




Design Sprints and Usability Testing

Innovative, fast-paced methods for creating user-friendly digital health interventions


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Anthony Threatt, PhD, MArch
Lindsay Mayberry, PhD, MS

#DesignSprintWorkshop
SGIM Workshop April 12, 2018

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Introductions




Tony Threatt, PhD, MArch
Senior User Experience (UX)
Designer

Master of All Things Design Sprint


 @tonyphd

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Introductions




Lyndsay Mayberry, PhD, MS
Assistant Professor

Usability Wizard


Twitter Averse

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3




Introductions



William Martinez, MD, MS
Assistant Professor

Knowledgeable enough
to be dangerous

 @DrWillMartinez

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Disclosures & COI

none

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Learning Objectives

1. Understand Design Sprint methodology and how to apply it to rapidly create health apps or web-based interventions that appeal to users' needs and supports their use
2. Recognize how a mixed-methods approach to evaluating prototype usability informs prototype revisions and enhances scientific rigor
3. Develop a plan to engage an interdisciplinary team and apply Design Sprint and usability assessment methods for your own digital health intervention

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Case Study

Diabetes Dashboard within a Patient Web Portal

The screenshot shows a patient web portal interface. The main navigation area includes 'MY TOOLS' with links for 'My record', 'My forms', 'Messages', 'Self management', 'Appointments', and 'My Accounts'. The 'Self management' link is circled in red. Below this are sections for 'MY HEALTH TOPICS' and 'MY HEALTH NEWS'.

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Design Sprint

The diagram illustrates the Design Sprint process over a five-day period:

- MONDAY:** Map (represented by a map icon)
- TUESDAY:** Sketch (represented by a sketch icon)
- WEDNESDAY:** Decide (represented by a decision icon)
- THURSDAY:** Proto-type (represented by a prototype icon)
- FRIDAY:** Test (represented by a test icon)

A book cover for 'SPRINT: How to Innovate on Days 1-5' by Jake Knapp is shown in the bottom left corner.

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How to Create Your Team

Decider

Team members

Facilitator

No more than 8 people

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Day 1 Understanding and Mapping

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Understand

Who are the users?

What are their needs?

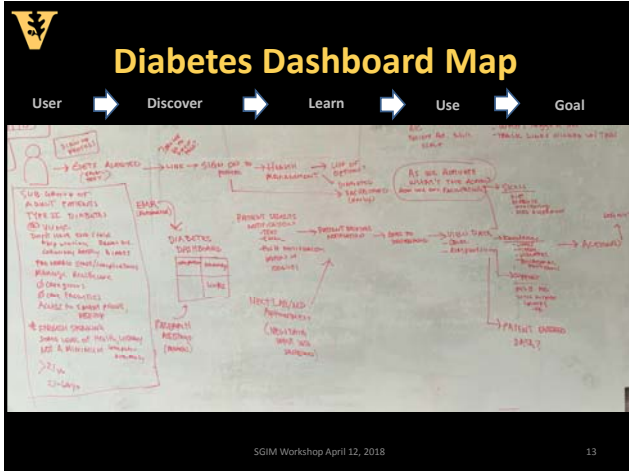
What is the context?

How does this fail?

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Always Be Capturing

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Ask the Experts

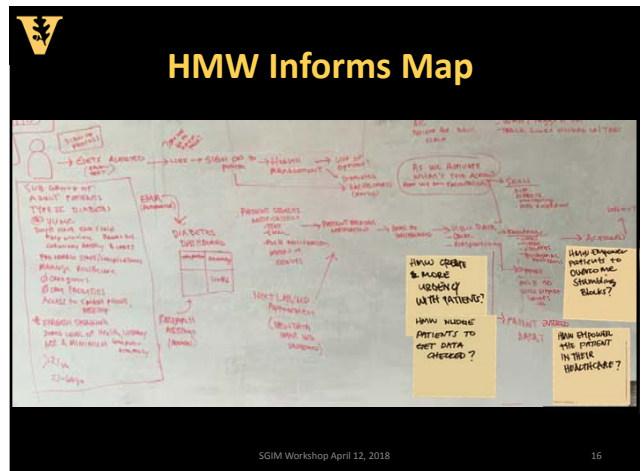
Questions

- What will make this project a success?
- How does it go wrong?
- What has been tried in the past?
- What was learned?
- What's wrong or missing from the map?

