INSIGHT

TAPPING INNOVATIVE SOLUTIONS & TECHNOLOGY AT JOHNS HOPKINS MEDICINE

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How to Build an App

ILLUSTRATION BY JAN KALLWEJT

Eighteen months ago, a Johns Hopkins team received a $50,000 grant from the Johns Hopkins Center for Behavior and Health to build the app My Sleep Script.

Many apps are available to help clinicians diagnose and treat patients. This app was developed to aid providers who are not sleep specialists diagnose and treat these conditions. The process required these seven steps, says software engineer Peter Dziedzic:

1. Determine if you want to use an Apple or Android platform. In the U.S. and Europe, Apple is more popular; in Africa and Asia, Android is predominant. Also decide if you want a native app, meaning that it will not require an Internet connection to function, or a Web-based app, which uses the Internet. My Sleep Script is a native Apple app.
2. If you are an employee, make sure to contact the Technology Transfer Office for guidance and regulations that apply to you.
3. Pick one task or function for the first version and work with a software engineer to map and build it. If you don't have access to an engineer, consider an app development company. My Sleep Script started with one survey and two videos.
4. Test and verify with your team that the app functions perfectly. The engineer will work out any glitches.
5. Submit the app to the App Store or Google Play (for Android) to ensure it follows particular engineering protocols. Once approved, offer the app to the public.
6. Consider feedback from your app users and then incorporate add-ons so the app can perform additional tasks. After several iterations, My Sleep Script now has 14 surveys, nine videos and eight PDF scripts.
7. Market the app to those it could help. For now, My Sleep Script is being piloted with Johns Hopkins providers, and it will be marketed to appropriate groups in the future.

"I think mobile apps will shrink the gap between patients and clinicians and help translate data and information into knowledge for better outcomes."
— Peter Dziedzic

MY SLEEP SCRIPT: THE TEAM BEHIND THE APP

Made up of two parts, My Sleep Script first teaches users about six common sleep disorders. It then provides quizzes that unlock a diagnostic checklist to identify patients with symptoms of a sleep disorder, as well as printable referral forms and information. The team that developed the app includes:

Sleep Experts
Rachel Salas, assistant professor of neurology

Charlene Gamaldo, medical director of the Johns Hopkins Sleep Disorders Center

Behaviorist
Luis Buenaver, director of the Johns Hopkins Behavioral Sleep Medicine Program

Programmer and Software Engineer
Peter Dziedzic, Department of Neurology

Project Manager
Paula David, senior research service analyst, Department of Biology

Animator
Anthony Kwan, 2013 graduate of The Johns Hopkins University

To learn more about app development from each of these team members, visit hopkinsmedicine.org/insight.

Mobile App Survey Results

Johns Hopkins Medicine conducted an email survey of its 41,000-plus employees between July 17 and Aug. 5 to better understand how apps are being used and how we can improve the ways we are integrating the appropriate apps into our work. A total of 3,905 staff members responded.

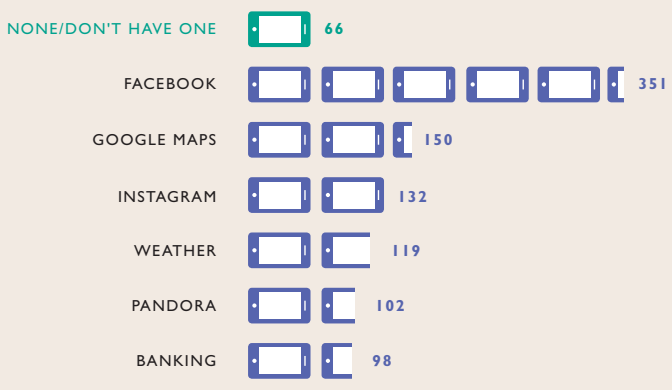
3 APPS REPORTED FAVORITES FOR WORK

EPOCRATES
Epocrates is a drug reference application that uses easy-to-learn features like the pill identifier, medical calculators and drug interaction checker to help support clinical care decisions.
http://bit.ly/1bjctEf

