



HCI: THE DESIGN PROCESS

Dr Kami Vaniea

First, the news...

- Make Your UX Design Process Agile Using Google's Methodology
- <https://www.interaction-design.org/literature/article/make-your-ux-design-process-agile-using-google-s-methodology>


Accessibility

Basic steps to accessibility


- Add appropriate alt text to every image
- Use headings correctly
- Make your forms work with screen readers
- Use a “Skip to Main Content” link at the beginning of each page
- Make all content accessible by keyboard
- Create significant contrast between your text and background
- Use an accessible template


Add appropriate alt text to images

[Study](#) [Visit](#) [Research](#) [News](#) [About](#) [Alumni](#) [Staff](#) [Students](#)

 THE UNIVERSITY
of EDINBURGH

[Schools & departments](#)





```
▼<div class="col-sm-7 col-md-8">  
    
</div>
```



Fangs output for: BBC - Home

Reload

Preferences

[Help and tutorial](#)



Screen reader output [Headings list](#) [Links list](#)

Screen reader output

Page has ninety-six headings and one hundred fifty-one links BBC dash Home dash Internet Explorer Link Homepage **Heading level two** Accessibility links List of two items bullet This page link Skip to content bullet Link Accessibility Help List end Link Sign in This page link Notifications List of nineteen items bullet Link News bullet Link Sport bullet Link Weather bullet Link iPlayer bullet Link TV bullet Link Radio bullet bullet bullet bullet bullet bullet bullet bullet bullet bullet This page link More List end Link Search the BBC Edit Search the BBC **Heading level one** BBC Homepage **Heading level two** Welcome to the BBC Sunday, thirteen November Link Customise your Homepage Sign in with your BBC ID, or Register to see Weather, Local News and more. Link Sign in with your BBC ID, or Link Register to see Weather, Local News and more Link **Heading level three** Remembrance Sunday colon Services honour war dead From UK Link **Heading level three** Tsunami hits after powerful New Zealand quake From Asia Link **Heading level three** England face Australia in crucial Four Nations match . Live now. From Rugby League Link **Heading level two** News headlines Link **Heading level three** Nato chief's warning for Trump From US Election two thousand sixteen Link **Heading level three** France 'to extend state of emergency' From Europe Link **Heading level three** Iraq 'retakes ancient Nimrud from IS' From Middle East Link **Heading level two** Sport headlines Link **Heading level three** England draw Test as India cling on From Cricket Link **Heading level three** Will Rosberg win the battle in Brazil? From Formula one Link Watch video **Heading level three** Murray wants to end season 'on a high note' From Tennis Remove **Heading level two** three things we love today Link **Heading level three** How the internet reacted to an epic night of dance From BBC One Link **Heading level three** Hundreds join Walnut the whippet on his final 'walk' From England Link Watch video **Heading level three** Murray and Djokovic take on the mannequin challenge From Tennis Remove **Heading level two** Help us make the BBC Homepage better Want to opt in to our alternative page? Find out more Link here Dismiss Link Try it now **Heading level two** The BBC around the UK List of five items bullet Link Graphic slash pthree hundred six tteight .png Scotland bullet Link Graphic slash pthree hundred six trm.png ALBA bullet Link Graphic slash pthree hundred six tpeight .png Wales bullet Link Graphic slash pthree hundred six tpeight .png Cymru bullet Link Graphic slash pthree hundred six tqc.png NI List end Dismiss **Heading level two** Real dash life stories Link Listen to audio **Heading level three** Bataclan survivor colon It's changed me on every single level From BBC Radio five live Link Watch video **Heading level three** The teacher who has the world's loudest shout From Northern Ireland Link Listen to audio **Heading level three** Sole survivor 'miracle girl' tells of fatal air crash horror From BBC World Service Remove **Heading level two** Link Add more sections This

```

    <div id="orb-header" class="orb-nav-pri orb-nav-pri-white
    orb-nav-dyn">
      <div class="orb-nav-pri-container b-r b-g-p">
        <div class="orb-nav-section orb-nav-blocks"></div>
        <section>
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            <ul>
              <li>
                <a href="#hp-bbc-homepage-content">Skip to content</a>
              </li>
              <li>
                <a id="orb-accessibility-help" href="/accessibility/">
                  Accessibility Help</a>
              </li>
            </ul>
          </div>
        </section>
        <div id="mybbc-wrapper" class="orb-nav-section orb-nav-id
        orb-nav-focus orb-nav-id-default"></div>
        <nav class="orb-nav" role="navigation" aria-label="BBC"></nav>
        <div class="orb-nav-section orb-nav-search"></div>
      </div>
      <div id="orb-panels"></div>
    </div>
  </header>

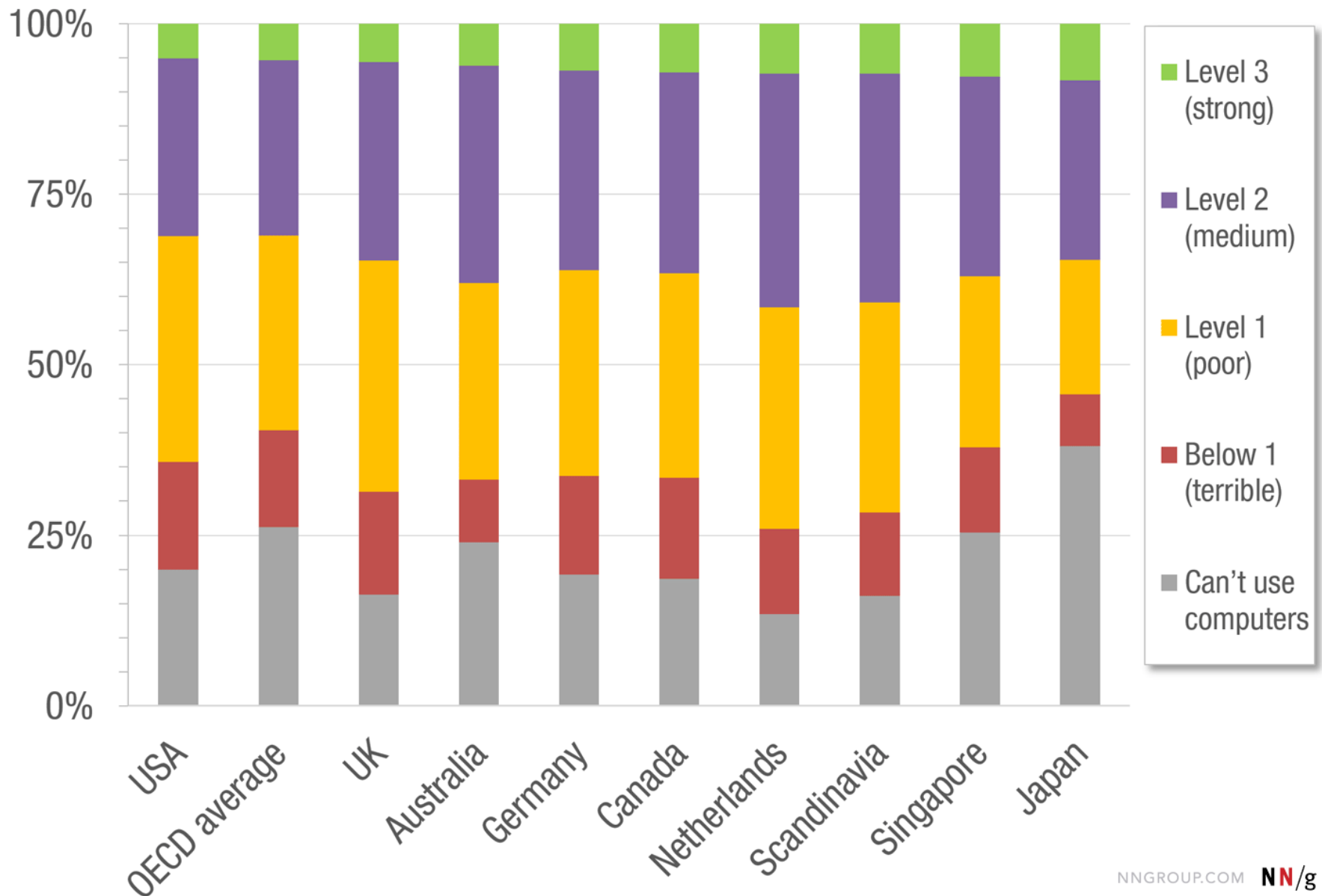
```

