

SENG 310

Lecture 3 - May 11th, 2023

Recap

Seven Fundamental Principles of Interaction

Discoverability

Affordances

Signifiers

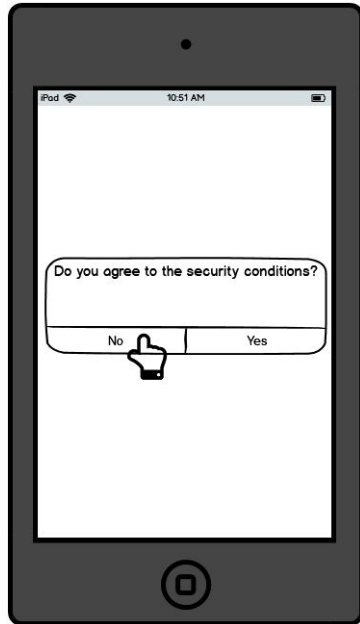
Mapping

Feedback

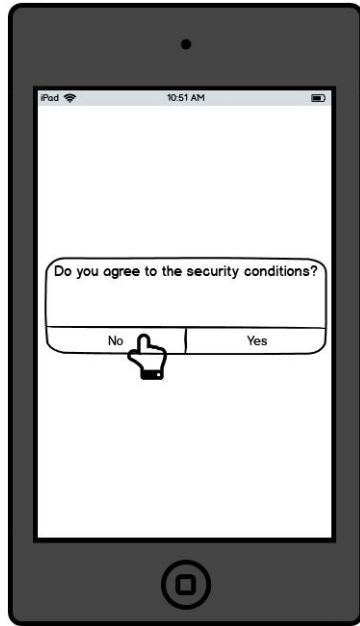
Constraints

Conceptual Models

Discoverability

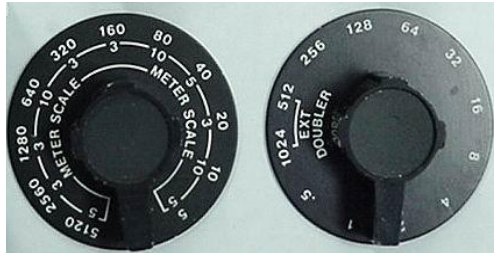
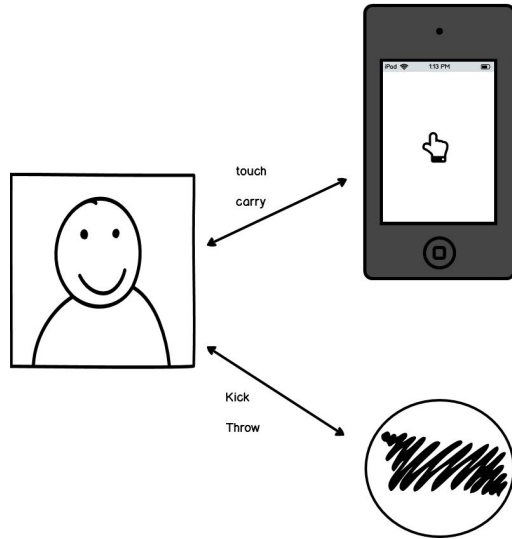


Discoverability

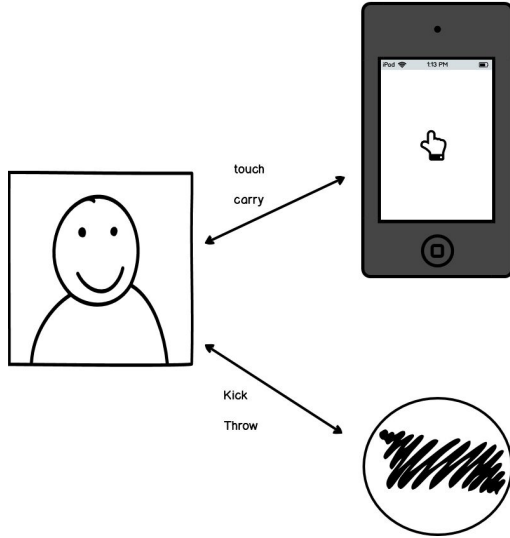


Is it possible to determine what actions are possible and where and how to perform them?

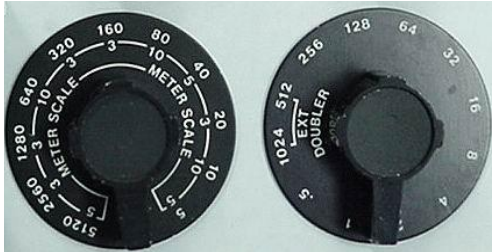
Affordances



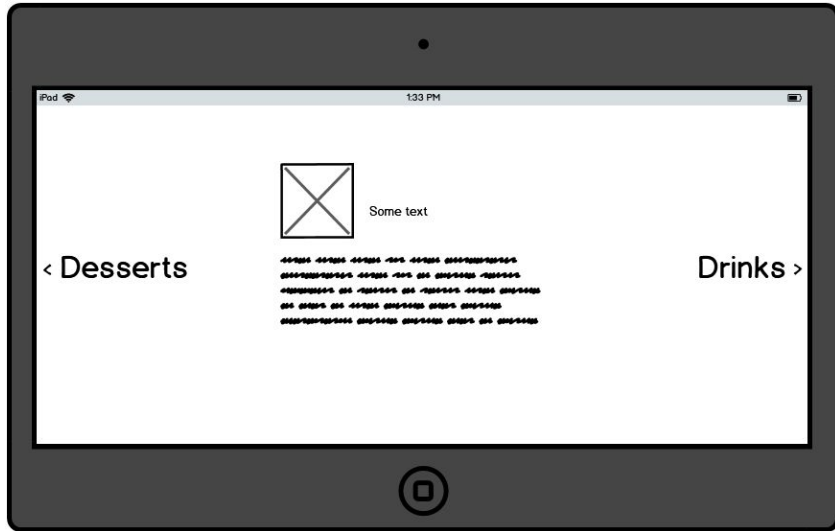
Affordances



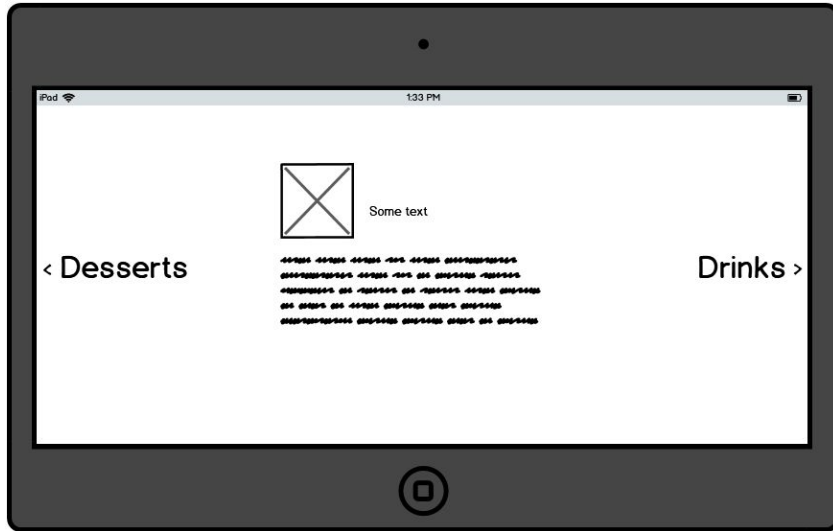
It is the relationship between the properties of the artifact **and** the capabilities of the agent that determine how the artifact could possibly be used.



Signifiers



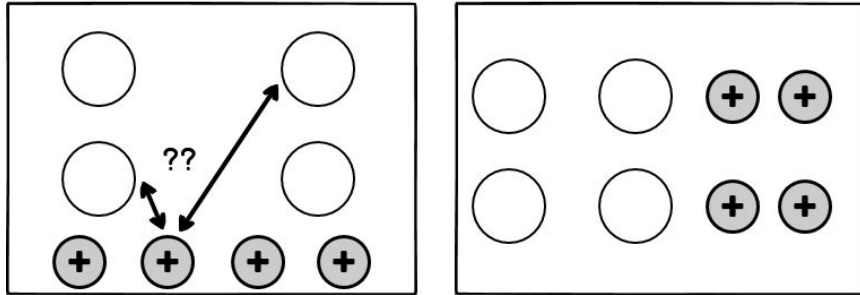
Signifiers



Signifier is a communication mechanism (sound, mark or other perceivable indicator) that communicates appropriate behavior to the person.

