The Nuts and Bolts of Bits and Bytes

A researchers primer on working with technologists to build effective and fundable projects

J. Graham Thomas, PhD
Jon Moon, PhD
Adam Hoover , PhD
Wendy Nilsen, PhD
Carly Goldstein, PhD

J. Graham Thomas, Ph.D.

Alpert Medical School of Brown University & The Miriam Hospital

Background: Clinical Psychologist with Emphasis in Behavioral Medicine

Role: NIH-funded behavioral scientist using eHealth/mHealth technology primarily for the purpose of measuring and intervening on weight-related behaviors such as diet and physical activity.

Primary Technologies Used: Native and Web-based smartphone apps for Ecological Momentary Assessment (EMA) and Ecological Momentary Intervention (EMI); Web-based virtual reality (VR); Objective sensing technology for behavioral monitoring.

Example Projects: Ecological Momentary Assessment of Behavioral and Pyschosocial Predictors of Weight Loss Following Bariatric Surgery (R01 DK108579); Experience Success: Virtual Reality Skills Training to Enhance e-Weight Loss (R42 DK103537); LIVE SMART: Smartphone Intervention for Weight Control (R01 DK095779).

Top Tips for Collaboration with Technologists: *#1:* Involve technologists early in project conceptualization. *#2:* Behavioral theory and empirical evidence are the most important tools for intervention development; not everything that is technically feasible will be effective. *#3:* Avoid assumptions about how users/participants/patients will respond to technology. Involve them in development, pilot test, & study their response.

Jon Moon, PhD

MEI Research, Ltd

Background: Biomedical Engineer, Entrepreneur, Researcher, and Patent Agent

Role: Corporate and academic technologist who creates machines and software for health research. That includes mHealth technologies for messaging, objective measurements and behavior management.

Primary Technologies Used: Mobile and web app development tools, agile methods, body worn sensors, data acquisition interfaces, HVAC systems, machine fabrication and, believe or not, plumbing.

Example Projects: Location Initiated Individualized Texts for African American Adolescent Health (1R41MD008840-01); Cross Platform Mobile EMA and Unified Platform for Managing Objective Behavioral Data (HHSN261201300084C); Integrating Voluntary Geographic Information and Public Data (HHSN261201400034C).

Top Tips for Collaboration with Technologists: *#1:* Involve people like me early and throughout. *#2:* Learn to describe your need or problem, not how to solve it. *#3:* Describe what you want in words supported by lots of diagrams and pictures. *#4*: Learn your institution's policies for contracts, security and privacy, accessibility, etc. well before you start the project.

Adam Hoover, Ph.D.

Electrical & Computer Engineering Dept, Clemson University

Background: Computer Engineer with Emphasis in Tracking Systems

Role: NIH-funded scientist developing new mHealth technologies for the measurement of energy intake and tracking of eating behaviors.

Primary Technologies Used: Cameras, range sensors, accelerometers, gyroscopes, pressure sensors, scales. University facilities for device prototyping with outsourcing of printed circuit board design, manufacturing, and case injection molding.

Example Projects: Using Context to Validate and Improve Wrist-Tracking Measures of Eating Activity (R01HL118181); Assessing the Bite Counter as a Tool for Food Intake Monitoring (R42DK091141).

Top Tips for Collaboration with Technologists: *#1:* The best problems to apply technology to are the ones which automation could simplify or improve quality. If a human cannot do a task, it is unlikely that technology will make a difference. *#2:* Educate the technologist about the problem domain so that they can apply their experience and perspective. *#3:* Engineering faculty have to publish too.

Wendy J. Nilsen, Ph.D.

National Science Foundation

Background: Clinical Child Psychologist

Role: Program director leading the NSF-NIH Smart and Connected Health program

Primary Technologies Used: The full range of technology!

Example Projects: Almost any project in the digital age can benefit from some technology

Top Tips for Collaboration with Technologists:

- Involve technology early in project conceptualization.
- Remember your technology colleagues need to gain tenure doing more than your program: make sure something good is in there for them and their students.
- Think about how to measure what you really want to know. Don't just create electronic versions of traditional constructs.
- Not everyone grew up with IRBs (or even human subjects); use your knowledge.
- **There are many kinds of technology experts – Know your partner!**