Who?

- Patients with T2DM
- Patient Portal Super Users
- Diabetes Educators
- Clinic Nurses
- Behavioral Scientists
- HIT Experts
- Physicians

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Mapping Exercise (5 min)

Given your end goal:

Who is your user?

What is step 3 or 4 basic steps does the user need to go through to get to the end goal?

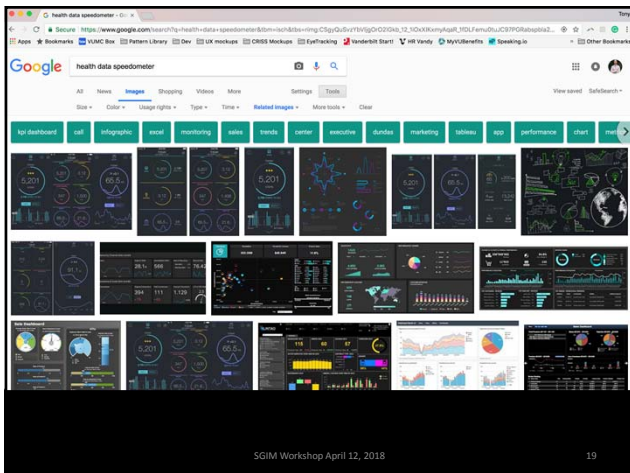
- How do they discover the app?
- What do they learn/observe when in the app?
- What action do they take in the app?

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Day 2

Sketch Competing Solutions

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Solution Sketches

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Sketching Exercise (7 min)

Given your workflow map:

- Sketch 1 specific screen
- You will sketch it 8 times

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Design Sprint – Day 3

Making difficult decisions and turning ideas into testable hypotheses

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Day 3

ART MUSEUM + VOTE
HEATMAP
REMOVE MAYBE LATER:

STORYBOARD + SOLUTION

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Decision Making Process

Submit Super Get Advice

Speed Critique

Decider to Decider

Art Museum Heat Map Speed Critique Vote Decider Decides

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Decision Making Process

Submit Super Get Advice

Speed Critique

Decider to Decider

Art Museum Heat Map Speed Critique Vote Decider Decides

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Decision Making Process

Discuss
(facilitator leads, 3 min/solution)

Scribe

Creator Silent till End

Art Museum Heat Map Speed Critique Vote Decider Decides

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Decision Making Process

Submit Super Get Advice

Speed Critique

Decider to Decider

Art Museum Heat Map Speed Critique Vote Decider Decides

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Decision Making Process

Art Museum → Heat Map → Speed Critique → Vote → Decider Decides

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Map → HMW → Solutions

Map

Solutions

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Diabetes Dashboard Storyboard

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Storyboarding Group Exercise (10 min)

- Given your workflow map and selected 3-part sketch, create one storyboard
- Place 3 part sketches where they go on the storyboard
- Draw the final square screen
- Draw the opening screen
- Fill in the storyboard


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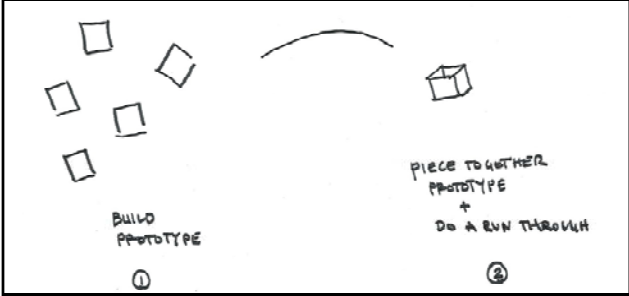
Design Sprint – Day 4