Headers

Skip to
content links

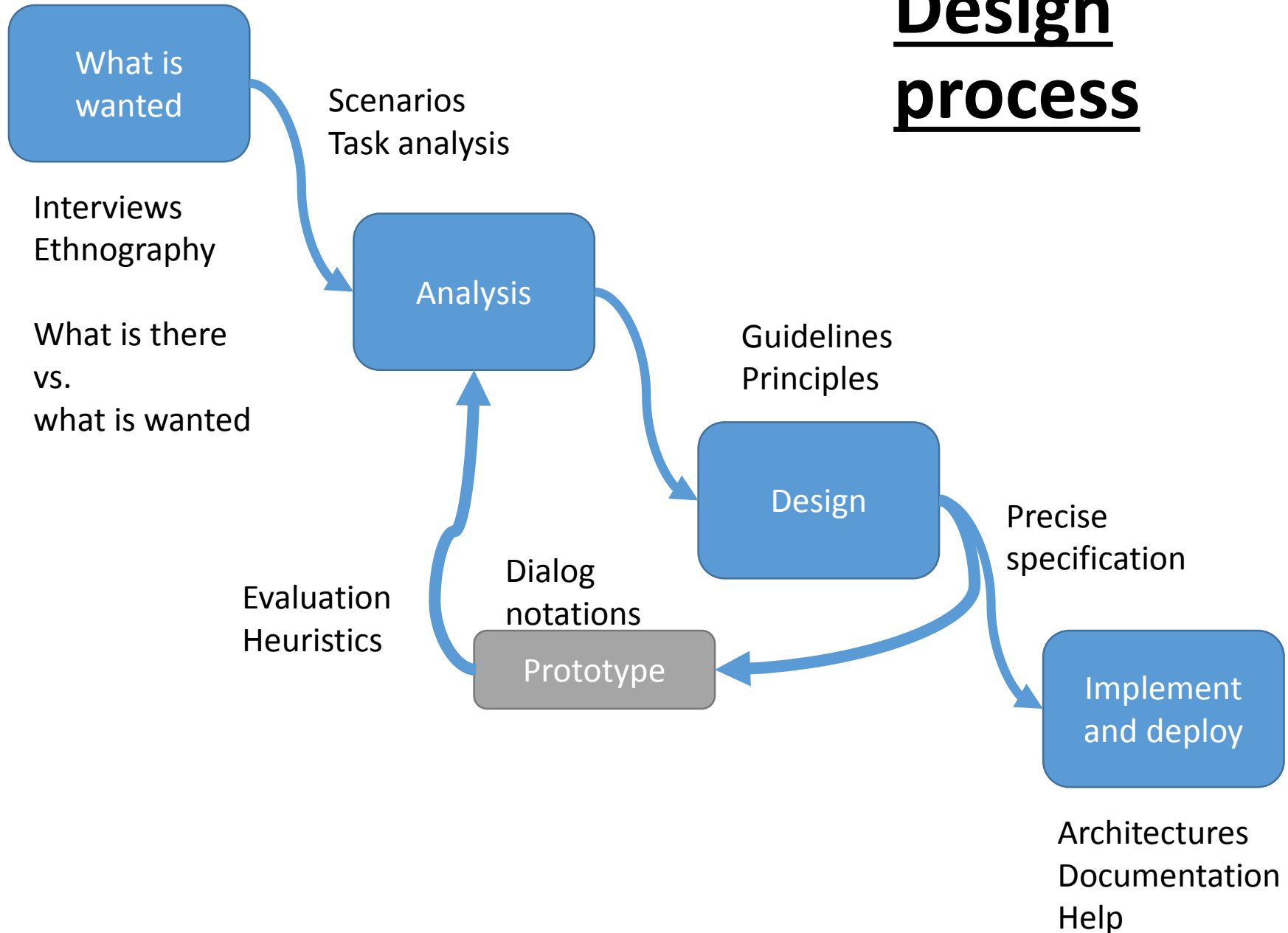
What level of technical skill can we expect out of “average” users?