Panel Discussion

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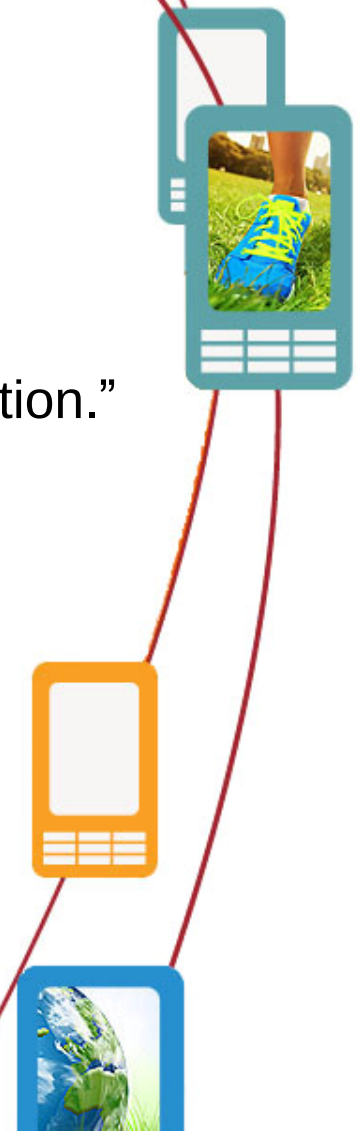
- Graham Thomas, PhD



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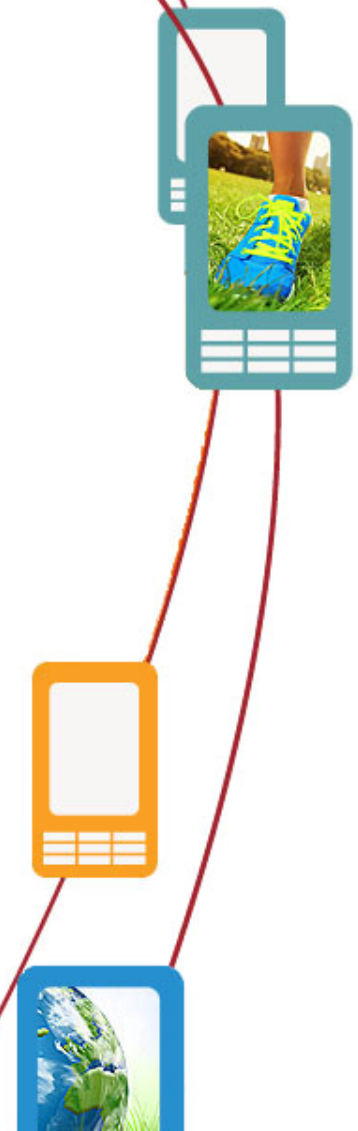

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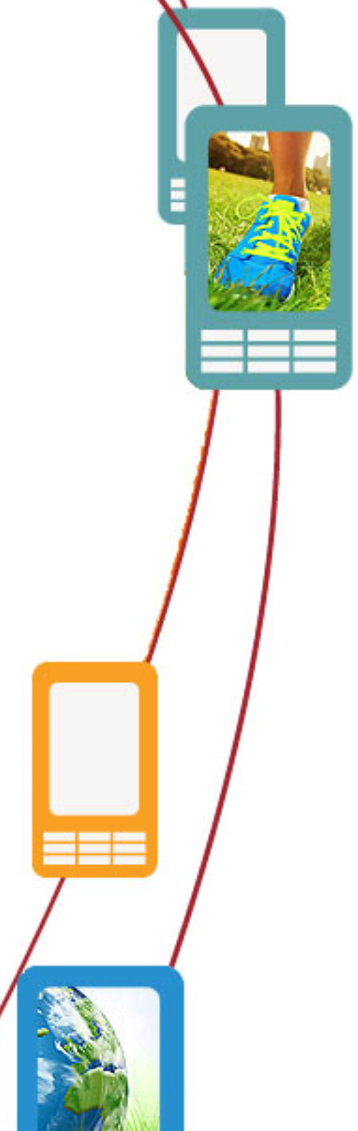

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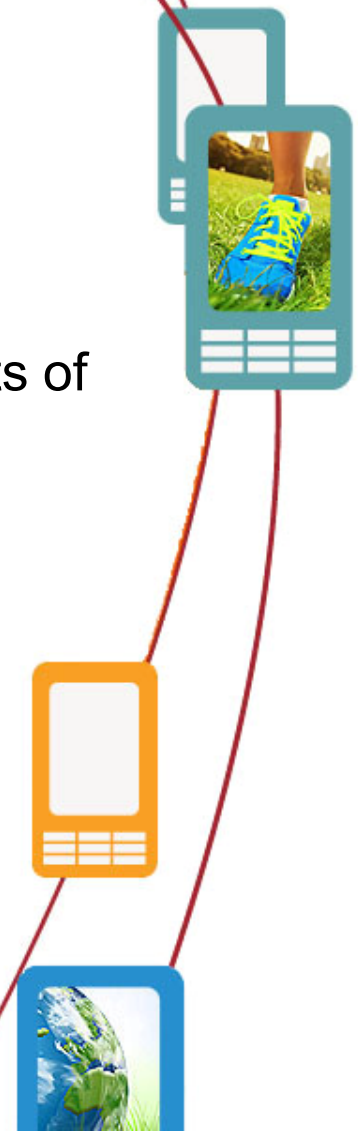

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