Creating a high-fidelity prototype

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Day 4



BUILD PROTOTYPE ①


PIECE TOGETHER PROTOTYPE + DO A RUN THROUGH ②

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<https://www.youtube.com/watch?v=QvMFu29n1O4>

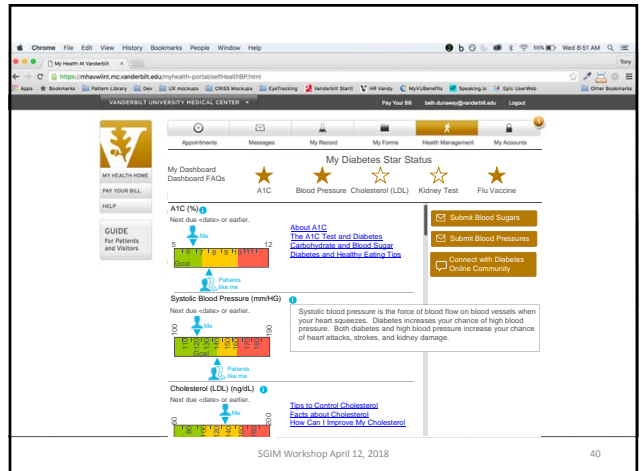
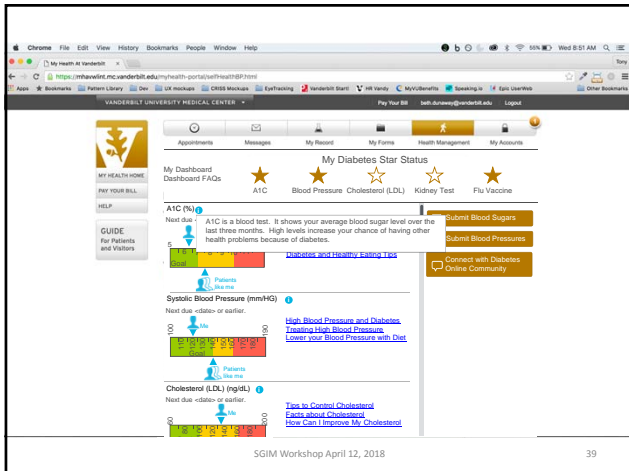
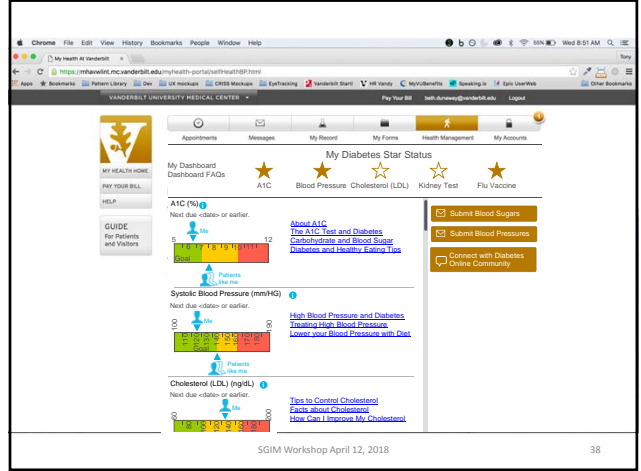
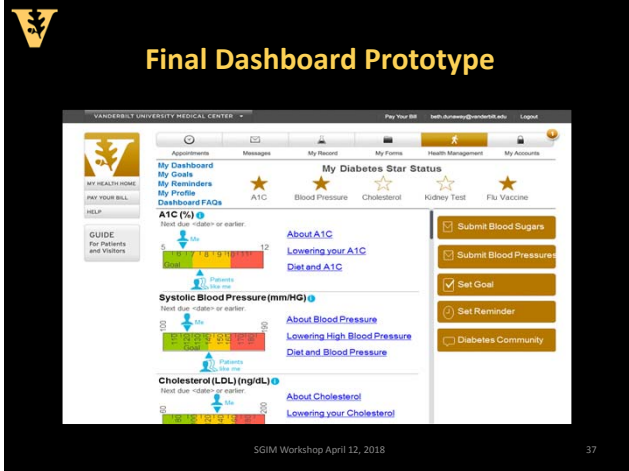
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Initial Dashboard Prototype