Distribution of Computer Skills Among People Aged 16–65



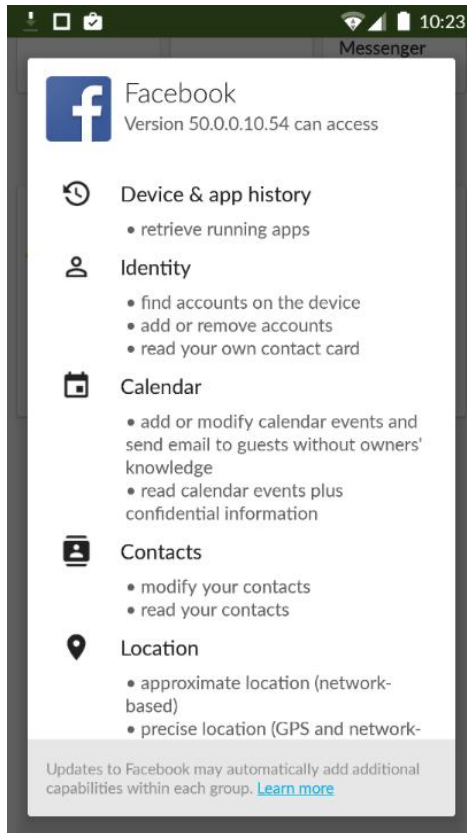
Design Process

Design process



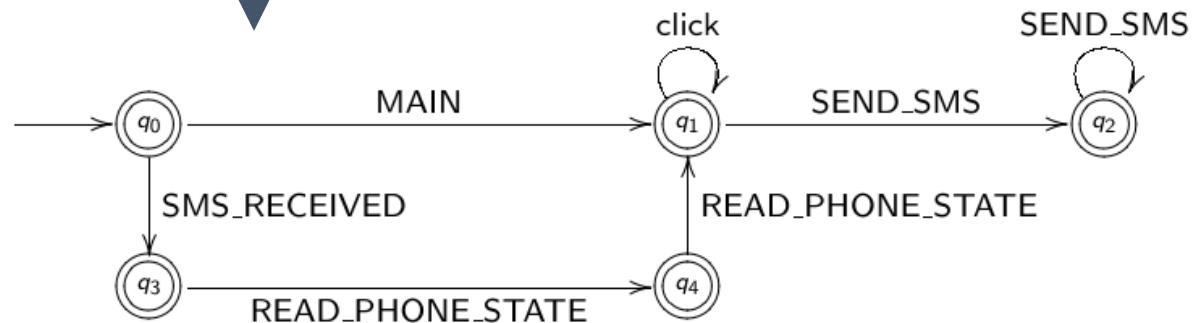
The following is part of a MSc project from last summer on re-designing permission screens for Android.

