value to their practices. She is also confident that there are many instances where patients are more than willing to provide data that might lead to improvements in their health.

Advisory board member John Mattison, MD, adds that the relentless advance of technological development makes it certain that a flood of new digital health products and services will continue to become available to consumers. The one factor that must remain consistent within that constantly evolving marketplace, he believes, is the ability of consumers to be able to conveniently access, translate, and use data from a wide variety of competing suppliers, rather than being limited to the products offered by one of them. It has been Open mHealth's goal to provide the technical platform that will make that possible, and the entry of Apple, Samsung, and other major technology companies into the health arena makes the need for such an integrative platform more rather than less important.

“The looming torrent of disparate data types with different semantic representations will overwhelm both consumer and provider,” Mattison says. “That is why Open mHealth was founded and continues to seek the base solution upon which all products and services can innovate and flourish without creating chaos.”

Because some of the most dominant technology companies have already introduced competing systems, Mattison believes that health applications will continue to be introduced based on a variety of propriety standards. This means that Open mHealth's role in the future will be even more critical as it promotes the development of platforms that can translate and integrate the disparate standards offered by the major players into unified systems.

Consistent with the consortium's vision from the beginning, Open mHealth's will make available open source software, so that other developers can use it for applications they want to introduce. This hybrid yet integrated approach would allow consumers to pick and choose between products from a wide variety of suppliers.

Prepared by: Doug Hill

Reviewed by: James Wood and Molly McKaughan

Program Officers: Christine E. Nieves Rodrigues and Stephen J. Downs

Grant ID#s: 69215, 69997

Project Co-Director: Deborah Estrin, (917) 675-4954; destrin@cs.cornell.edu

Project Co-Director: Ida Sim, (415) 514-8657; sim@medicine.uscsf.edu

Project Co-Director; David Haddad, (510) 432-9091; david@openmhealth.org

APPENDIX 1

Architecture Working Group

(Current as of the end date of the program; provided by the program's management; not verified by RWJF.)

Deborah Estrin, PhD

Professor
Computer Science, Public Health
Cornell Tech and Weill Cornell Medical College
New York, N.Y.

Anne Wright, M.Eng

Co-Principal Investigator
Director of Operations BodyTrack
CREATE Lab
Carnegie Mellon University
Pittsburgh, Pa.

Robert Evans

Senior Software Engineer
Knowledge Department
Google, Inc.
Mountain View, Calif.

Eric Blue

Founder/CEO
TRAQS
Los Angeles, Calif.

Ian Eslick

Managing Partner
Vital Reactor
San Francisco, Calif.

JP Pollak, PhD

CTO and Co-Founder
Wellcoin, Inc.
New York, N.Y.

Mitsu Hadeishi

Co-Founder
Curious, Inc.
San Francisco, Calif.

APPENDIX 2

Board of Advisors

(Current as of the end date of the program; provided by the program's management; not verified by RWJF.)

Patricia Flatley Brennan, PhD, RN

Professor
School of Nursing and College of Engineering
University of Wisconsin-Madison
Madison, Wis.

Eric Horvitz, MD, PhD

Distinguished Scientist and Managing Director
Microsoft Research
Redmond, Wash.

Gaetano Borriello, PhD, MS
Professor
Computer Science & Engineering
University of Washington
Seattle, Wash.

John Mattison, MD
Assistant Medical Director
Chief Medical Information Officer
Kaiser Permanente, Southern California
Pasadena, Calif.

Jody Ranck, DrPH, MA
CEO
Ranck Consulting
Chevy Chase, Md.

BIBLIOGRAPHY

(Current as of date of the report; as provided by the grantee organization; not verified by RWJF; items not available from RWJF.)

Communications and Promotions

Websites

<http://openmhealth.org>. Website created to facilitate public access to information about the nonprofit organization, Open mHealth, and its development of—and applications for—an open software architecture to make effective use of personal health data from mobile devices. San Francisco: Tides Center.

Social Media Pages

“An Intro to Open mHealth.” Open mHealth, posted to YouTube, <https://www.youtube.com/watch?v=y2FJ3hnmHt0>, 2136 views as of September 4, 2014. Also appears under a different URL, <https://www.youtube.com/watch?v=tKuqLyl0Nis>, 972 views as of September 4, 2014.

“An Intro to Open mHealth.” Open mHealth, posted to YouTube, <https://www.youtube.com/watch?v=RieskDNAPsw>, 931 views as of September 4, 2014.

“Diabetes Scenario.” Open mHealth, posted to YouTube, <https://www.youtube.com/watch?v=UwfjwBjNb-4>, 122 views as of September 4, 2014.

Facebook page on Open mHealth, <https://www.facebook.com/openmhealth>, 312 likes as of September 2014.

GitHub page on Open mHealth, <https://github.com/openmhealth/openmhealth.github.com>, 24 contributions since September 4, 2014.

Google+ page on Open mHealth, <https://plus.google.com/106476080119059155073/posts>, 325 followers, 51,144 views as of September 2014.

“Ida Sim.” Open mHealth, posted to YouTube, https://www.youtube.com/watch?v=S8bJEQwR7Sk&list=FLuQP5mc-b2FW9R8TNC_LsCA, 81 views as of September 4, 2014.

“mHealth Summit.” Open mHealth, posted to YouTube, https://www.youtube.com/watch?v=RieskDNAPsw&list=PLkKF1XL_zdC7HJb-WEUwHlmIemEx3JPt-, 26 views as of September 4, 2014u

“Open mHealth for Diabetes—Alex Freeman.” Open mHealth, posted to YouTube, <https://www.youtube.com/watch?v=N5gno33YjxQ>, 356 views as of September 4, 2014.

“Open mHealth Intro New.” Open mHealth, posted to YouTube, <https://www.youtube.com/watch?v=TxRYeMDHdCM>, 29 views as of September 4, 2014.

Twitter page on Open mHealth, <https://twitter.com/OpenMHealth>, 865 followers, 1,057 tweets as of September 2014.

“WebMD and Open mHealth Partnership.” Open mHealth, posted to YouTube, <https://www.youtube.com/watch?v=ESP4JVbGFYI>, 168 views as of September 4, 2014.