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My Diabetes Star Status

My Dashboard Dashboard FAQs A1C Blood Pressure Cholesterol (LDL) Kidney Test Flu Vaccine

MY HEALTH HOME MY HEALTH HOME PAY YOUR BILL PAY YOUR BILL HELP HELP

GUIDE For Patients and Visitors

A1C (%)
Next due <date> or earlier.
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
03/15/2016 06/15/2016 09/15/2016 12/15/2016
About A1C The A1C Test and Diabetes Medications and Blood Sugar Diabetes and Healthy Eating Tips

Systemic Blood Pressure (mmHG)
Next due <date> or earlier.
90 100 110 120 130 140 150 160 170 180 190 200
03/15/2016 06/15/2016 09/15/2016 12/15/2016
High Blood Pressure and Diabetes Training High Blood Pressure Lower your Blood Pressure with Diet

Cholesterol (LDL) (mg/dL)
Next due <date> or earlier.
0 20 40 60 80 100 120 140 160 180 200
03/15/2016 06/15/2016 09/15/2016 12/15/2016
LDL cholesterol is a blood test. It shows how much bad fat called LDL is in your blood. LDL cholesterol can deposit in your blood vessels. Higher levels increase your chance of heart attacks and strokes.
Tips to Control Cholesterol Facts about Cholesterol How Can I Improve My Cholesterol

Submit Blood Sugars Submit Blood Pressures Connect with Diabetes Online Community

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My Diabetes Star Status

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MY HEALTH HOME MY HEALTH HOME PAY YOUR BILL PAY YOUR BILL HELP HELP

GUIDE For Patients and Visitors

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My Diabetes Star Status

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MY HEALTH HOME MY HEALTH HOME PAY YOUR BILL PAY YOUR BILL HELP HELP

GUIDE For Patients and Visitors

Date	Value
03/15/2016	6.3%
06/15/2016	7.3%
09/15/2016	8.3%

A1C (%)
Next due <date> or earlier.
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
03/15/2016 06/15/2016 09/15/2016 12/15/2016
About A1C The A1C Test and Diabetes Medications and Blood Sugar Diabetes and Healthy Eating Tips

Systemic Blood Pressure (mmHG)
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03/15/2016 06/15/2016 09/15/2016 12/15/2016
Tips to Control Cholesterol Facts about Cholesterol How Can I Improve My Cholesterol

Submit Blood Sugars Submit Blood Pressures Connect with Diabetes Online Community

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My Diabetes Star Status

My Dashboard Dashboard FAQs A1C Blood Pressure Cholesterol (LDL) Kidney Test Flu Vaccine

MY HEALTH HOME MY HEALTH HOME PAY YOUR BILL PAY YOUR BILL HELP HELP

GUIDE For Patients and Visitors

A1C (%)
Next due <date> or earlier.
5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
03/15/2016 06/15/2016 09/15/2016 12/15/2016
About A1C Vanderbilt patients like you (same gender, age group, and diabetes medication) have an average A1C of 7.5%.
The A1C Test and Diabetes Medications and Blood Sugar Diabetes and Healthy Eating Tips

Systemic Blood Pressure (mmHG)
Next due <date> or earlier.
90 100 110 120 130 140 150 160 170 180 190 200
03/15/2016 06/15/2016 09/15/2016 12/15/2016
High Blood Pressure and Diabetes Training High Blood Pressure Lower your Blood Pressure with Diet

Cholesterol (LDL) (mg/dL)
Next due <date> or earlier.
0 20 40 60 80 100 120 140 160 180 200
03/15/2016 06/15/2016 09/15/2016 12/15/2016
Tips to Control Cholesterol Facts about Cholesterol How Can I Improve My Cholesterol

Submit Blood Sugars Submit Blood Pressures Connect with Diabetes Online Community

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My Diabetes Star Status

My Dashboard Dashboard FAQs A1C Blood Pressure Cholesterol (LDL) Kidney Test Flu Vaccine

A1C (%)
Next due <date> or earlier.