Describing how an app uses permissions

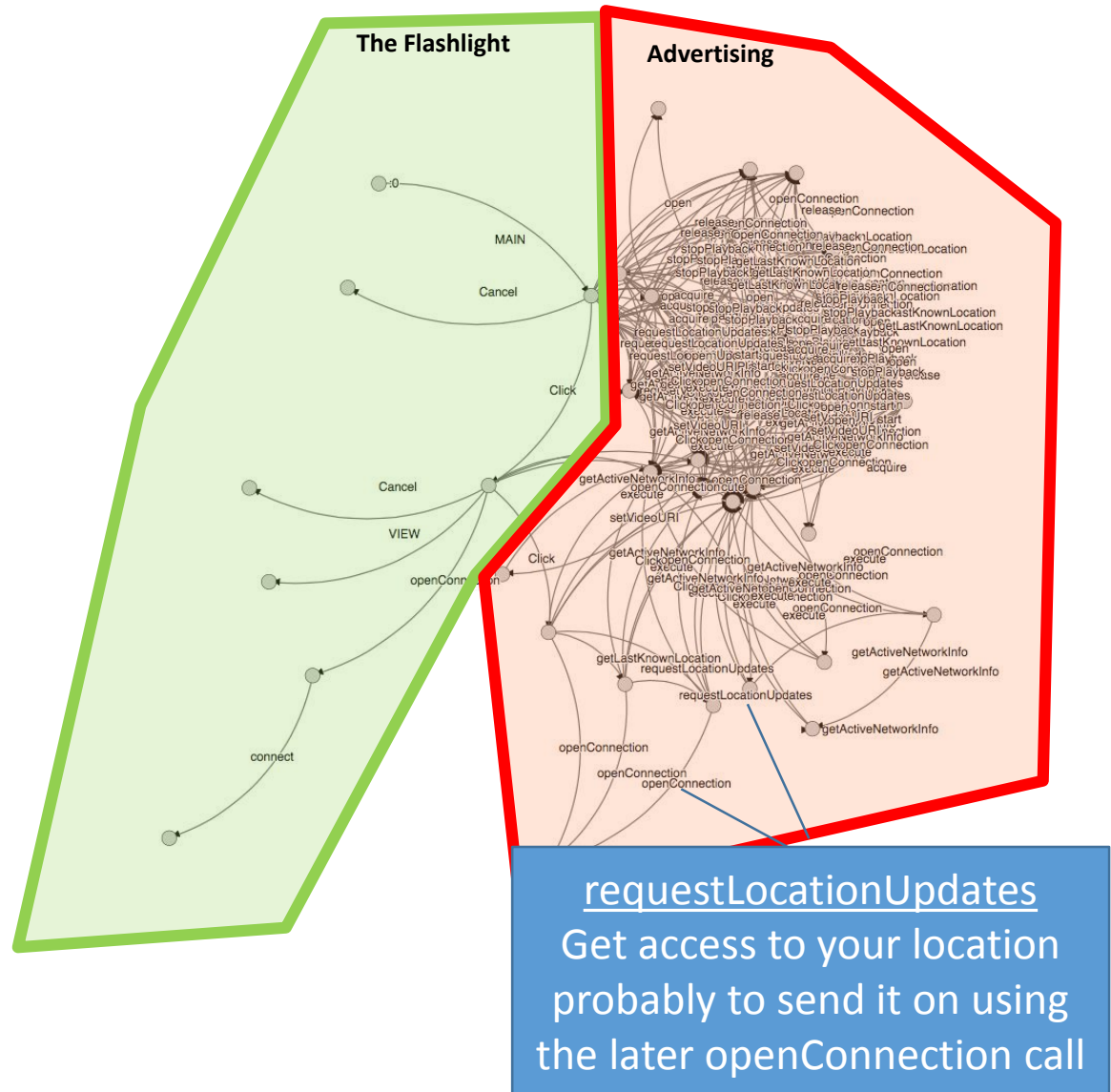


← **Allowed to do**

↓ **Actually does**



Static analysis: Breaks an app up into a control flow diagram



The brief:

Create a new permission screen using the output from a static analysis tool that helps people understand the context in which permissions will be used.

Problem 1:

What permissions do people worry about?

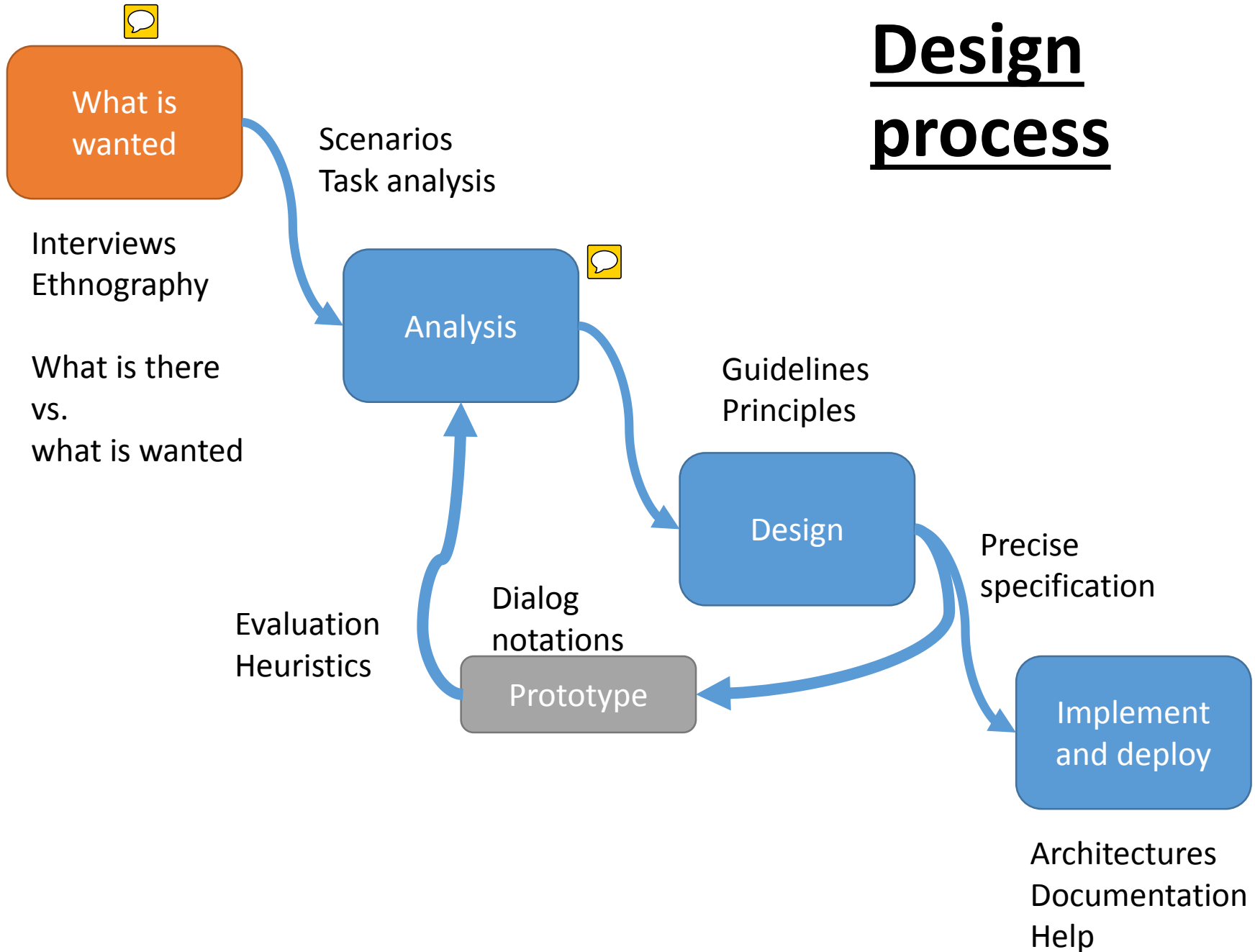
Sub-problem:

Most people don't understand permissions enough to actually worry about them

Solution:

**Affinity diagram using Computer
Security MSc students**

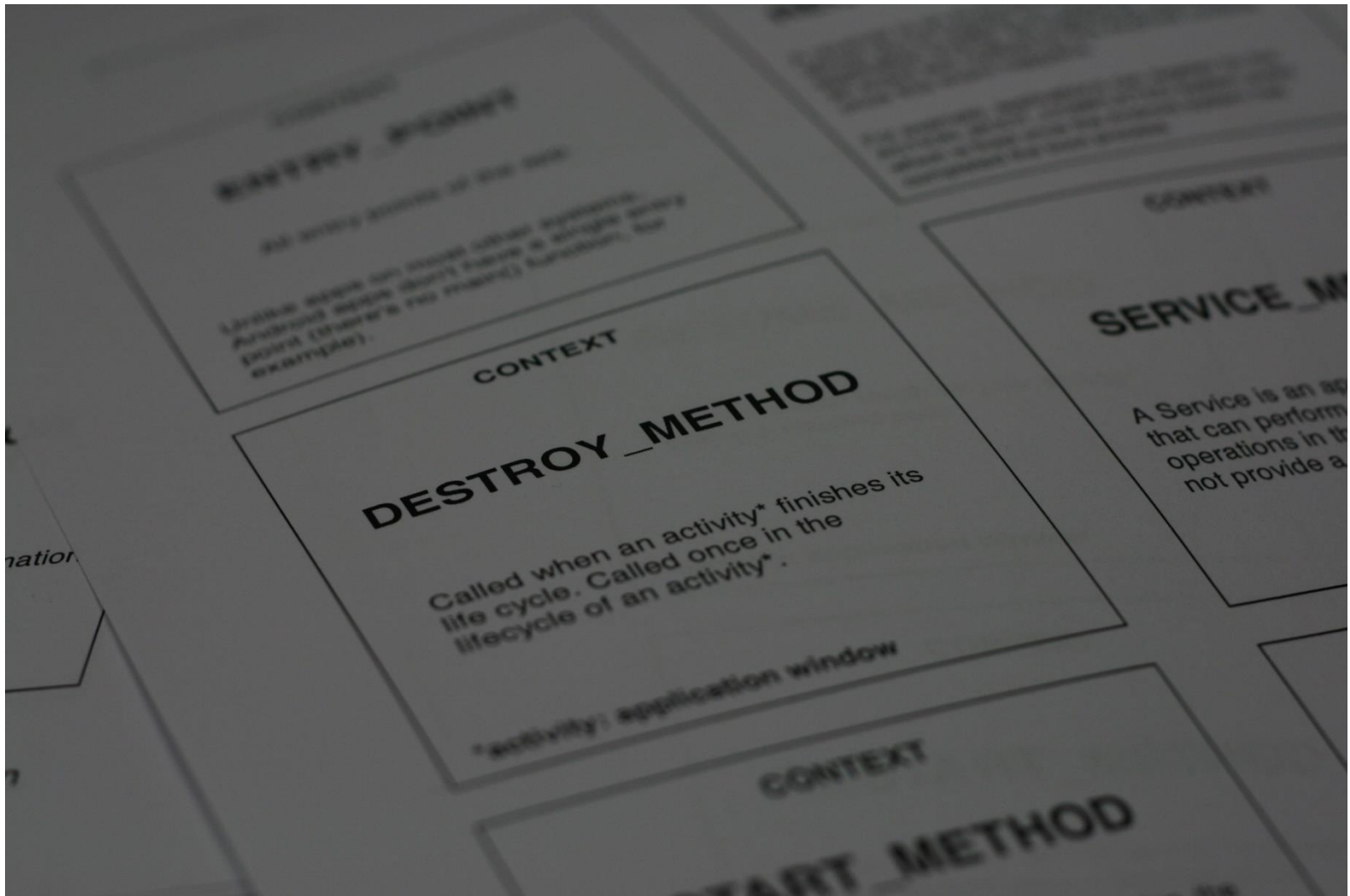
Design process



Protocol

1. Pre-print a list of Android permissions and contexts
2. Have students brainstorm answers to questions onto sticky notes
 - A. Name three permissions
 - B. App behaviors you are not comfortable with
 - C. Situations that would cause a permission to be used
3. Put all notes on the wall and do an affinity diagram
4. Encourage hierarchy design
5. Discuss outcome with participants as a group

Pre-printed contexts



Pre-printed contexts

PERMISSION

ACCESS_CHECKIN_PROPERTIES

Allows read/write access to the "properties" table in the checkin database, to change values that get uploaded.

PERMISSION

ACCESS_COARSE_LOCATION

Allows an app to access approximate location.

CONTEXT

DESTROY_METHOD

Called when an activity* finishes its life cycle. Called once in the lifecycle of an activity*.

