

Build Test Iterate

COMP47250: Team Software Project

Dr. Mark Matthews & Dr. Simon Caton

The Challenge

In 7 minutes, build the tallest free-standing structure out of:

The marshmallow must be on top



20 sticks of spaghetti



+ one yard tape



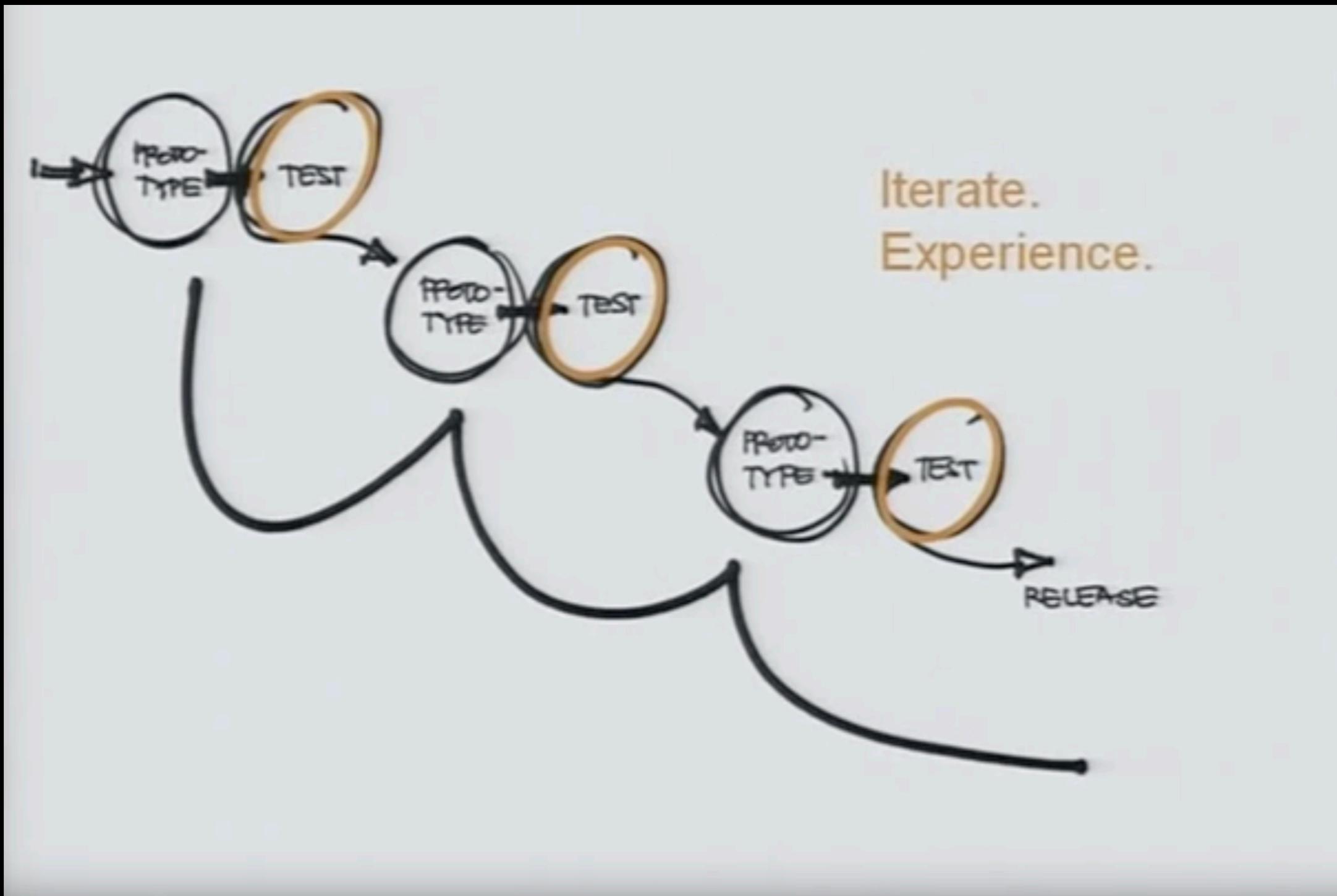
+ one yard string



+ one marshmallow



Build - test - iterate



Marshmallow

Your Project

Goal

Build the tallest tower you can with the marshmallow on the top....

?

Ingredients

Spaghetti, Tape,
Marshmallow

People, Data, Model,
Web app

Measure of success

Height of the tower
Is the marshmallow
on top?

Quality of data?
Accuracy of model?
Usability & UX of app
Presentation of project

Generating ideas

*“The best way to have a good idea
is to have lots of ideas.”*

Linus Pauling
Professor of Chemistry
Caltech, UC San Diego, Stanford
Only person awarded two unshared Nobel Prizes



IDEO Brainstorming Rules

1. Be visual
2. Defer judgment
3. Encourage wild ideas
4. Build on the ideas of others
5. Go for quantity
6. One conversation at a time
7. Stay focused on the topic

[Kelley, The Art of Innovation]

Identify your goal

- As clear as possible, write down your goal in 1 sentence
- You may have a vision for broad application of your app but focus on one initial application
- Critique - refine
 - “Help someone to book a flight in 5 minutes”
 - “I have two job offers - one from Dublin, one from Cork. Which salary is better?”

Who is it for?

- Be as specific as possible based on your goal
- Are you designing for yourself? Or for others?
- If others, how are you going to check if you're on the right track?

ITERATIVE DESIGN

Requirements gathering

What is needed?

Understand users, environments, tasks.

Use formative inquire methods:

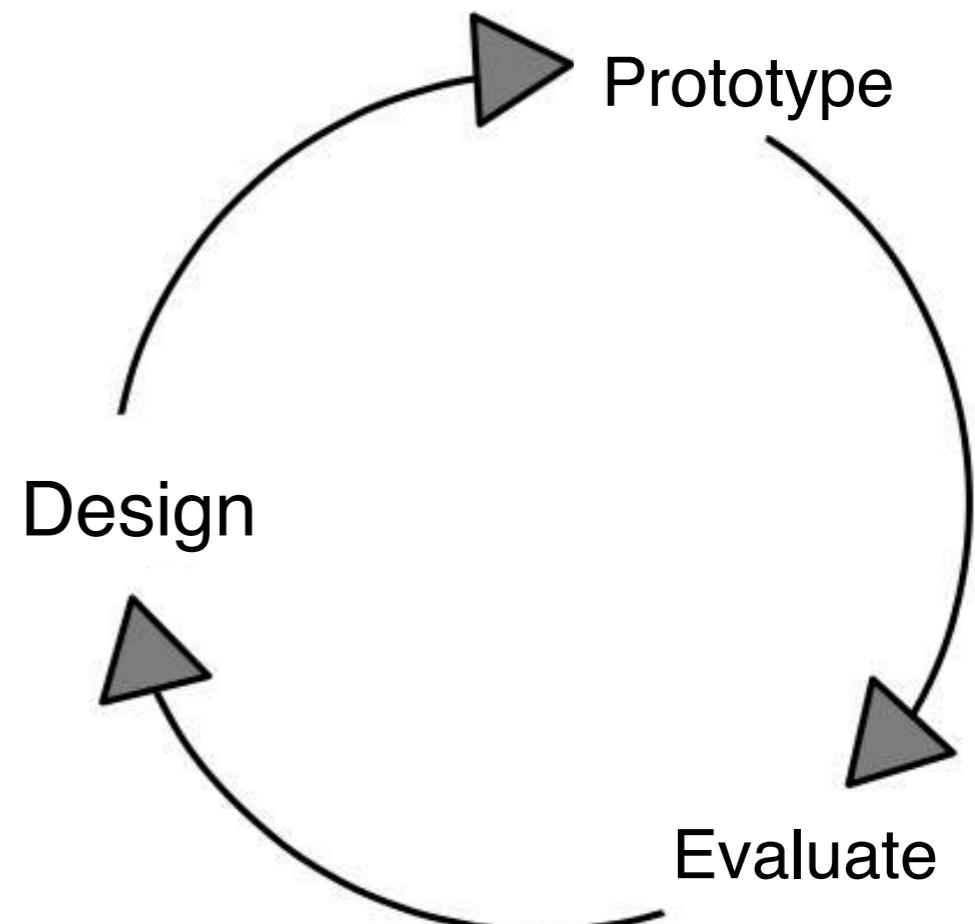
Interviews (detailed)

Questionnaires (large-scale)

Observation

Literature review

Analyse existing products



PERSONAS



<http://simpsons.wikia.com/wiki/File:TheHomer.png>

It's hard to reason about users in aggregate, and impossible to please everyone.

General users have too many conflicting goals.

Personas capture user characteristics

- Not real people, but synthesised from real user characteristics
- Should not be idealised
- Bring them to life with a name, characteristics, goals, personal background



Photo credit: Freemailimages.com/novak kulina

Rick Fletcher

Technology

Even though Rick owns a laptop and a tablet, they are mostly used by his daughter. Rick lives with dyslexia and this has affected his use of technology. He likes watching TV in the evenings, but he has to scroll through the channels because he can't read the menu. Since he's had a smart energy monitoring system, Rick has become very conscious about saving energy.

Health

Rick sees himself as healthy for his age. When he had health concerns in the past, it was always his wife who made him go to the GP. However, now that he is divorced, he is very reluctant to seek medical advice and care. Rick has an old ankle injury that has flared up recently. His doctor warned him that he will eventually need surgery if he doesn't rest the ankle to allow it to heal properly, but Rick doesn't want to take time off work. For Rick, being able to work is what makes him feel healthy and well.

Thoughts about smart home technology for health and wellbeing

Age: 53

Occupation: Warehouse operative

Education: No formal qualifications

Household: Lives in a 2-bedroom Council house with his teenage daughter

Smart/health tech.: Smart energy monitoring linked to an app, which allows household data to be visualised

Motivation

- Learning how to be more energy efficient
- Saving money on utility bills
- Knowing what his daughter gets up to while he is at work

Barriers

- Not being able to read information from the system
- Fear that the system will detect a chronic or terminal condition that would prevent him from working

Attitude

Expectation of benefits for self



Interest in seeing personal data



Interest in seeing household data





TOBI DAY

PERSONA TEMPLATE

AGE 26

OCCUPATION Record Store Manager

STATUS Single

LOCATION New York, NY

TIER Enthusiast

ARCHETYPE The Maestro

Ambitious

Admired

Focused



"If I had a way to share projects and collaborate in real time, that would make my workload so much easier to manage."

MOTIVATIONS



PERSONALITY



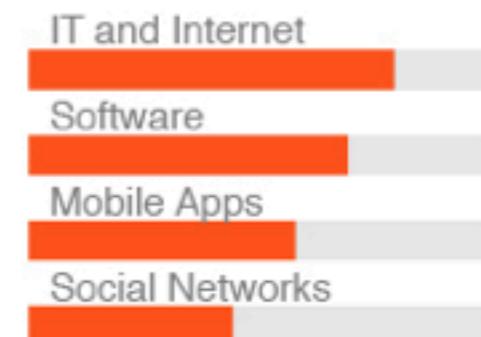
GOALS

- To grow a strong industry reputation
- To build an audio-pro portfolio
- To keep track of everything

FRUSTRATIONS

- Slow download times
- Data crashes
- Poor communication

TECHNOLOGY



Audi

Coca-Cola

SONY

PreSonus

BIO

Tobi has a day job at a record store, but on the side she does all kinds of production work for up-and-coming artists. She never hesitates to learn something new and she often acts as tech support for her friends and clients. She is usually working on a dozen projects at a time and is trying to establish herself in the industry, so she hates data crashes or anything that makes her look bad. Because she works alone and in her home, collaboration is everything.

Get Building

BENEFITS OF PROTOTYPES

- Prototypes support creativity—they help the designer capture and generate ideas
- Prototypes answer questions, facilitate exploration of design space: prototypes can target and manifest different attributes in a design space
- Recognise that requirements are likely to be inaccurate when first specified and supports the collection information on requirements and the adequacy of possible designs
- Permit early and iterative evaluation: prototypes can be tested in various ways including traditional usability studies and informal user feedback, throughout the design process
- Allow you to fail fast: related to the above, prototypes allow you to try out and experiment with multiple ideas rapidly and fail

What is a prototype?

In HCI it can be (among other things):

- a series of screen sketches
- a storyboard, i.e. a cartoon-like series of scenes
- a Powerpoint slide show
- a video simulating the use of a system
- a lump of wood (e.g. PalmPilot)
- a cardboard mock-up
- a piece of software with limited functionality written in the target language or in another language