Systolic Blood Pressure (mmHG)
Next due <date> or earlier.

Cholesterol (LDL) (mg/dL)
Next due <date> or earlier.

Kidney Test (Urine)
Next due <date> or earlier.

Flu Vaccine Completed
(Sep 2016 - Apr 2017)

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My Diabetes Star Status

My Dashboard Dashboard FAQs A1C Blood Pressure Cholesterol (LDL) Kidney Test Flu Vaccine

Cholesterol (LDL) (mg/dL)
Next due <date> or earlier.

Past Due
Request appointment to have checked.

Kidney Test (Urine) Completed
Next due <date> or earlier.

Flu Vaccine Completed
(Sep 2016 - Apr 2017)

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My Diabetes Star Status

My Dashboard Dashboard FAQs A1C Blood Pressure Cholesterol (LDL) Kidney Test Flu Vaccine

Cholesterol (LDL) (mg/dL)
Next due <date> or earlier.

Kidney Test (Urine) Completed
Next due <date> or earlier.

Flu Vaccine Completed
(Sep 2016 - Apr 2017)

Microalbumin is a urine test. It can find very small levels of a protein called "albumin" in your urine. High levels are an early sign of kidney damage from diabetes. High levels increase your chance of kidney failure and dialysis. Patients with diabetes should have a microalbumin test at least once every 12 months.

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My Diabetes Star Status

My Dashboard Dashboard FAQs A1C Blood Pressure Cholesterol (LDL) Kidney Test Flu Vaccine

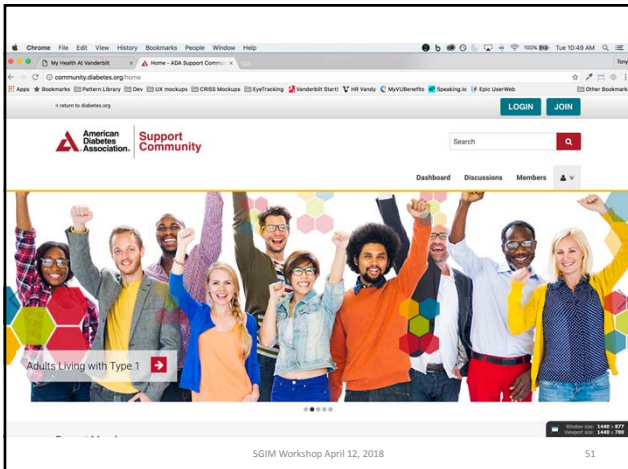
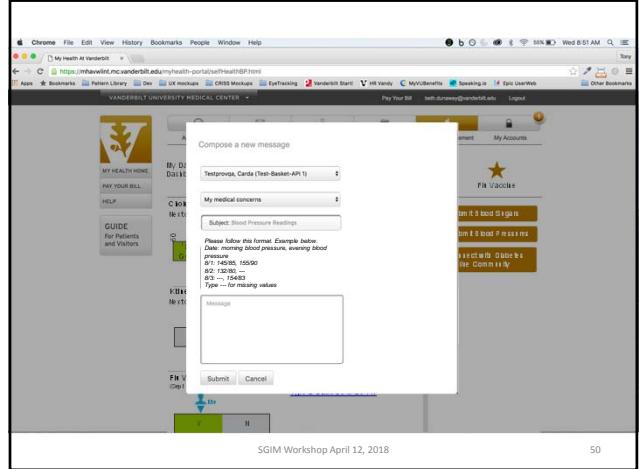
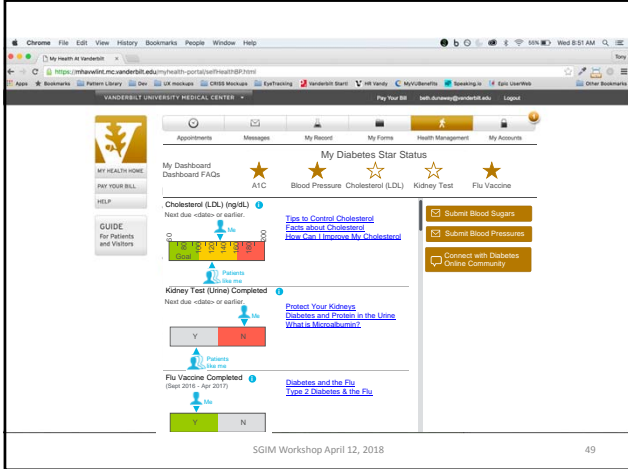
Cholesterol (LDL) (mg/dL)
Next due <date> or earlier.