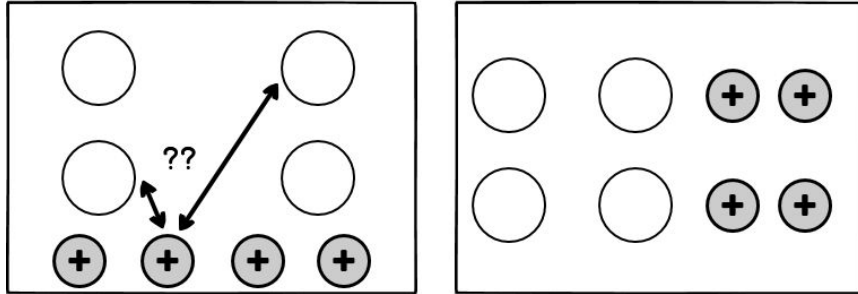
Mapping

Stove Mappings



Mapping

Stove Mappings



Mapping is the relationship between controls and their corresponding actions.

Typically spatial correspondence is helpful. Some may emerge from cultural practices

Feedback



Feedback



Feedback shows full and continuous information about the results of action and the current state of the technology.

Constraints



Constraints



Constraints set some limitations for how people interact with the technology.

Conceptual Models



Conceptual Models



Conceptual Model is an explanation we form, typically simplified, of how something works and in turn interact with technology.

Slip vs. Mistake

SLIP:

MISTAKE:

Slip vs. Mistake

SLIP: error in carrying out an action (e.g., motor action)

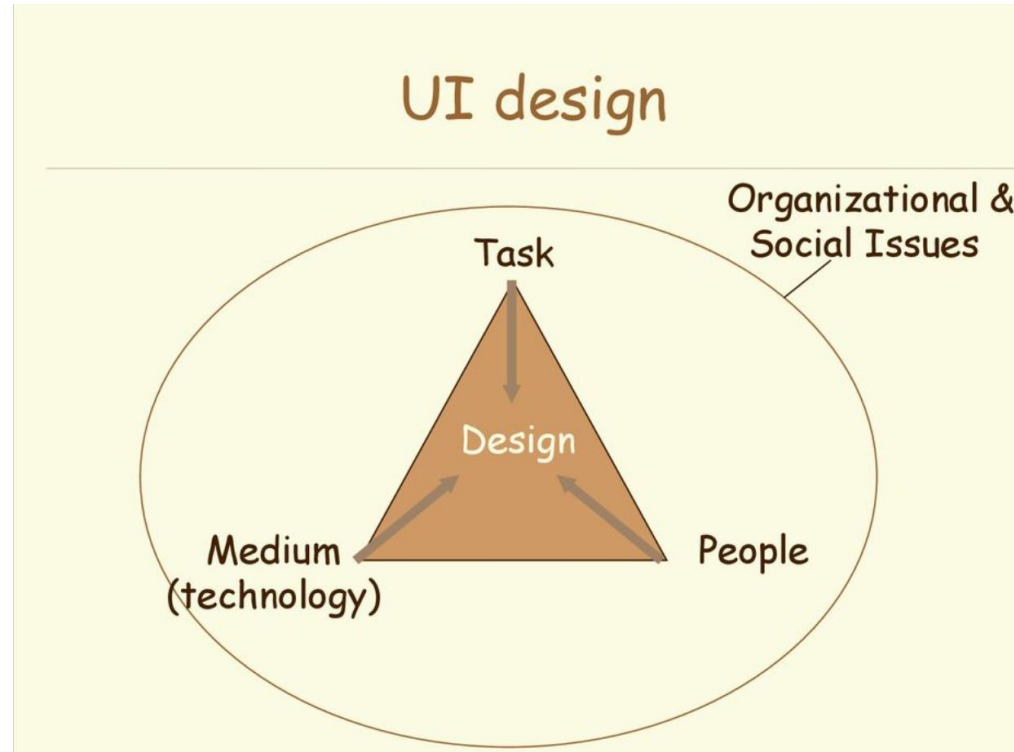
MISTAKE: error in choosing an objective or action (e.g., cognitive goal)

Slips could be a lapse in attention, or due to a change in typical circumstances

Mistakes typically occur when a person **misunderstands** something in the system

Human Centered Design

Intro to HCD



Designing a Good Interface is Tough

Designing working systems are expensive and fixing issues adds to the cost

People won't invest in something that doesn't serve any purpose

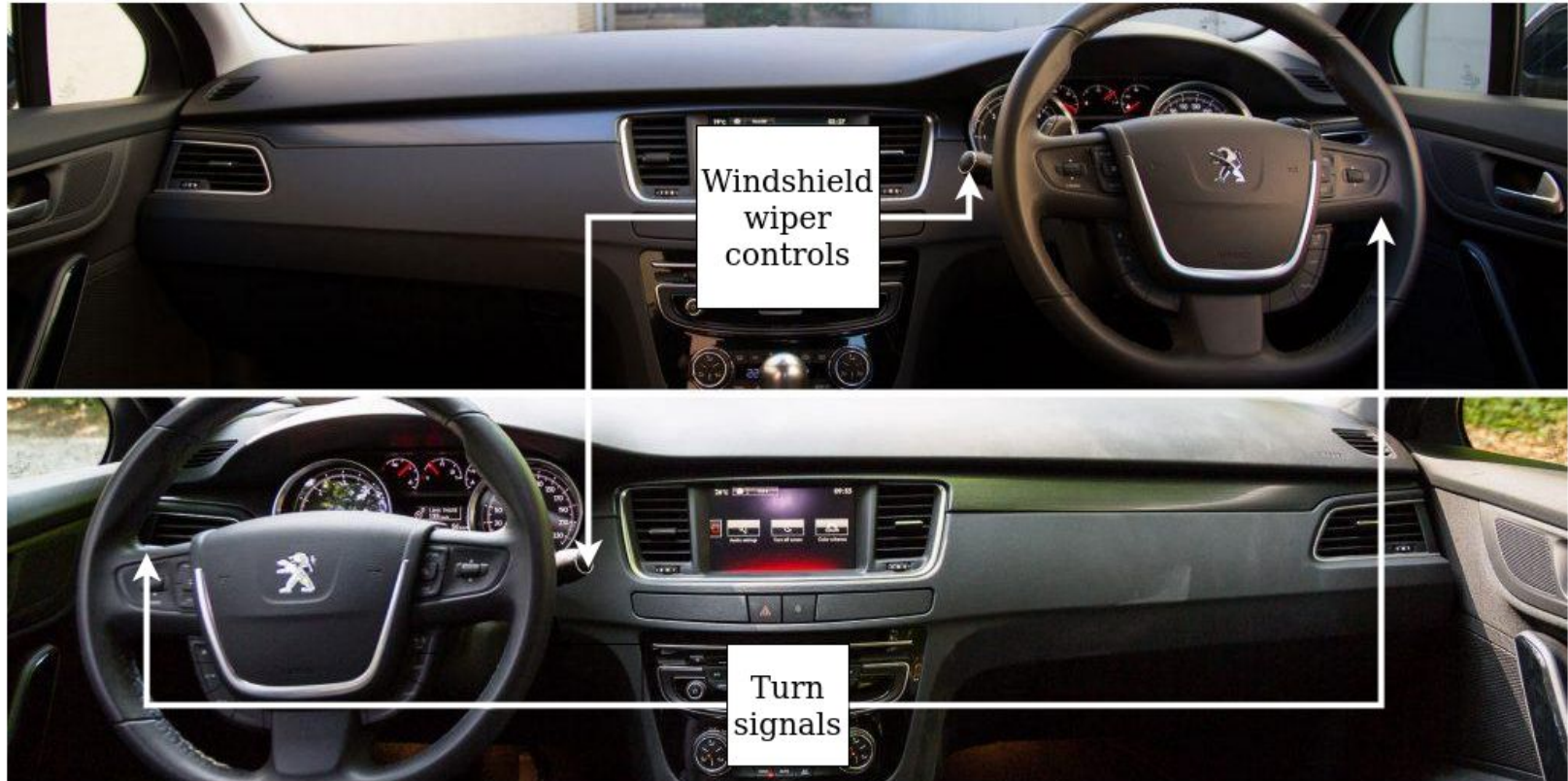
Why Should We Learn About Users?