***activity: application window**

CONTEXT

SERVICE_METHOD

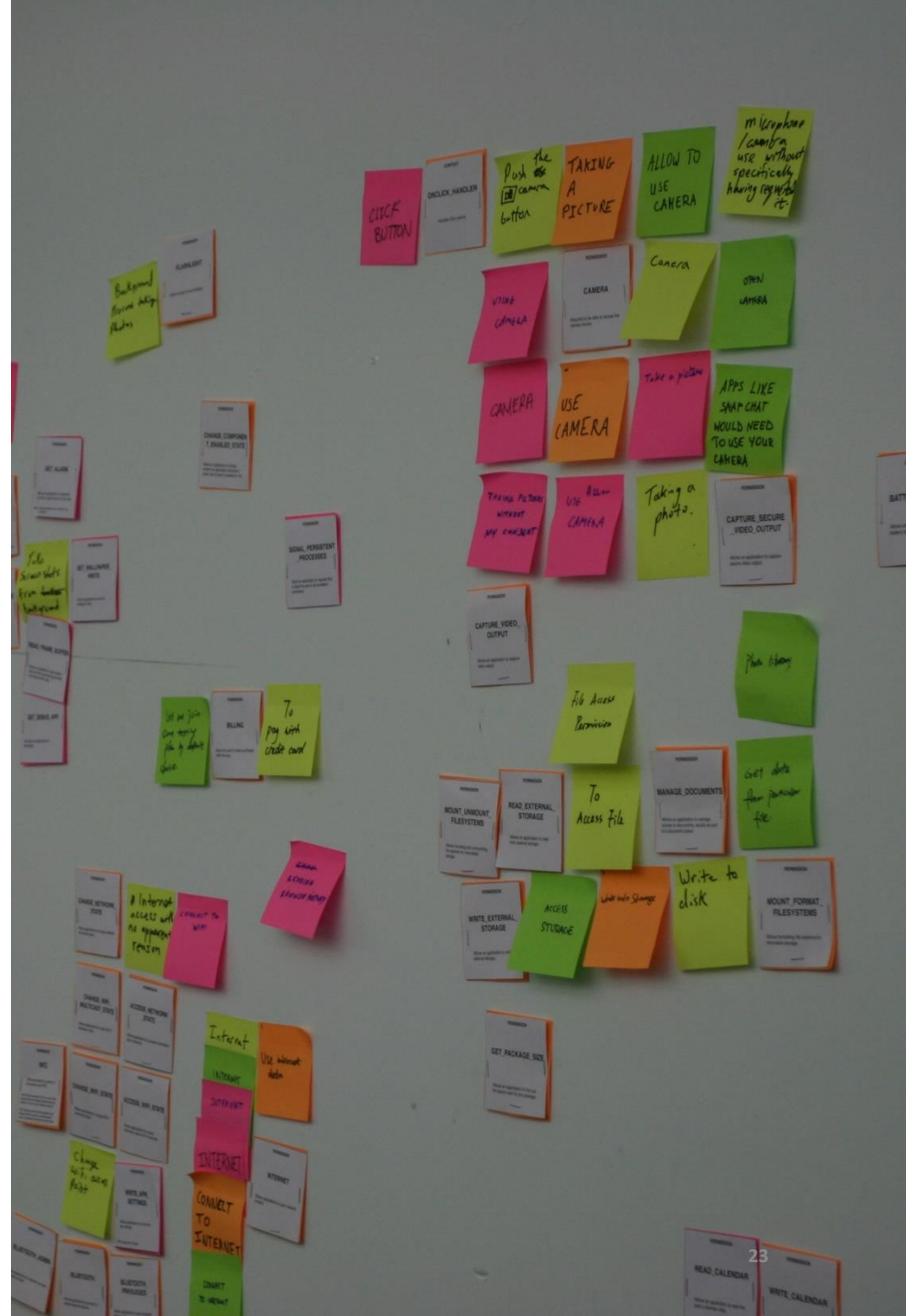
A Service is an application component that can perform long-running operations in the background and does not provide a user interface.

Examples of pre-printed and brainstormed sticky notes



Initial sorting


- This stage looked a lot like your tutorial
- We just sorted all the notes on the wall and added a few notes where needed



A woman with long brown hair and glasses is looking at a whiteboard covered in numerous colorful sticky notes. She is holding a pen in her right hand. The sticky notes are organized into sections, with one large section titled "DOCUMENTS/STORAGE" containing several smaller notes about file access, permissions, and storage operations. Other notes include "GET PACKAGE SIZE", "BILLING", "To pay with credit card", "ACCESS NETWORK STATE", "WRITE API SETTINGS", "READ DEVICE INFO", "MANAGE DOCUMENTS", "RECENT DOCUMENT FILESYSTEMS", "RECENT FOLDER FILESYSTEMS", "READ EXTERNAL STORAGE", "WRITE EXTERNAL STORAGE", "Write to disk", "CONNECTION WITH READ", and "To Access File". The background is a plain white wall.



CAMERA.

Push the  camera button

TAKING A PICTURE

ALLOW TO USE CAMERA

microphone / camera use without specifically having requested it.

USING CAMERA

PERMISSION
CAMERA
Required to be able to access the camera device.

Camera

OPEN CAMERA

CAMERA

USE CAMERA

Take a picture

APPS LIKE SNAP CHAT WOULD NEED TO USE YOUR CAMERA

USE Allow CAMERA

Taking a photo.

PERMISSION
CAPTURE_SECURE_VIDEO_OUTPUT
Allows an application to capture secure video output.

PERMISSION
CAPTURE_VIDEO_OUTPUT
Allows an application to capture video output.

Accessing Location

LOCATION / MAP

Retention
record location.

Permissions
Gather my location without my permission. (default setting)

PERMISSION
ACCESS_LOCATION_EXTRA_COMMANDS
Allows an application to access extra location provider commands.

PERMISSION
INSTALL_LOCATION_PROVIDER
Allows an application to install a location provider into the Location Manager.

PERMISSION
ACCESS_COARSE_LOCATION
Allows an app to access approximate location.

PERMISSION
LOCATION_HARDWARE
Allows an application to use location features in hardware, such as the geofencing api.

PERMISSION
CONTROL_LOCATION_UPDATES
Allows enabling/disabling location update notifications from the radio.

Modifying Location

PERMISSION
UNINSTALL_SHORTCUT
Allows an application to uninstall a shortcut in Launcher.

PERMISSION
INSTALL_SHORTCUT
Allows an application to install a shortcut in Launcher.