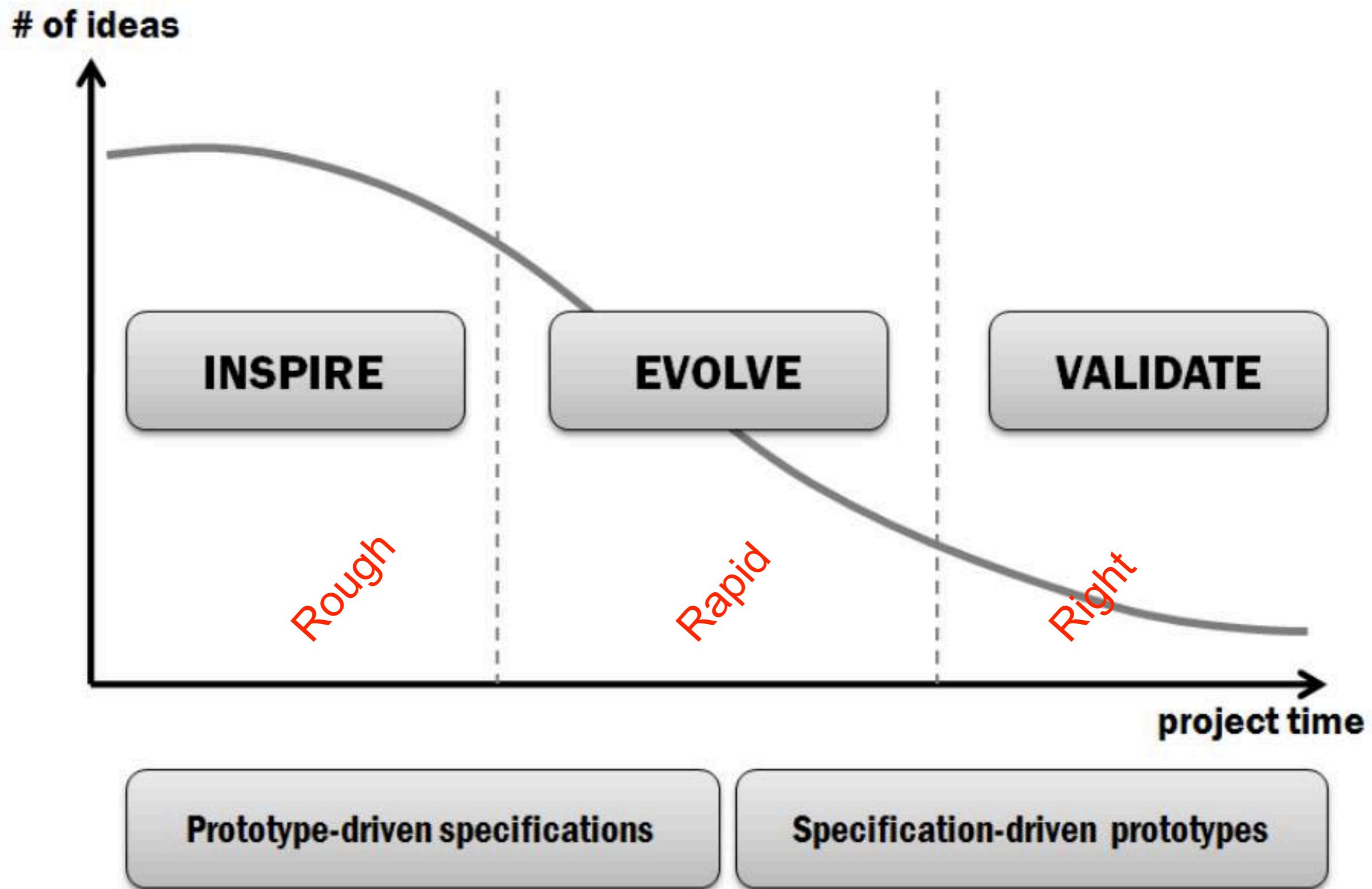
Low fidelity:

Uses a medium which is unlike the final medium, e.g. paper, cardboard

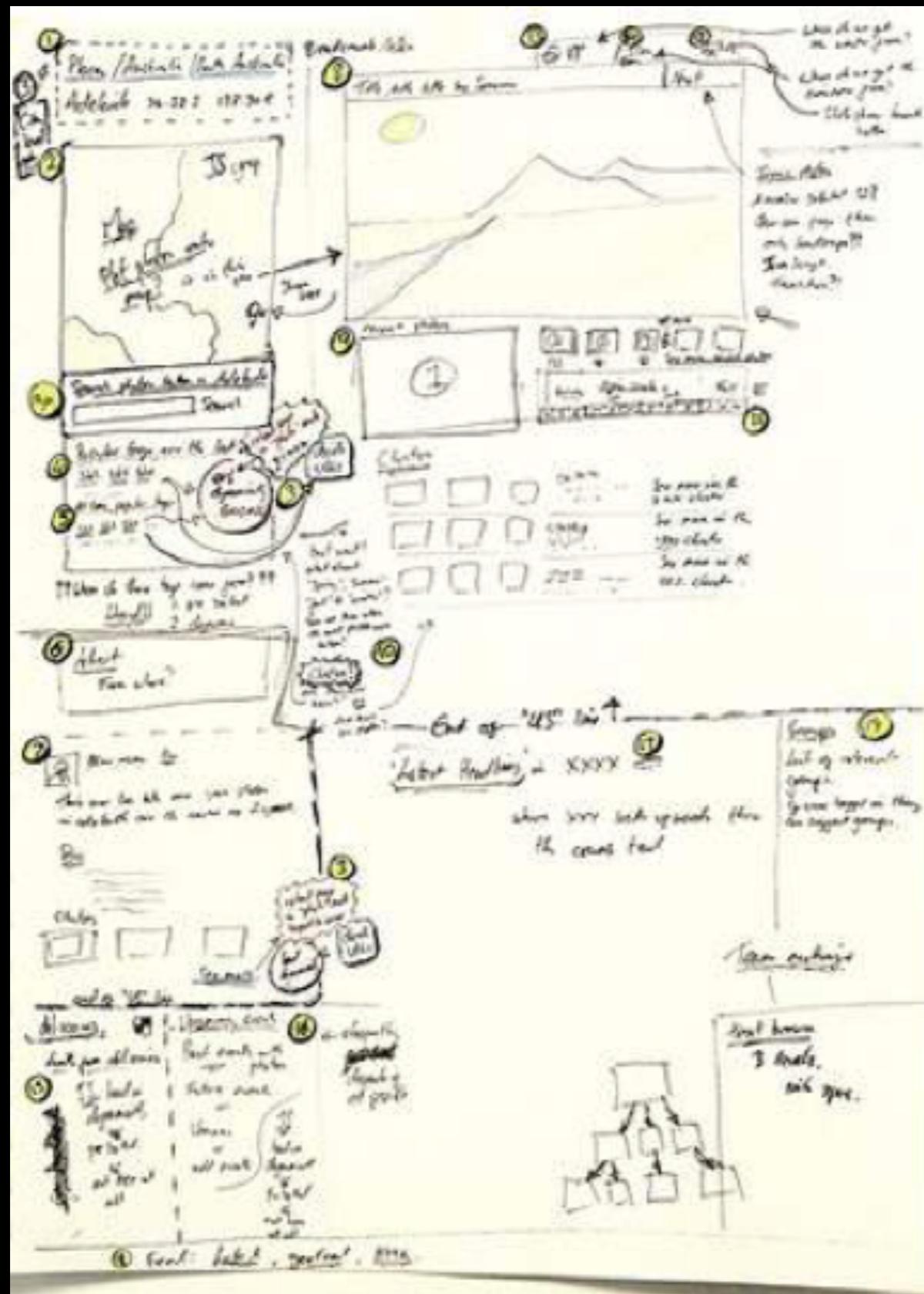
Is quick, cheap and easily changed

High fidelity

Three Stages of Prototyping (IDEO)



Low fidelity prototyping: paper, whiteboard, card



flickr

Home | You | Organize | Contacts | Groups | Explore | Find a Person | Search

Explore places: United States | California | San Francisco

56° / 53° 1:03AM PDT Thu, October 18

Persistence by MumbleJude

Search for Interesting photos Recent

Popular tags over the last week san, zonetag, celltagged, cameraphone

All time popular tags california, bridge, night, water, red, blue, goldengatebridge, baybridge, reflection, sign, street, sky, sf, goldengate, sunset, yellow, ocean, bay, architecture, city

Hey! Are you wondering how these photos got here? [Find out!](#)

Featured Photographers

 San Francisco at Night 3,292 members | 43,261 photos What I saw in San Francisco.