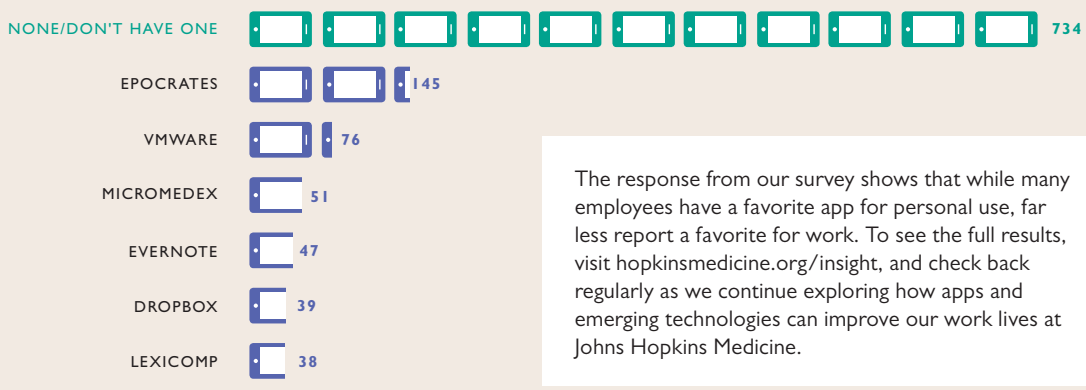
VMWARE
No matter where you are, this virtual desktop application allows your smart device to operate as your normal workstation computer.
http://bit.ly/ZAZMDI

MICROMEDEX DRUG REFERENCE
This free app provides on-the-go access to drug information, including dosing recommendations, therapeutic class, administration, monitoring, toxicology and clinical teaching.
http://bit.ly/ZAZNHK

OVERALL FAVORITE APP



FAVORITE APP FOR WORK USE



The response from our survey shows that while many employees have a favorite app for personal use, far less report a favorite for work. To see the full results, visit hopkinsmedicine.org/insight, and check back regularly as we continue exploring how apps and emerging technologies can improve our work lives at Johns Hopkins Medicine.

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Dolphin App for Neurological Brain Function

ILLUSTRATION BY PAIGE VICKERS

The brainchild of the Kata team in Johns Hopkins' Brain, Learning, Animation, and Movement Lab, I Am Dolphin is an immersive virtual game created to study the connection between motor skills and cognition.

Players take on the form of a dolphin or orca. The swipe of a finger on a touch screen phone or tablet can send the sea creatures soaring in the air or exploring the oceans' depths in search of a meal.

The team is creating a different game based on similar underlying principles that can be tested in a clinical trial to determine its ability to help patients of stroke recover lost motor function. Participants will play the game to augment traditional therapy. Their results will be compared to a control group that won't be playing the novel video game to determine who recovers motor function faster.

"I'd been wondering for a long time: Where does the cognitive stop and the motor begin?" neurologist and principle investigator John Krakauer said in an interview with *National Geographic* in June. "They're inseparable: Movement is cognition. By studying movement and what it does to people—why they love it, why they're devastated when they lose it—we can learn so much more about the brain." Through observation, researchers may discover how movements are learned.

The creators are a diverse group: an artist, a neuroscience and neurology professor, and two software engineers. Together, they married principles of neuroscience and gaming to create a cast of cetacean characters capable of lifelike movements.

Software architect Omar Ahmad and his two colleagues, Promit Roy and Kat McNally, logged hundreds of hours at Baltimore's National Aquarium observing, filming and drawing the dolphins to develop the realistic simulations. "Our simulations have virtual muscles, bones and a functioning motor system that users can actually connect with via their own motor systems," explains Ahmad. By learning to make these animals move, players might be able to relearn movements that they've lost.

The animal avatars are so realistic that the game pulls subjects into a world where they feel as if they are the virtual marine mammals. Researchers hope that by watching users learn how to make the simulations move, they will be able to unlock how movements are learned in the first place.

Make Web Content Accessible Across All Devices

If you've visited hopkinsmedicine.org recently, chances are you did so with a mobile device.

Nearly 50 percent of visitors to the Johns Hopkins Medicine website are using tablets, smartphones or other devices.