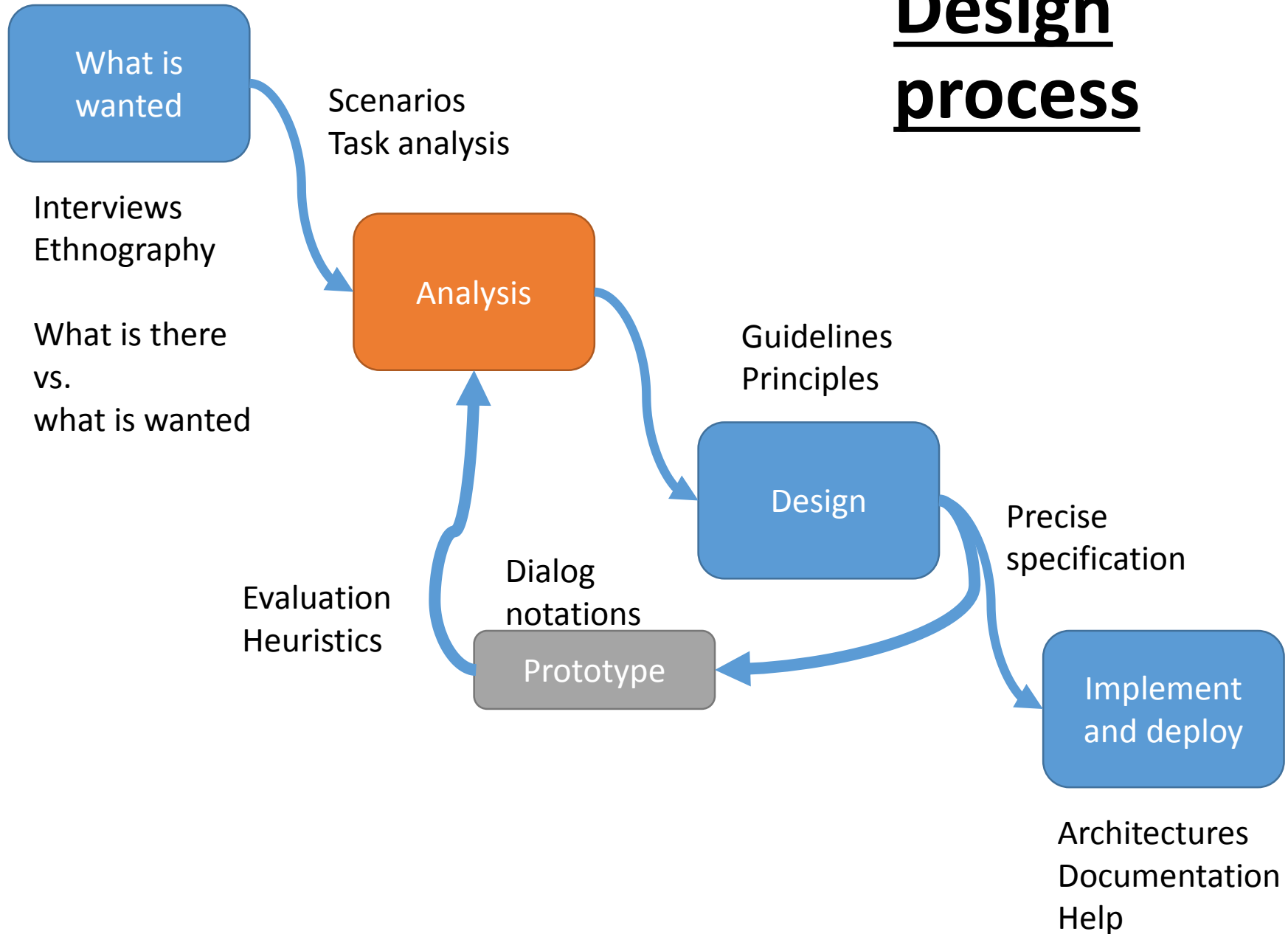
PERMISSION
BROADCAST_PACKAGE_REMOVED
Allows an application to broadcast a notification that an application package has been removed.

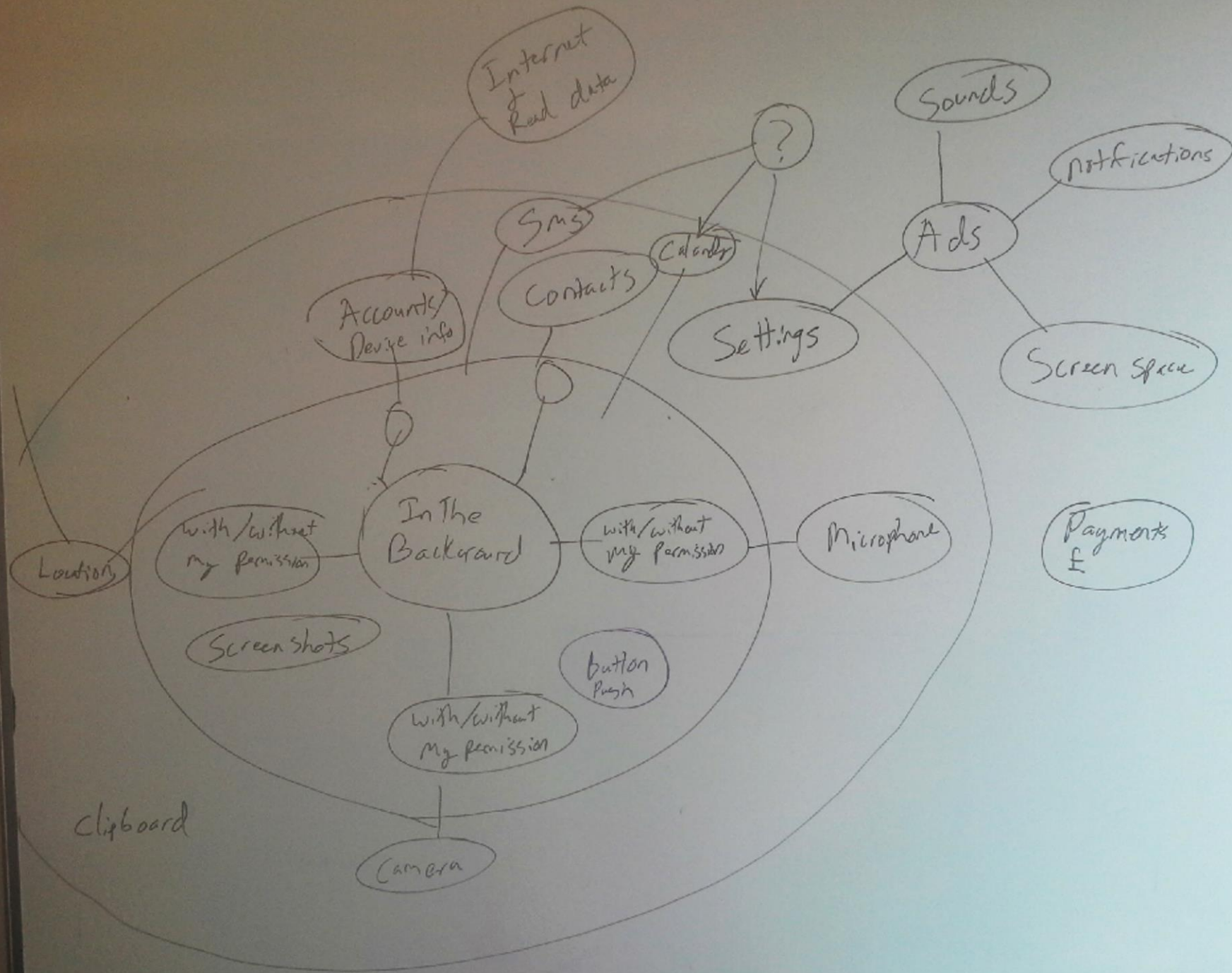
PERMISSION
REQUEST_INSTALL_PACKAGES
Allows an application to request installing packages.