Reveal Incorrect Assumptions

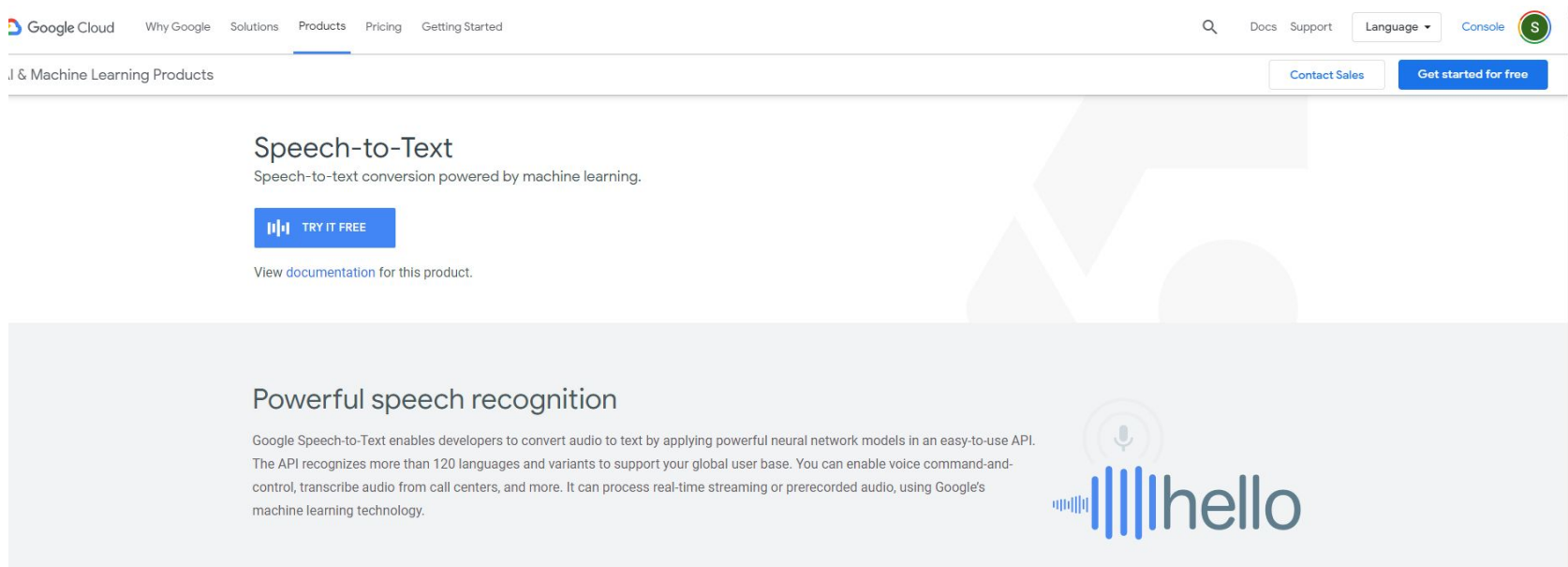


Katie A. Siek, Yvonne Rogers, and Kay H. Connelly. 2005. Fat finger worries: how older and younger users physically interact with Personal Digital Assistants.

Learn Cultural Differences



Reveal Biases




The screenshot shows the Google Cloud website's product page for Speech-to-Text. The top navigation bar includes links for Google Cloud, Why Google, Solutions, Products (which is underlined), Pricing, and Getting Started. On the right, there are links for Docs, Support, a Language dropdown menu, a Console link, and a user profile icon. Below the navigation bar, a breadcrumb trail reads 'AI & Machine Learning Products'. Two buttons are visible: 'Contact Sales' and 'Get started for free'. The main content area features the heading 'Speech-to-Text' with the subtext 'Speech-to-text conversion powered by machine learning.' Below this is a blue button with a microphone icon and the text 'TRY IT FREE'. A link to 'View documentation for this product.' is also present. A large, light gray banner at the bottom of the page is titled 'Powerful speech recognition' and contains a paragraph about the API's capabilities. To the right of the text is a logo for 'hello' that includes a microphone icon and a stylized blue bar chart.

Google Cloud Why Google Solutions **Products** Pricing Getting Started

AI & Machine Learning Products

Speech-to-Text


Speech-to-text conversion powered by machine learning.

 TRY IT FREE

[View documentation for this product.](#)

Powerful speech recognition

Google Speech-to-Text enables developers to convert audio to text by applying powerful neural network models in an easy-to-use API. The API recognizes more than 120 languages and variants to support your global user base. You can enable voice command-and-control, transcribe audio from call centers, and more. It can process real-time streaming or prerecorded audio, using Google's machine learning technology.



Koenecke, Allison, et al. "Racial disparities in automated speech recognition." *Proceedings of the National Academy of Sciences* 117.14 (2020): 7684-7689.