 Robper Member since 5 Nov, 2005

 Streets of San Francisco 274 members | 2,440 photos Many things happen in Our streets, Parade events, there are street people, and things that you will not see anywhere...

 Deborah Jaffee Member since 10 Feb, 2005

Subscribe to London photo - Latest and first 105

Activity On Your Photos | Comments You've Made | In Your Groups | Photos from your friends

You Your Photos | Organize | Upload | Your Account | Do More with Your Photo

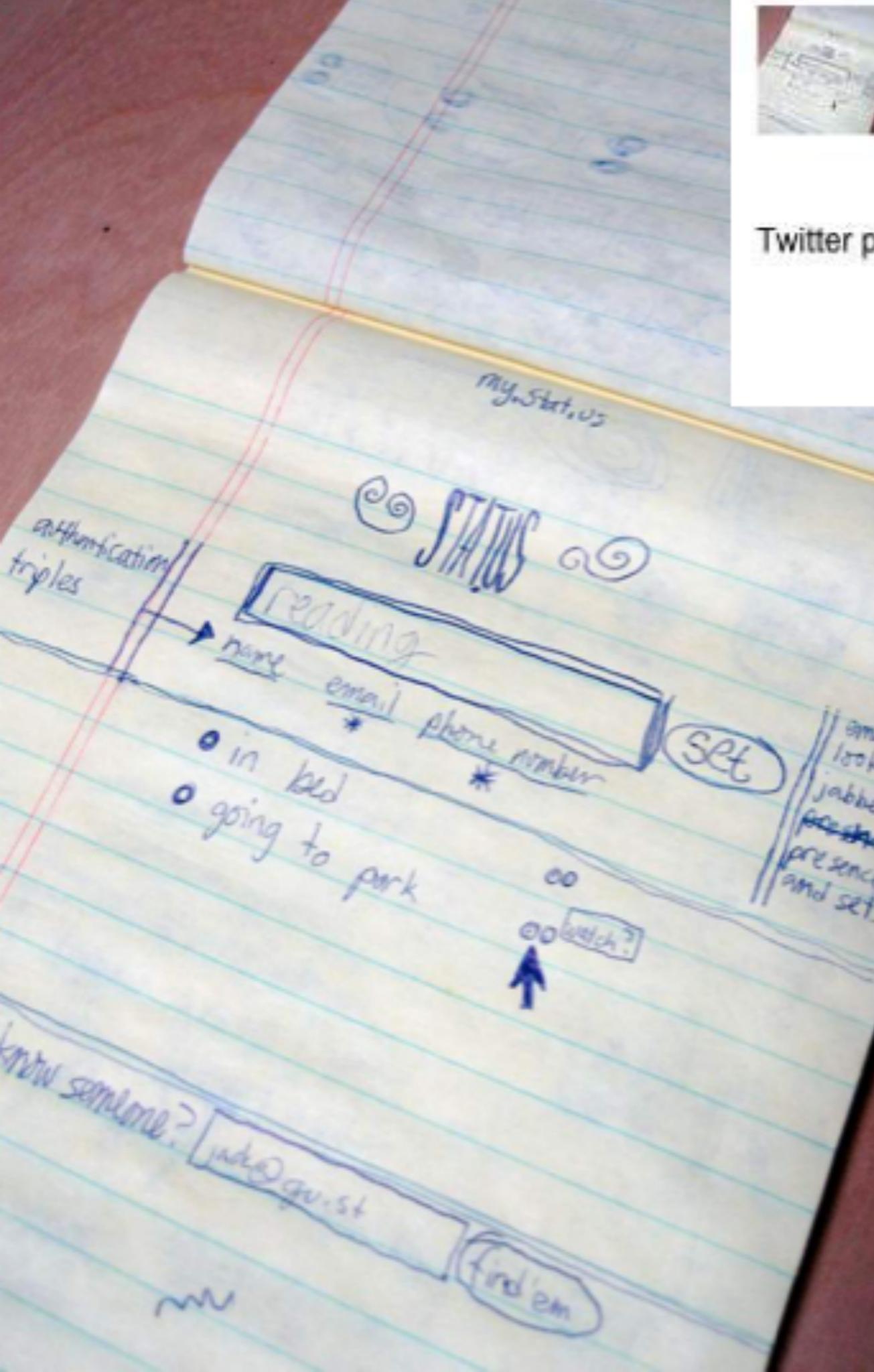
Explore Last 7 Days | This Month | Popular Tags | Creative Commons | Search

Help Community Guidelines | The Forum | FAQ | Tools | Flickr | Help by Email

Flickr Blog | About Flickr | Terms of Service | Your Privacy | Copyright Policy | Report Abuse

DEUTSCH | ENGLISH | ESPAÑOL | FRANÇAIS | 中文 | ITALIANO | PORTUGUÉS

Copyright © 2007 Flickr Inc. All rights reserved.