Kidney Test (Urine) Completed
Next due <date> or earlier.

Flu Vaccine Completed
(Sep 2016 - Apr 2017)

The flu is an infection caused by a virus that infects your lungs. People with diabetes are at high risk of serious complications from the flu. The flu shot helps your body protect itself from the flu virus. Patients with diabetes should have a flu shot every fall (Sept - Nov).

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Design Sprint – Day 5

Prototype assessment using a mixed-methods approach

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User Test Your Prototype

- Usability testing helps ensure interventions work as intended
 - Recruit target users
 - 5 is magic number
 - Use multiple rounds of testing
 - Collect both qualitative and quantitative data

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User Testing Methods

Adapted from Nielsen Norman Group

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Usability Questionnaires

- Computer Usability Satisfaction Questionnaire (CUSQ)¹
- System Usability Scale (SUS)²
- Health Information Technology Usability Evaluation Scale (Health-ITUES)³

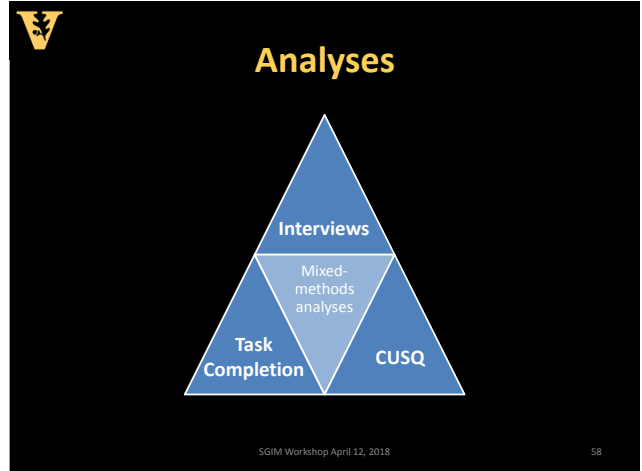
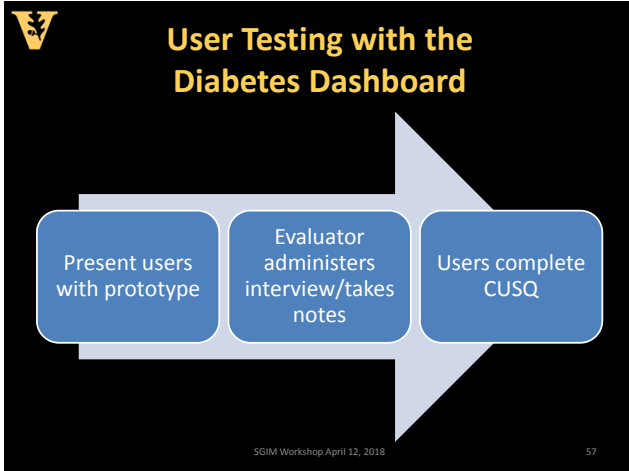
¹ Lewis JR. *Int J Hum Comput Interact* 2009
² Brooke J. *In Usability evaluation in industry* 1996
³ Schanil et al. *JMIR mHealth and Uhealth* 2018

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Sample SUS items

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I found the various functions in this system well-integrated.
4. I think that I would need the support of a technical person to be able to use this system.