Errors

Memory lapses

Tired or fatigued

Have the wrong conceptual model

Judge the situation wrong due to incomplete information

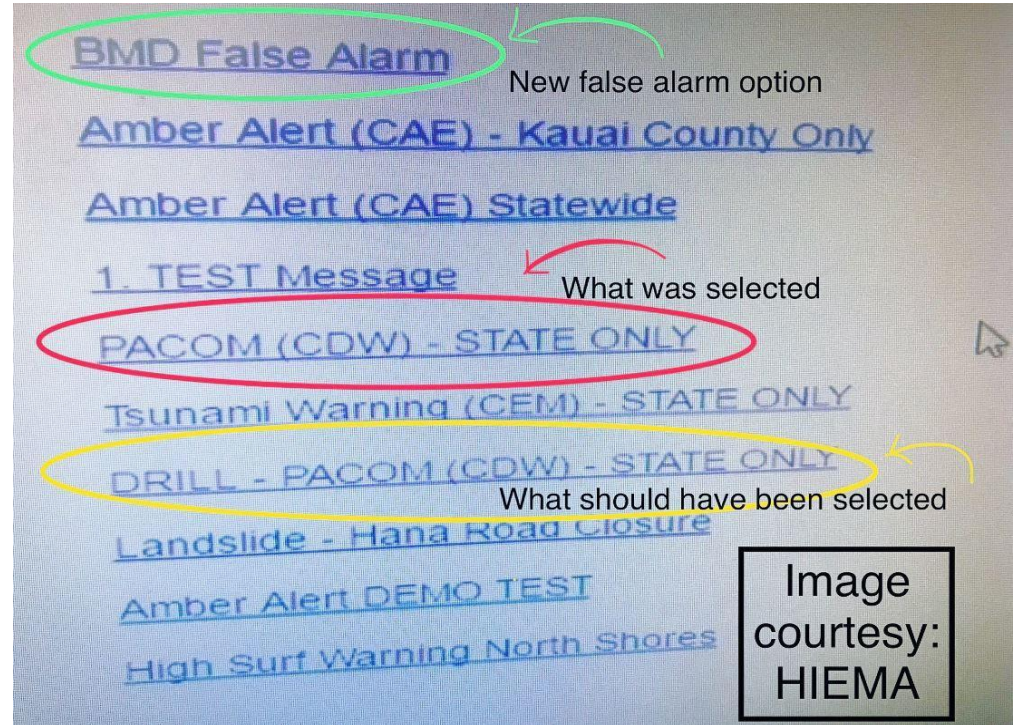
No training for complex systems

Deliberately violate procedures and rules

Not paying much attention when system is automated

Get distracted easily

Designers Tend to Blame People



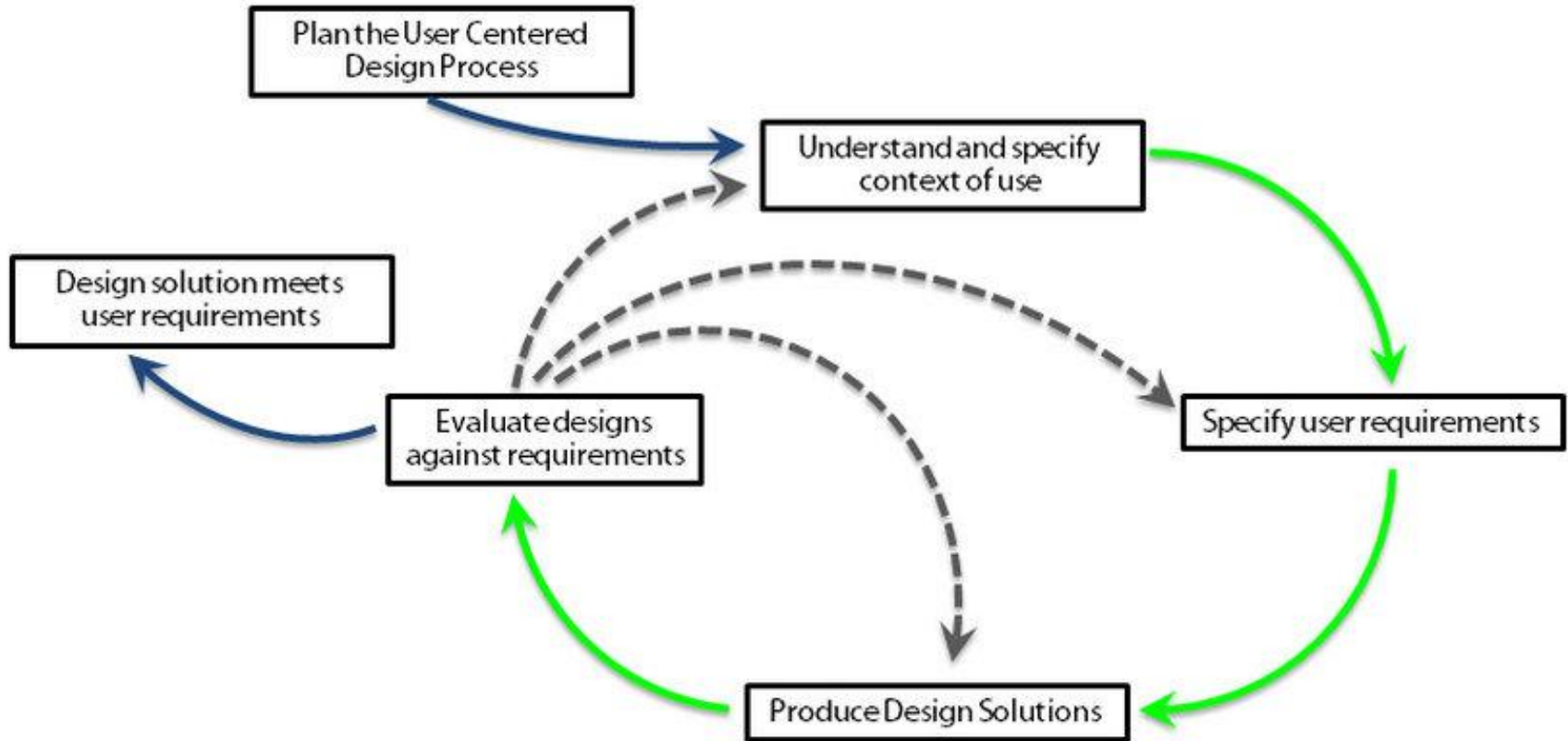
False Consensus Effect

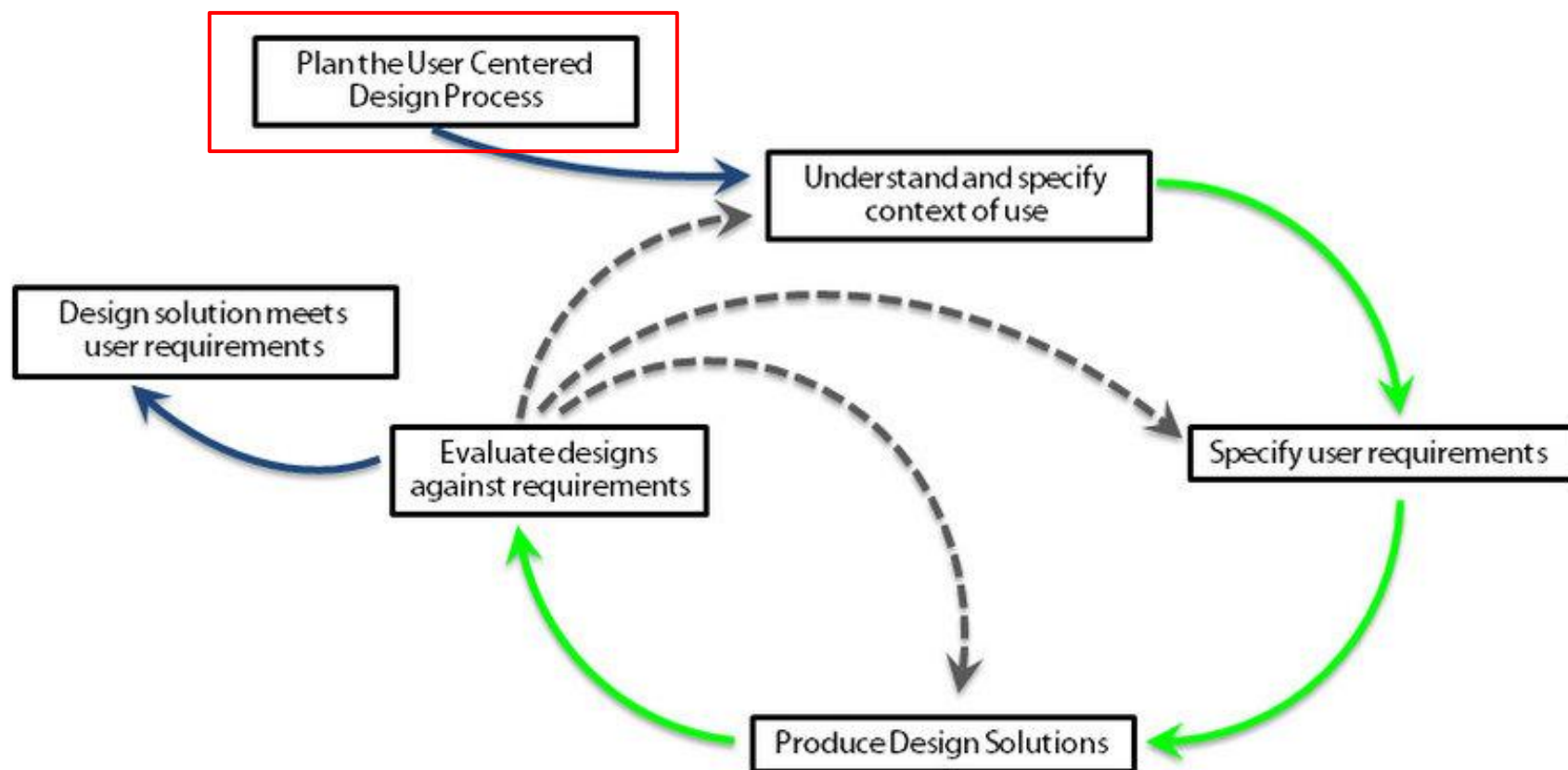
False-consensus is the tendency to think that others share our beliefs and will behave similarly in a given context