Prototype

A gallery curated by [LeanMantra](#) | 1 photo | 197 views

Twitter paper prototype



Jack Dorsey

+ Follow

twtrr sketch

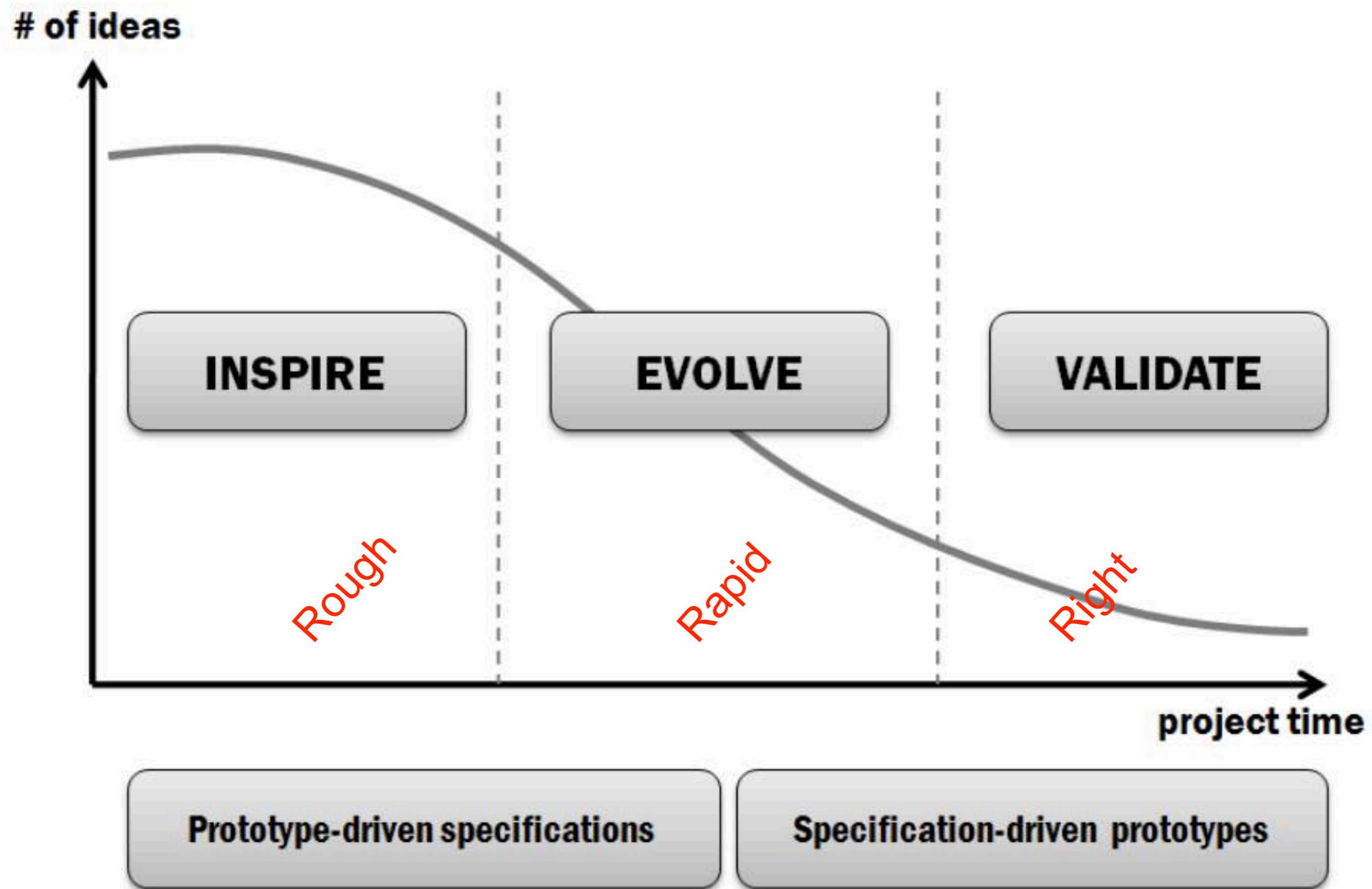
On May 31st, 2000, I signed up with a new service called LiveJournal. I was user 4,136 which entitled me a permanent account and street cred in some alternate geeky universe which I have not yet visited. I was living in the Sunshine Biscuit Factory in Oakland California and starting a company to dispatch couriers, taxis, and emergency services from the web.

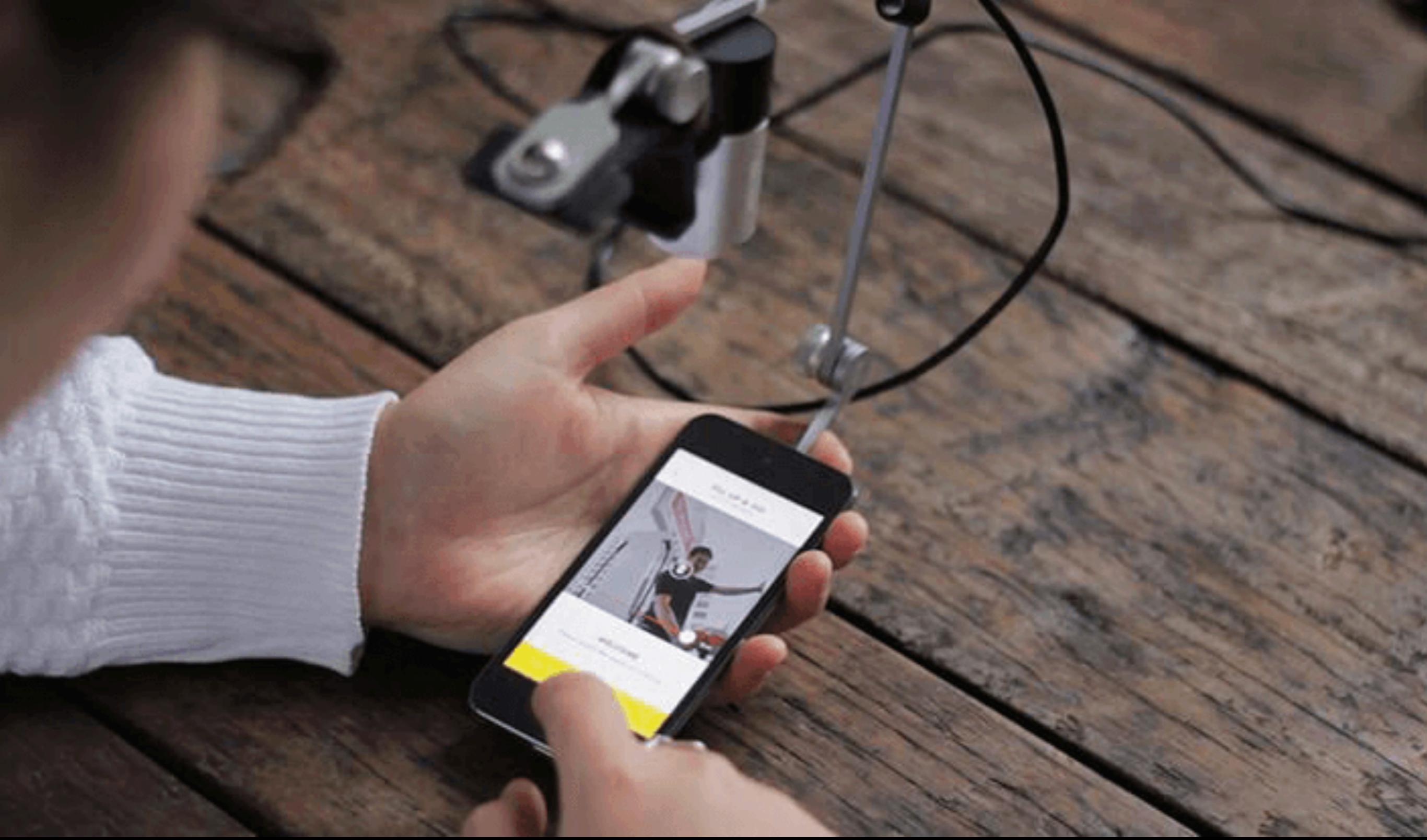
One night in July of that year I had an idea to make a more "live" LiveJournal. Real-time, up-to-date, from the road. Akin to updating your AIM status from wherever you are, and sharing it. For the next 5 years, I thought about this concept and tried to silently introduce it into my various projects. It slipped into my dispatch work. It slipped into my networks of medical devices. It slipped into an idea for a frictionless service market. It was everywhere I looked: a wonderful abstraction which was easy to implement and understand.