Today there are thousands of different devices on the market in hundreds of different display sizes. In addition to phones and tablets, we see content delivered to watches, glasses and the dashboards of cars. Because content has to be created for these seemingly infinite venues and user experiences, Web professionals face a significant challenge in the years ahead.

Johns Hopkins' Internet Strategy team is working to meet that challenge. In the last 18 months, the team transformed the most visited and strategically critical pages of hopkinsmedicine.org to render effectively across devices using an approach called responsive design.

In fact, if you're reading this issue of *Insight* on a tablet or phone, you'll see that it is dramatically different than the desktop or print version being read by some of your colleagues.

Responsive design enables pages and content to render effectively regardless of screen size. Image and font sizes are transformed for maximum legibility and readability. Columns are realigned or disappear completely. Navigation adopts its performance behaviors to match those of the operating system.

It's the best way to create engaging experiences that are simple, effective and available however and whenever the audience chooses to consume them.

Responsive design requires constant, incremental creativity and innovation between designers, developers, writers and other key players as we restructure content to perform in the digital era.

Learn more about responsive design at left-nav.blogs.hopkinsmedicine.org/category/mobile.

TELL US WHAT YOU THINK!

SCAN THE QR CODE OR VISIT

HOPKINSMEDICINE.ORG/INSIGHT/SURVEY

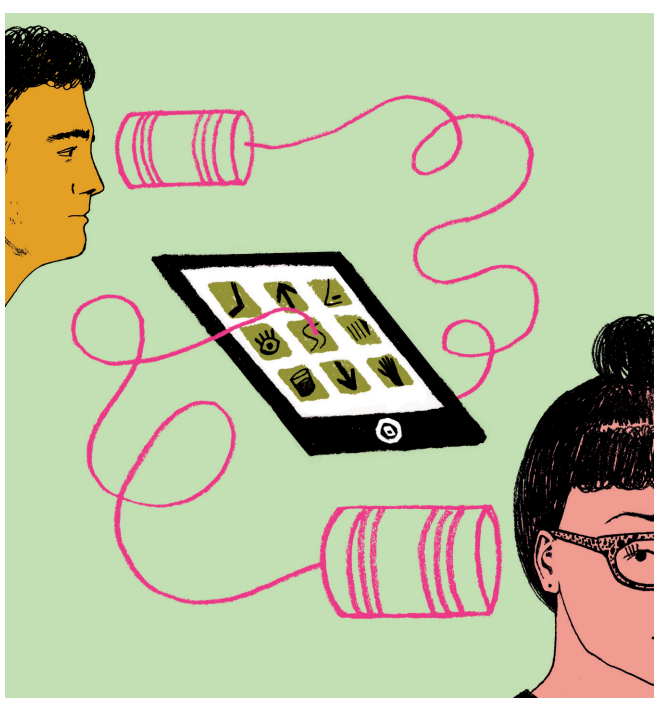

ILLUSTRATION BY PAIGE VICKERS

Pupil-Tracking Device Gives a Voice to the Voiceless

The Department of Physical Medicine and Rehabilitation is tapping into new technology to improve communication with hospitalized patients who are unable to talk or write.

Occupational and speech therapists help these individuals—many of whom require breathing or feeding tubes—speak to their loved ones and care team through a device called an "eye gaze system." Users can create a message or choose from a menu of phrases through brief eye contact with icons on an overhead screen. The message is then vocalized by the machine or sent as an email.

"It gives patients a sense of control," explains Kelly Casey, an occupational therapist and assistive technology practitioner at The Johns Hopkins Hospital. "The system also helps us better understand patient needs and preferences, especially at critical moments like the end of life," Casey says.

Casey recalls how the system helped a middle-age woman regain independence during a difficult recovery following surgery to remove a brain tumor.

"She was in a lot of pain and in a really bad place," Casey says. "The second we put the eye gaze system in front of her, she lit up. She was able to talk to her husband again and email her friends."

Tablet applications are another popular tool to help patients communicate. One app called Proloquo2Go pairs images with words and plays selected phrases aloud when pressed. Like the eye gaze system, patients can use the app to talk with their loved ones or to ask their care team a question.