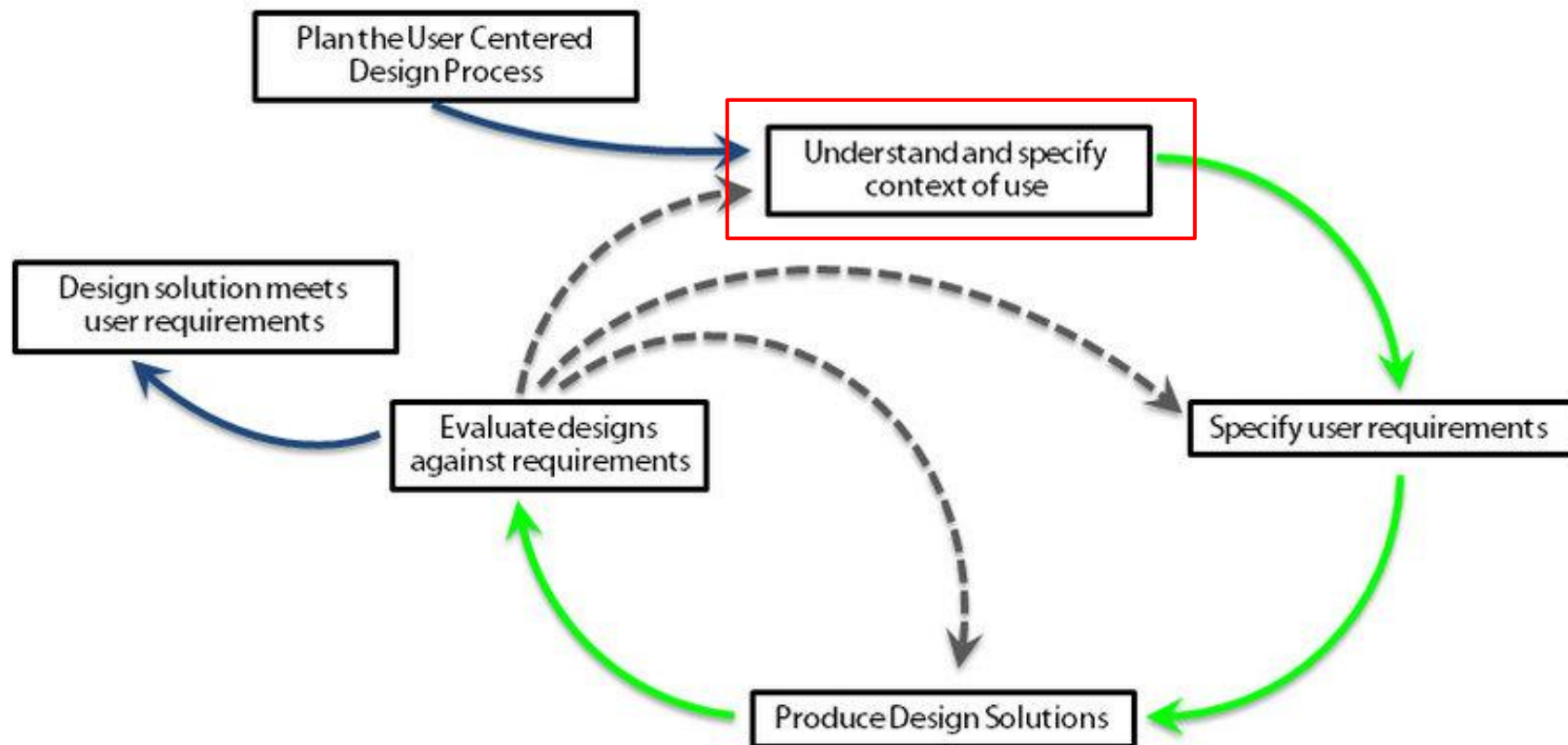


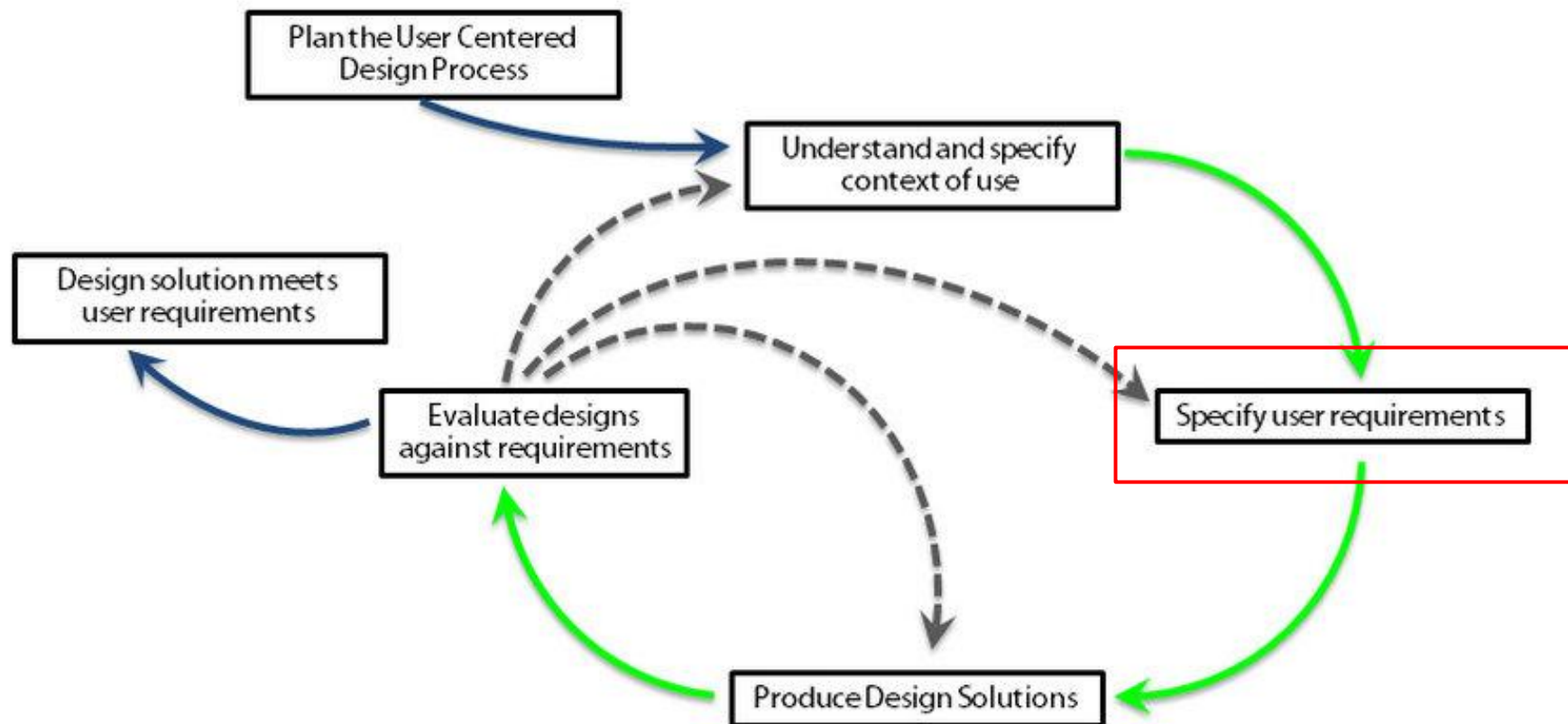
<https://www.youtube.com/watch?v=TewiUcN35Yo>