The 6th year; the idea has finally solidified (thanks to the massively creative environment my employer [Odeo](#) provides) and taken a novel form. We're calling it twtrr (though this original rendering calls it status; I love the word.ed domains, e.g. [gu.st/](#)). It's evolved a lot in the past few months. From an excited discussion and persuasion on the South Park playground to a recently approved application for a SMS shortcode. I'm happy this idea has taken root; I hope it thrives.

Some things are worth the wait.

Three Stages of Prototyping (IDEO)





Medium & High fidelity

PRINCIPLES & GUIDELINES

“Broad brush” design rules. More suggestive than standards.

Many text books and papers full of design guidelines. The most well know include:

- Dix et al. Human Computer Interaction
- Nielsen's 10 Heuristics
- Shneiderman's 8 Golden Rules
- Norman's Design Principles

Abstract guidelines applicable during early life cycle activities

Detailed guidelines (style guides) applicable during later life cycle activities

SHNEIDERMAN'S 8 GOLDEN RULES

- 1. Strive for consistency**
- 2. Enable frequent users to use shortcuts**
- 3. Offer informative feedback**
- 4. Design dialogs to yield closure**
- 5. Offer error prevention and simple error handling**
- 6. Permit easy reversal of actions**
- 7. Support internal locus of control**
- 8. Reduce short-term memory load**

Heuristic evaluation

- Developed by Jacob Nielsen in the early 1990s.
- Based on heuristics distilled from an empirical analysis of 249 usability problems.
- These heuristics have been revised for current technology by Nielsen and others for:
 - mobile devices,
 - wearables,
 - virtual worlds, etc.
- Closely related to design guidelines.

Nielsen's original heuristics

Visibility of system status:

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

No. of evaluators & problems

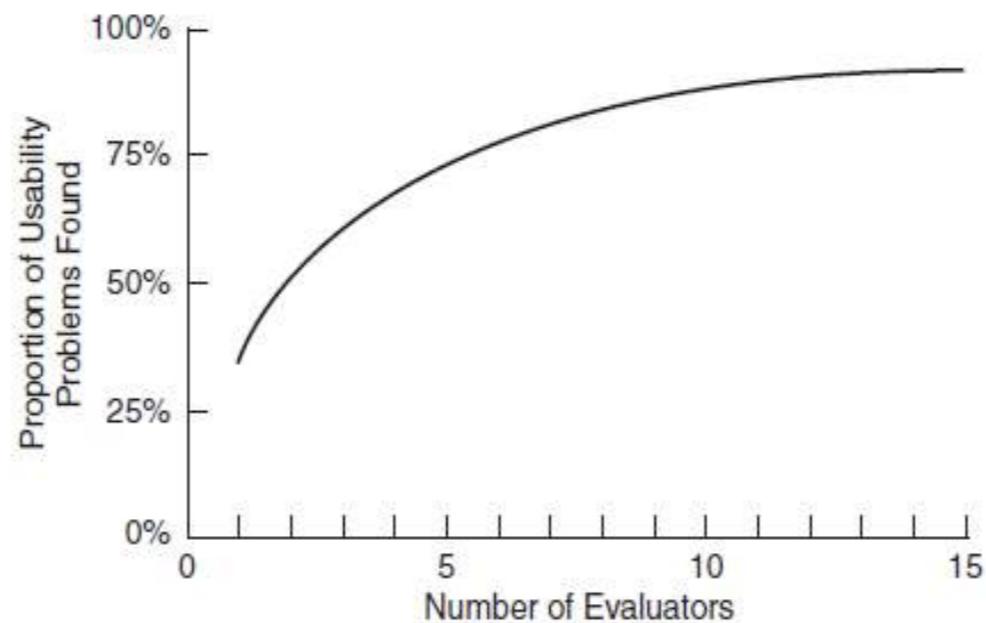


Figure 15.1 Curve showing the proportion of usability problems in an interface found by heuristic evaluation using various numbers of evaluators. The curve represents the average of six case studies of heuristic evaluation

Source: Usability Inspection Methods, J. Nielsen & R.L. Mack ©1994. Reproduced with permission of John Wiley & Sons Inc.

Nielsen suggests that on average 5 evaluators identify 75-80% of usability problems.

Cockton and Woolrych (2001) point out that the number of users needed to find 75-80% of usability problems depends on the context and nature of the problems.

Basic Rules of Usability

1. Watch what people actually do.
 2. Do not believe what people say they do.
 3. Definitely don't believe what people predict they *may* do in the future.
-

Think Aloud

- user observed performing task
- user asked to describe what he is doing and why, what he thinks is happening etc.
- Advantages
 - simplicity - requires little expertise
 - can provide useful insight
 - can show how system is actually used
- Disadvantages
 - subjective
 - selective
 - act of describing may alter task performance



Traditional testing conditions

- Usability lab or other controlled space.
- Emphasis on:
 - selecting representative users;
 - developing representative tasks.
- 5-10 users typically selected. Though some experts argue that testing should continue until no new insights are gained.
- Tasks usually around 30-60 minutes
- Test conditions are the same for every participant.
- Informed consent form explains procedures and deals with ethical issues.

Examples of data collected

- Time to complete a task.
- Time to complete a task after a specified time away from the product.
- Number and type of errors per task.
- Number of errors per unit of time.
- Number of times online help and manuals accessed.
- Number of users making an error.
- Number of users successfully completing a task.

The system usability scale

1. I think that I would like to use this ballot frequently.

1	2	3	4	5

2. I found the ballot unnecessarily complex.

1	2	3	4	5

3. I thought the ballot was easy

				5

Efficiency: How fast someone can use it?

Intuitiveness: How effortlessly someone can understand it?

Ease: How easy it is to use?

Satisfaction: How much a user subjectively likes or dislikes using it?

I BALLOT WERE WELL INTEGRATED.

1	2	3	4	5
---	---	---	---	---

Benefits of using a SUS

SUS has become an industry standard, with references in over 1300 articles and publications. The noted benefits of using SUS include that it:

- Is a very easy scale to administer to participants
- Can be used on small sample sizes with reliable results
- Is valid – it can effectively differentiate between usable and unusable systems

2	3	4	5	

2	3	4	5	

2	3	4	5	

A SUS score above a 68 would be considered above average and anything below 68 is below average

10. I needed to learn a lot of things before I could get going with this ballot.

1	2	3	4	5

Does my model work?