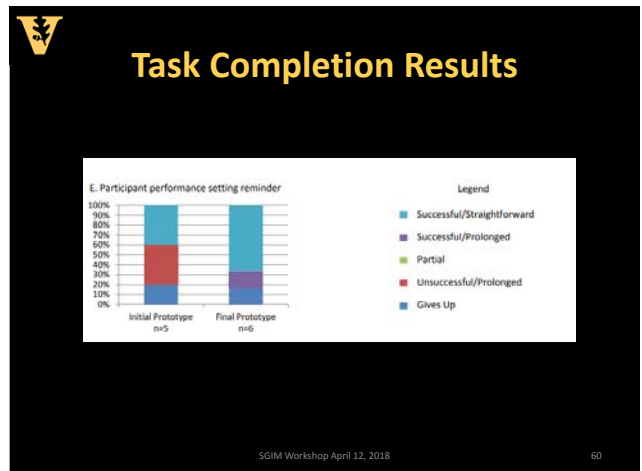
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Qualitative Results

Usability Element	Unique Concern Type and Example Quote
Design	Goal Setting Functionality <i>"The end date [for the goal], you're talking about the last day of your goal, I don't get that. Help me."</i>
	Reminder functionality <i>"That's a reminder, oh! That's a clock symbol. Gotcha. It could be clearer."</i>
Efficiency of Use	Redundancy <i>"I mean those two things [my medical concerns drop down menu] and the message subject [free text]."</i>
Content & Terminology	Online Community <i>"You're not going to be able to communicate with other patients and talk about the key things they do for support. That might be something you would add."</i>

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Final Thoughts

Design Sprints provide a highly efficient, human-centered approach to:

- Rapidly understand the problem and audience
- Explore creative solutions
- Identify and map the best ideas
- Develop and test realistic prototypes

Yes, you need to carve out 5 days, but worth it considering overall time saved

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Acknowledgements



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Thank You!

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[Link to slides:](#)


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Design Sprint Links

<http://www.gv.com/sprint/>
<https://www.fastcodesign.com/1672887/how-to-conduct-your-own-google-design-sprint>
<https://www.fastcodesign.com/1672889/from-google-ventures-the-6-ingredients-you-need-to-run-a-design-sprint>
<https://www.thesprintbook.com>
<https://sprintstories.com>
<https://blog.ajsmart.com>
https://www.youtube.com/channel/UCeB_OpLspKjGikv1CYkWFFw
<https://blog.prototypr.io/a-google-design-sprint-gone-wrong-410dbb92f02b>

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Design Sprint Books



Sprint: How to Solve Big Problems and Test New Ideas in Just Five Days


Jake Knapp
John Zeratsky



Design Sprint: A Practical Guidebook for Building Great Digital Products

Richard Banfield
C. Todd Lombardo
Trace Wax

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Usability References

Lewis JR. IBM computer usability satisfaction questionnaires: psychometric evaluation and instructions for use. *International Journal of Human-Computer Interaction*. 1995 Jan 1;7(1):57-78

Brooke J. SUS-A quick and dirty usability scale. *Usability evaluation in industry*. 1996 Jun 11;189(194):4-7.

Schnall R, Cho H, Liu J. Health Information Technology Usability Evaluation Scale (Health-ITUES) for Usability Assessment of Mobile Health Technology: Validation Study. *JMIR mHealth and uHealth*. 2018;6(1):e4.

Sarkar U, Gourley GI, Lyles CR, Tieu L, Clarity C, Newmark L, Singh K, Bates DW. Usability of commercially available mobile applications for diverse patients. *Journal of general internal medicine*. 2016 Dec 1;31(12):1417-26.

- Uses Task-based Usability Measure

Lyles CR, Sarkar U, Osborn CY. Getting a technology-based diabetes intervention ready for prime time: a review of usability testing studies. *Current diabetes reports*. 2014 Oct 1;14(10):534.

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