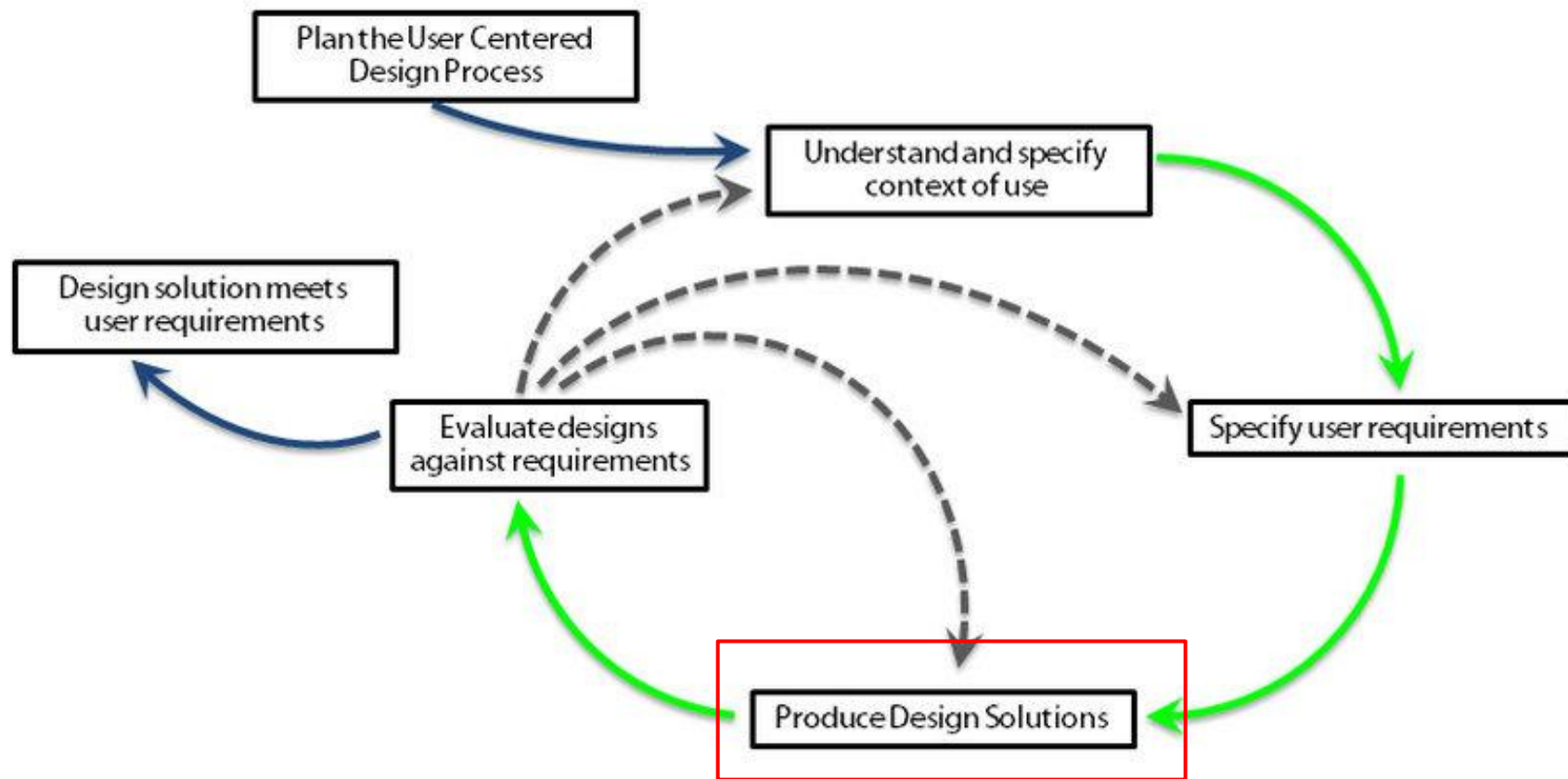
Involving People is Important
to Design Good Interfaces!