Related questions:

- Have we **defined** success?
- What parameters (might) **evidence** different / better etc.?
- Can we actually **observe** them?
- What **data** do we need and how much of it?
- How have other people / researchers evaluated “**similar**” projects?

Two example web-based projects:

1. Unobtrusive personality prediction via Facebook.
2. Assessing Quality Control in Crowd Platforms.

[1] Hall, M. and Caton, S., 2017. Am I who I say I am? Unobtrusive self-representation and personality recognition on Facebook. *PLoS one*, 12(9), p.e0184417.

[2] Krause, M., Afzali, F.M., Caton, S. and Hall, M., 2019. Is Quality Control Pointless?. In Proceedings of the 52nd Hawaii International Conference on System Sciences.

What's the difference between these two tweets? (Aside from no. of retweets etc.)



RETWEETS
8.775



RETWEETS
2



The
facebook
version of you



The
Realistic
version of you

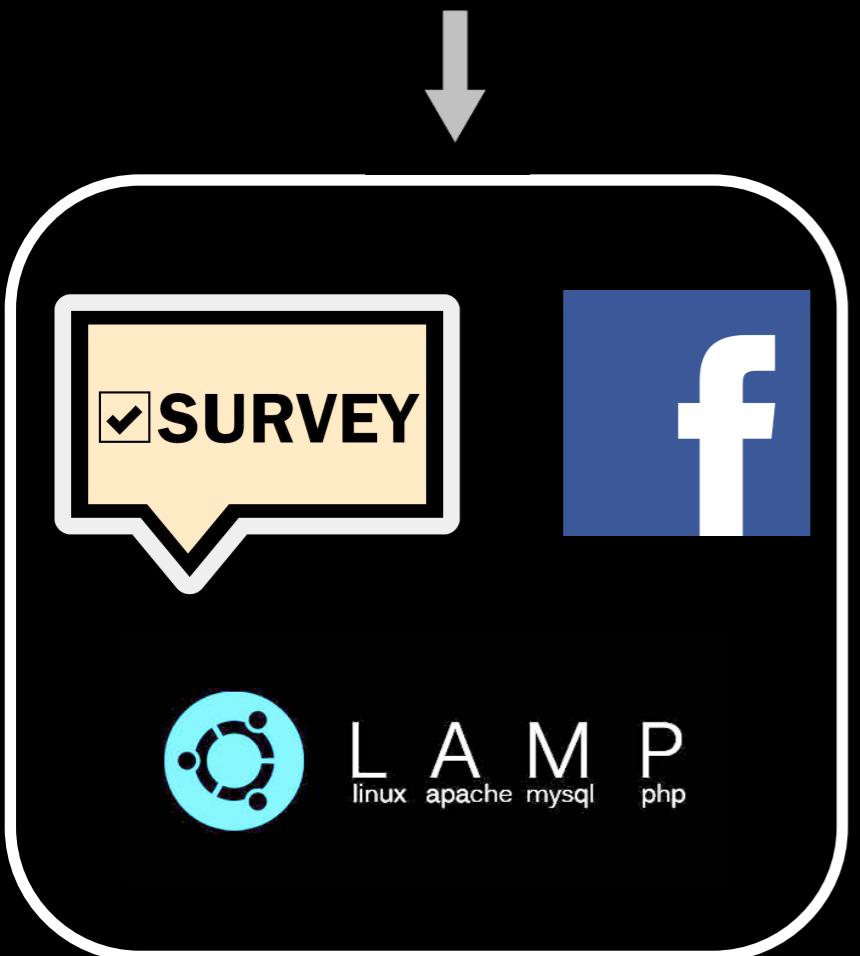
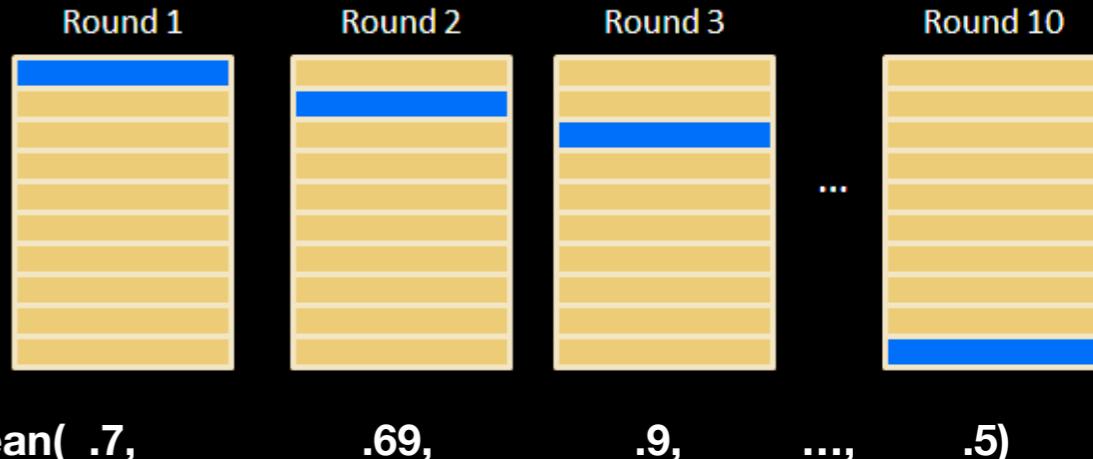


Self-representation: controlling or guiding the impression others could make by altering the posters' settings, appearance and manner (based on (Goffman, 1959))



amazon mechanical turk™
Artificial Artificial Intelligence

Validation Set
Training Set



Feature Cleaning

Feature Engineering

Model Selection

LIWC

How? $f(\text{Facebook}) \approx \boxed{\checkmark \text{SURVEY}}$?

How do amazon mechanicalturk™ workers respond to quality control measures?

Artificial Artificial Intelligence





python
Flask
web development,
one drop at a time

mongoDB

∅

placebo

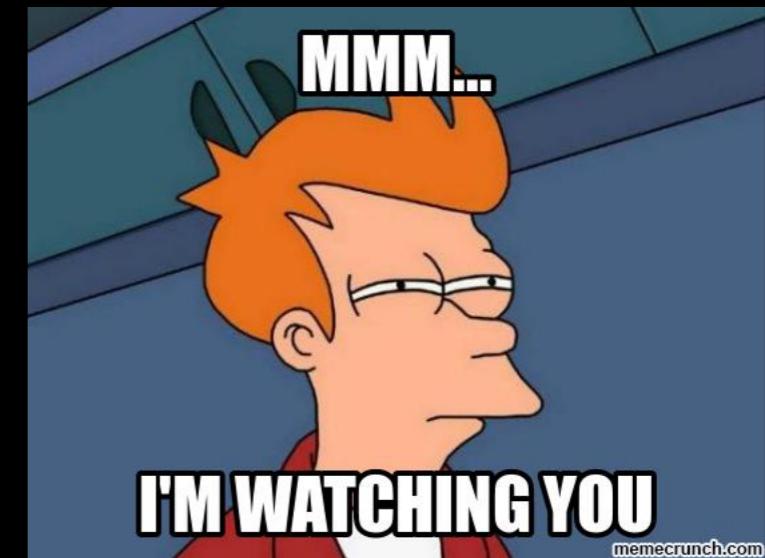
MCQ

ML

I think...