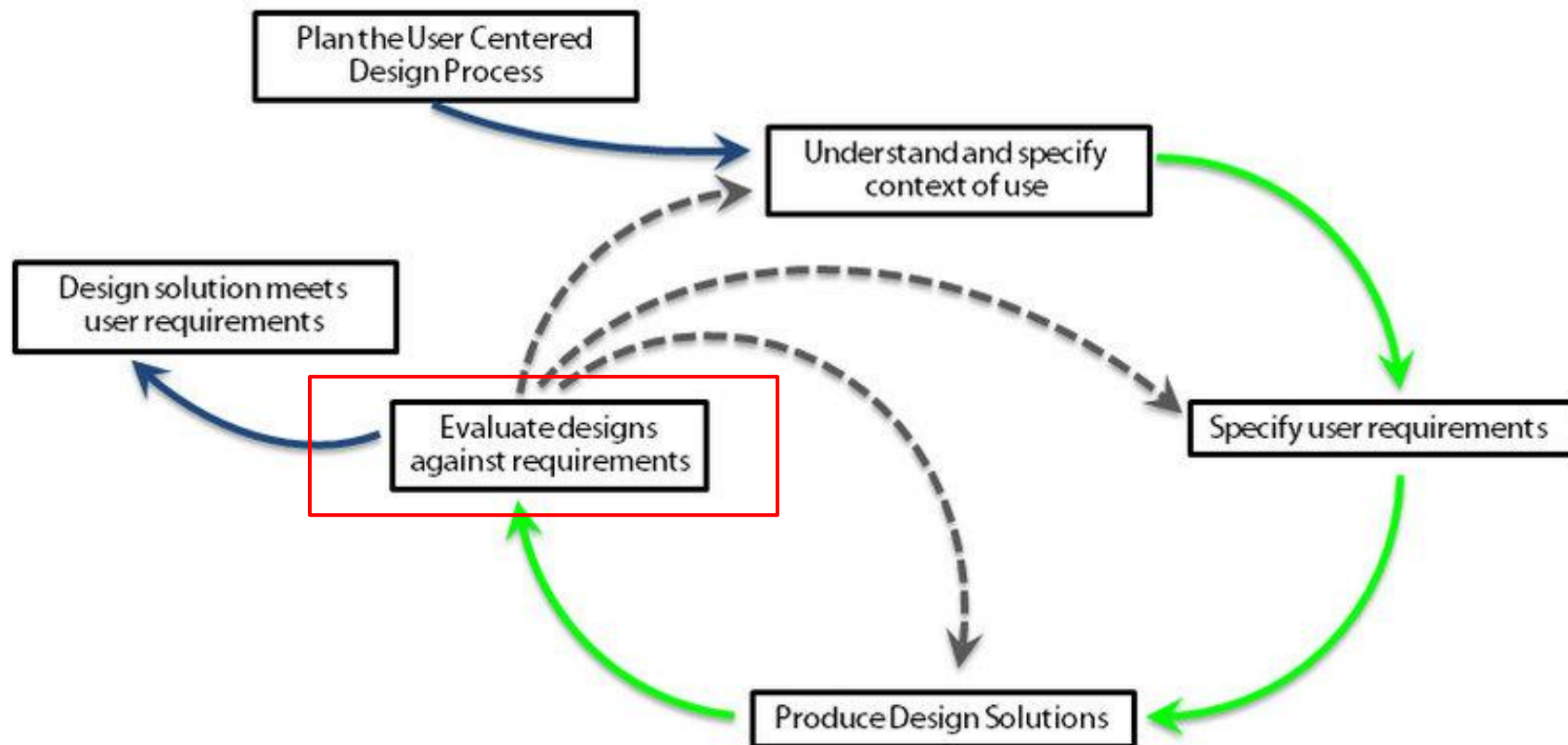


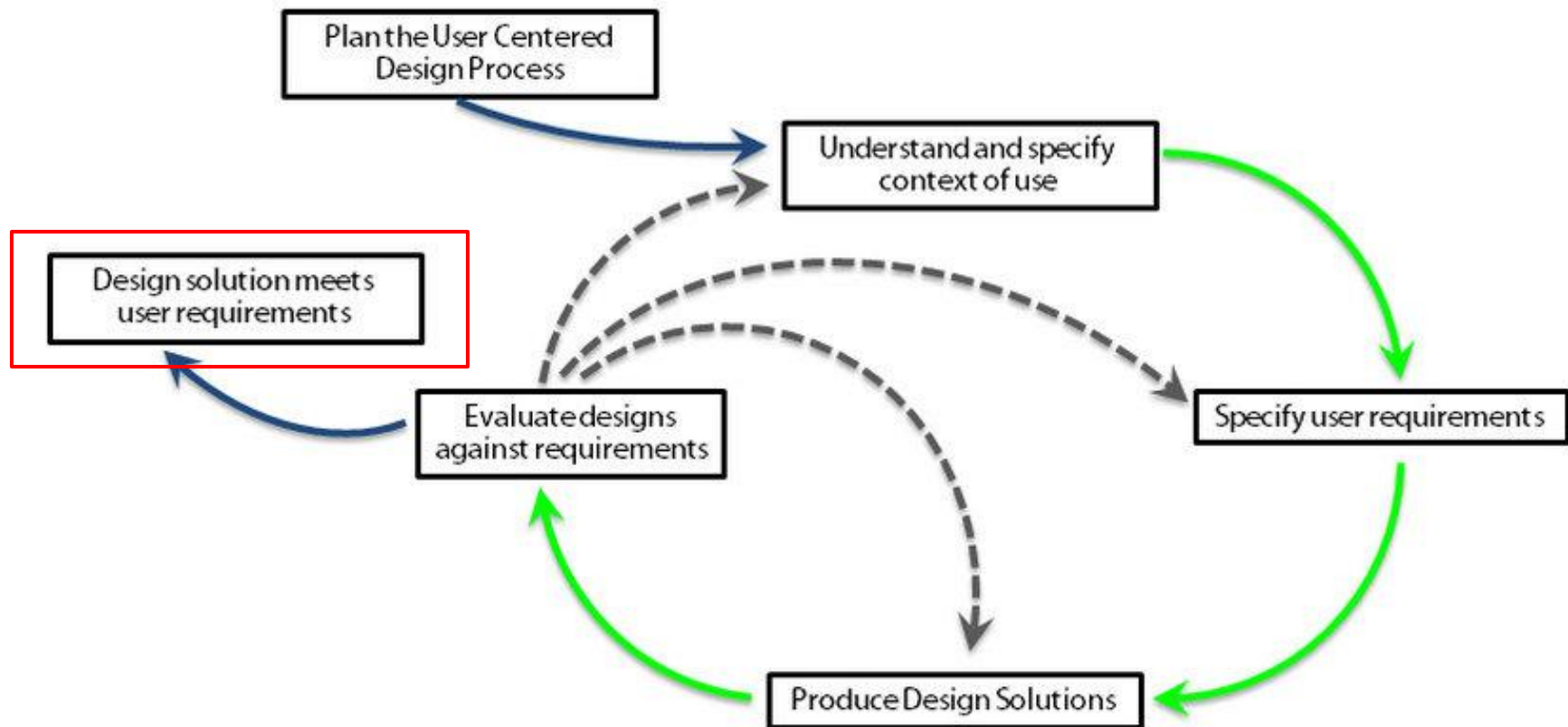












Example of HCD

Cross-Sensory Globe

Ghodke, Uttara, Lena Yusim, Sowmya Somanath, and Peter Coppin. "The cross-sensory globe: participatory design of a 3D audio-tactile globe prototype for blind and low-vision users to learn geography." In Proceedings of the 2019 on Designing Interactive Systems Conference, pp. 399-412. 2019.

Longitudinal Design Process

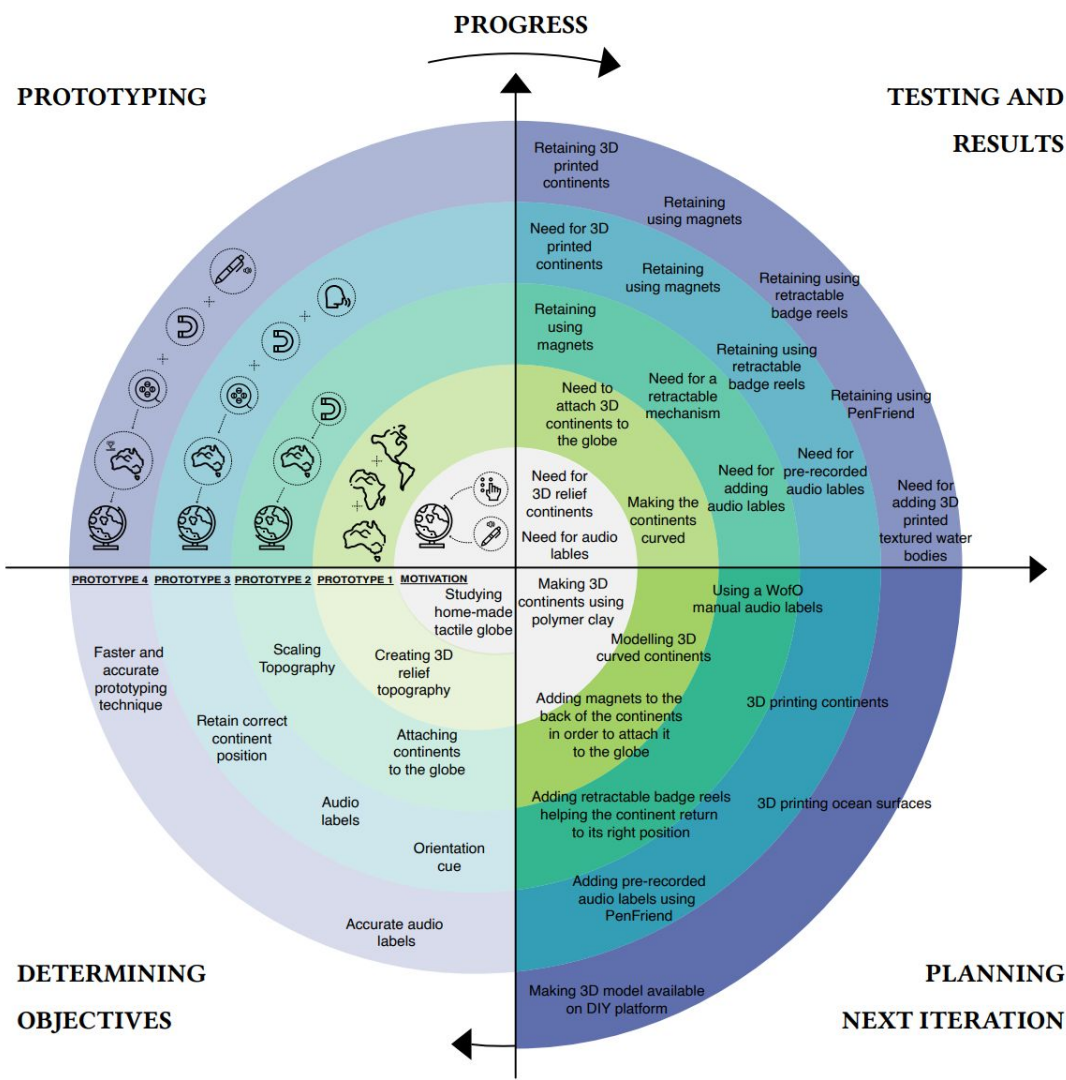
Conducted Participatory Design session with P1 - a male with complete visual impairment

Experienced with maps using a self-made interactive audio-tactile globe

Longitudinal Design Process

4 takeaways from first session:

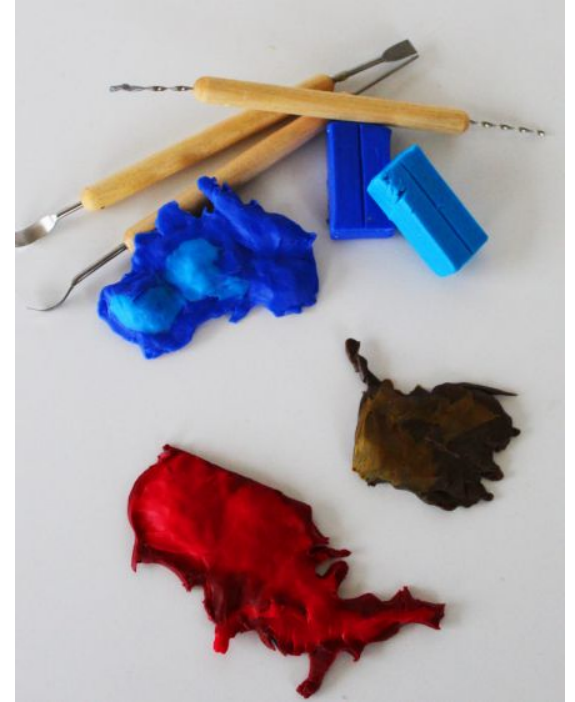
- Navigating various land masses was time-consuming due to the low spatial resolution of the braille overlay
- Identifying countries and continents was difficult
- Importance of 3D representation
- Separate continent pieces