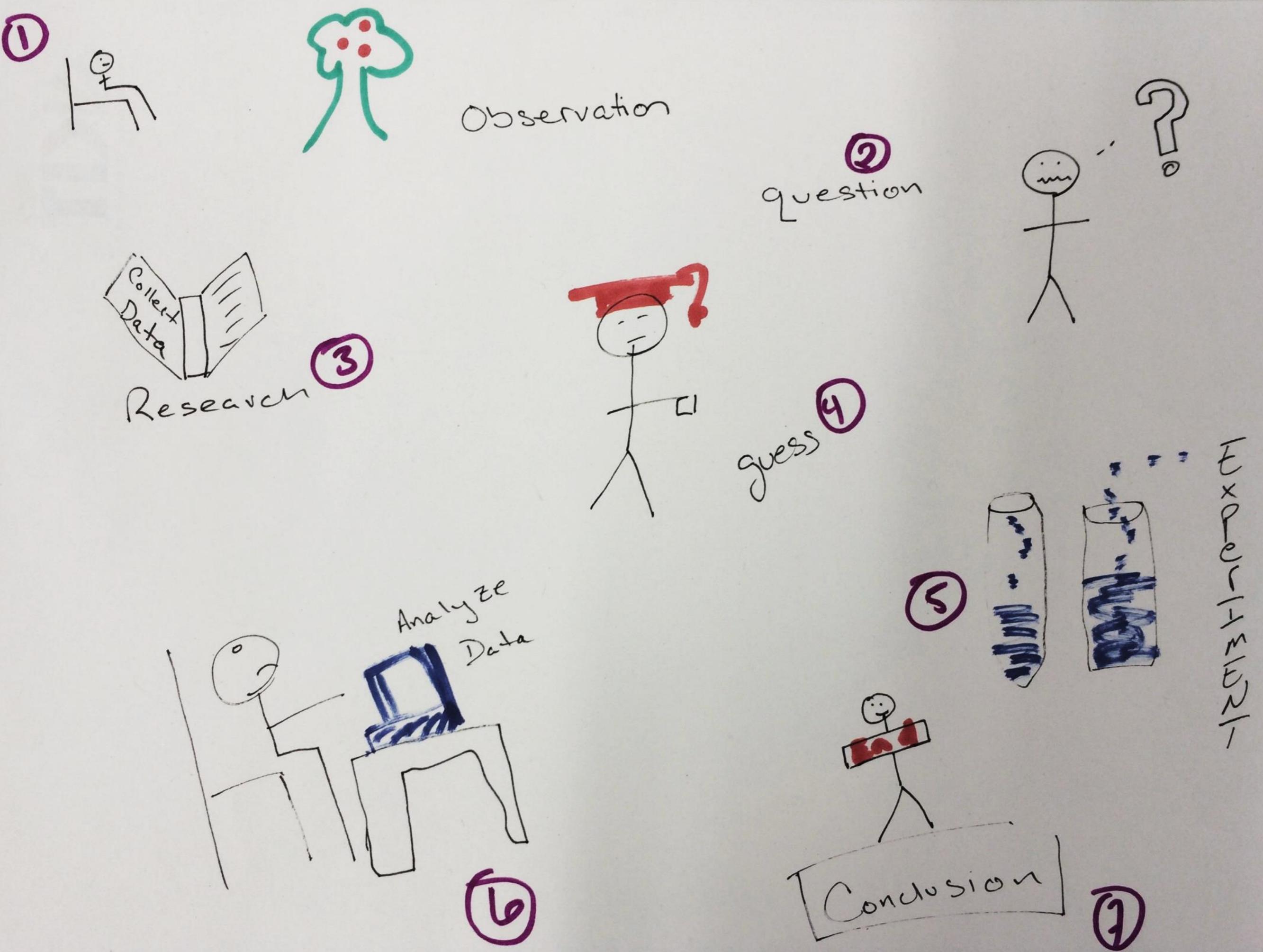


How?



Comp.	M1	SD1	M2	SD2	T	df	p	Sig
none fake	0.63	0.09	0.80	0.11	-8.21	100	0.00	***
none quiz	0.79	0.12	-7.72	97	0.00	***
none ML	0.78	0.13	-7.67	105	0.00	***
none human	0.79	0.13	-8.17	106	0.00	***
fake quiz	0.80	0.11	0.79	0.12	0.44	102	0.66	
fake ML	0.78	0.13	0.74	106	0.46	
fake human	0.79	0.13	0.25	107	0.80	
quiz ML	0.79	0.11	0.78	0.13	0.29	104	0.77	
quiz human	0.79	0.13	-0.20	105	0.85	
ML human	0.78	0.11	-0.50	111	0.62	

Shapiro-Wilk Normality Test
Spearman's Rank Correlation
Bartlett's test for homoscedasticity
Two-way ANOVA
Welch two sample t-tests with Holm correction



Tool box

- Marshmallow Challenge: <http://www.ted.com/talks/view/lang/en//id/837>
- Ideas Generation
 - <https://www.wrike.com/blog/techniques-effective-brainstorming/>
 - Brainstorming: <https://www.mindtools.com/brainstm.html>
 - Techniques for idea generation: <https://blog.hubspot.com/marketing/creative-exercises-better-than-brainstorming>
- Principles of Interaction Design: <https://asktog.com/atc/principles-of-interaction-design/>
- Prototyping techniques
 - Paper prototyping: <https://usabilitygeek.com/paper-prototyping-as-a-usability-testing-technique/>
 - Prototyping techniques: <https://www.interaction-design.org/literature/article/what-kind-of-prototype-should-you-create>
 - Prototyping: <https://www.usability.gov/how-to-and-tools/methods/prototyping.html>
 - Storyboarding with Powerpoint: <https://usabilitygeek.com/wireframing-storyboarding-powerpoint-powermockup/>
- User Testing / Evaluation
 - First Rule of Usability? Don't Listen to Users? <https://www.nngroup.com/articles/first-rule-of-usability-dont-listen-to-users/>
 - Interviewing Users: <https://www.nngroup.com/articles/interviewing-users/>
 - Think Aloud Evaluation: <https://www.nngroup.com/articles/thinking-aloud-the-1-usability-tool/>
 - User Observation Guidelines: <https://www.nngroup.com/articles/observer-guidelines/>
 - Comprehensive list of UX evaluation methods: <http://www.allaboutux.org/all-methods>
 - System Usability Scale: <https://measuringu.com/sus/>
 - Nielsen's Heuristics: <https://www.nngroup.com/articles/ten-usability-heuristics/>