Prototype 1



Continent pieces made out of easy bake polymer clay



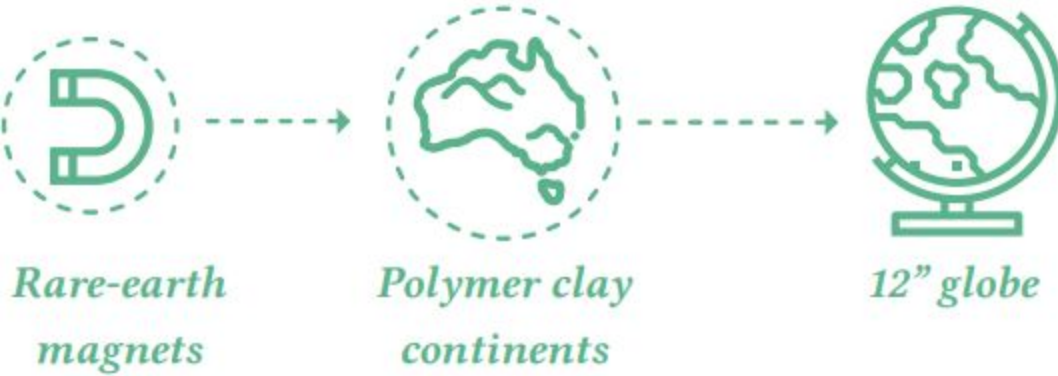
Insights from User-Testing

Easy bake polymer clay was liked by P1 as it does not feel harsh or rough on the fingers

Mentioned that differences in ratios of lower and higher elevations was too subtle to be noticeable: “*The USA has some mountainous features again, but it’s not very distinctive.*”

Recommended providing scale information and more prominent relief features to exaggerate the areas with the highest elevations in the next prototype

Prototype 2



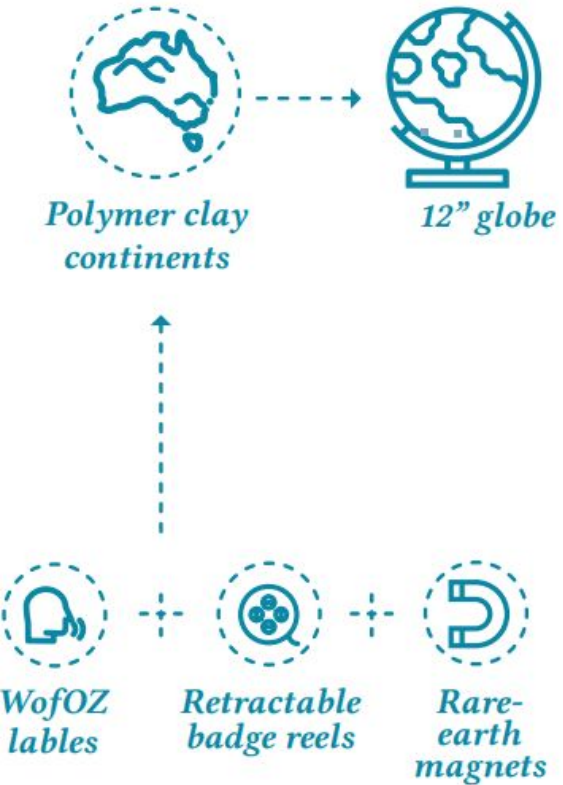
Insights from User-Testing

Exaggerated relief for the higher elevations made it easier for him to distinguish between mountains, plateaus and plains

Rare-earth magnets worked effectively and should be retained: *“These magnets are great. That is genius! I like it. It snaps back on in the right place.”*

Need for a mechanism or convention to enable a blind or low-vision user to register the continent pieces back to their appropriate locations after removal: *“But what if all the pieces are off the globe? How do you put them back in the right spot? Maybe there could be something to guide the user for the right direction.”*

Prototype 3



Insights from User-Testing

Although the retractable badge reels helped re-attach the continents back onto the globe, achieving correct orientation required effort

Need to have defined boundaries to understand the positioning of continents, even when the continent piece is taken off the globe

Although using WofO technique was very helpful in providing attribute information, P1 mentioned the need to have pre-recorded voice labels

Evaluation With 5 users

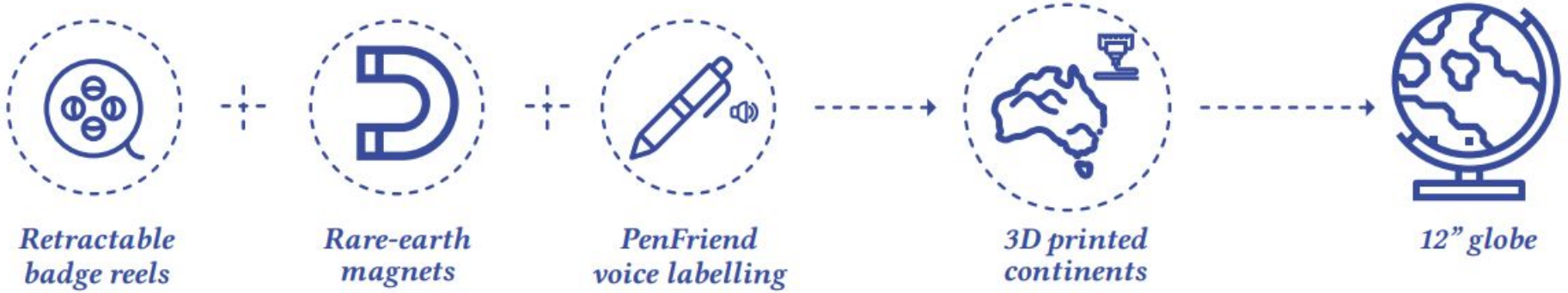
5 evaluators with low-vision to complete blindness

Using hand-made clay modelling was time consuming and did not result in precise representations of the elevations. Participants suggested 3D printing continents

WofO audio label system required assistance from visual users. Participants suggested an automated voice labeller called PenFriend for pre-recorded audio labels

P4 and P5 suggested disregarding tilt of Earth's axis, suggesting a vertical axis instead. They described how the tilted axis confused them when attempting to locate the north and south poles

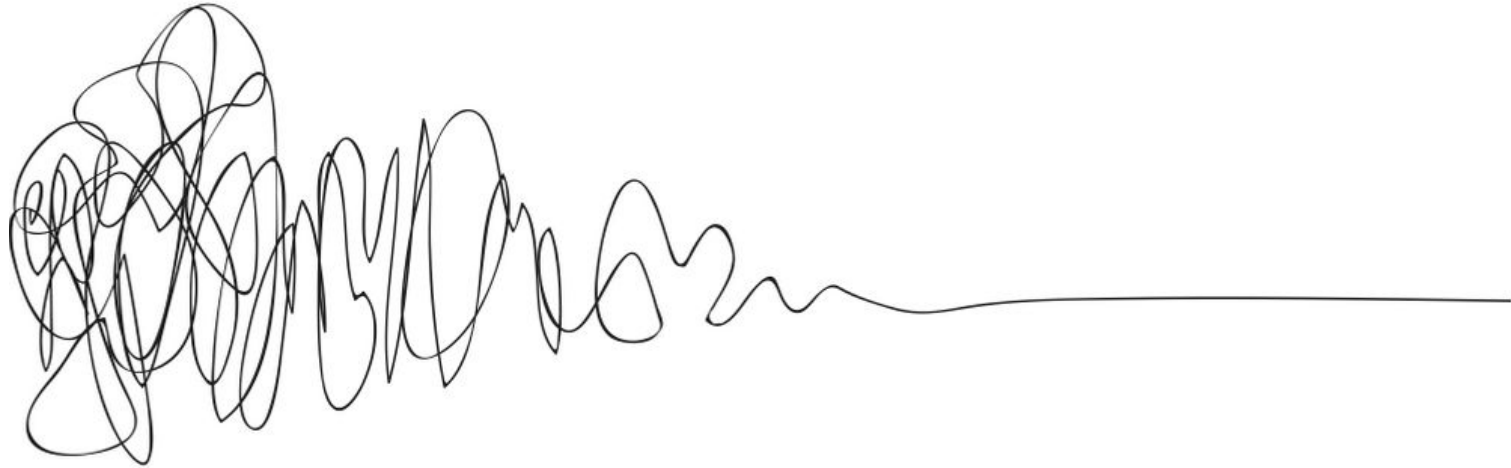
Prototype 4



The Process of Design Squiggle by Damien Newman

Noise / Uncertainty / Patterns / Insights

Clarity / Focus



Research & Synthesis

Concept / Prototype

Design