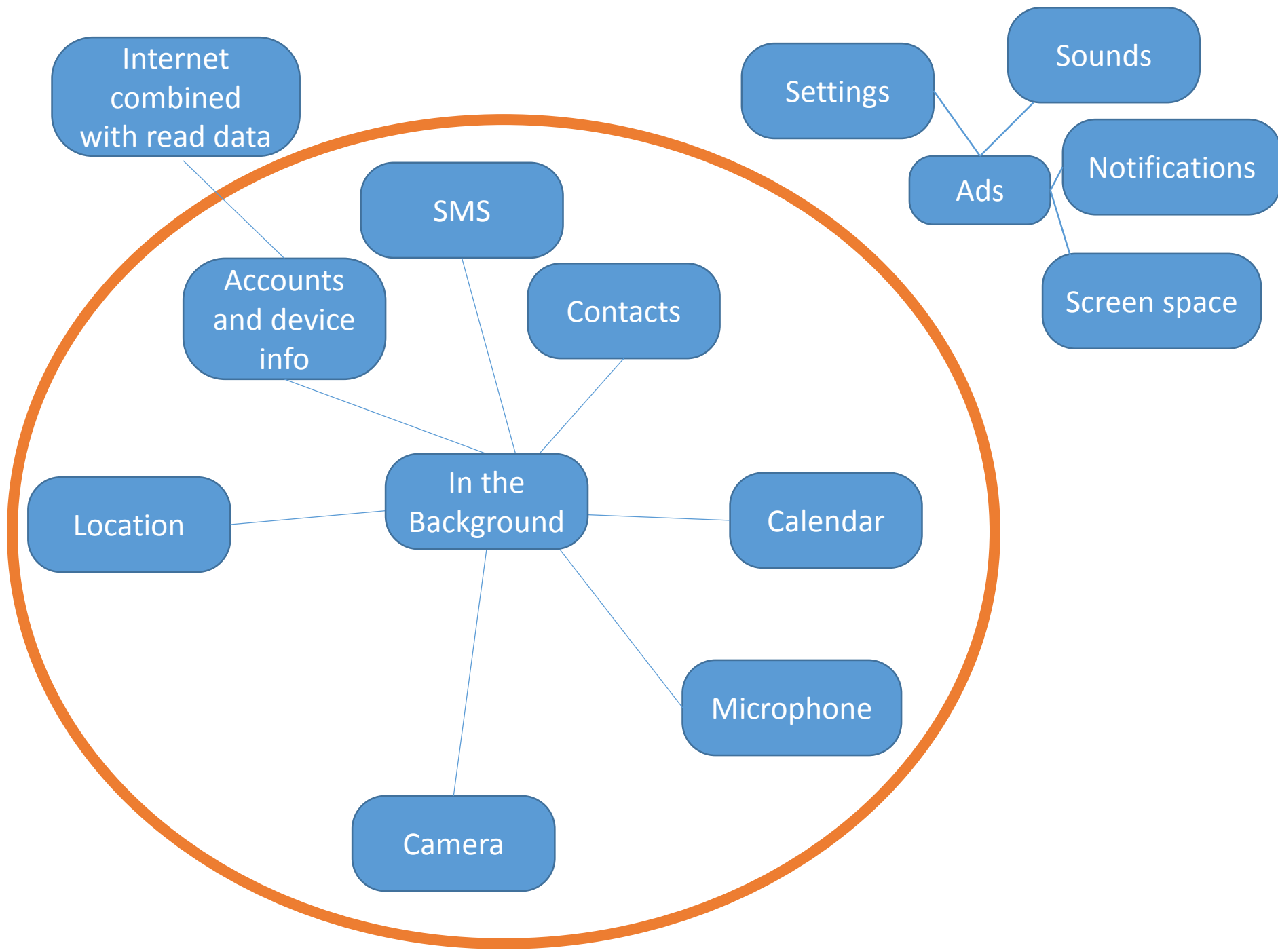
PERMISSION
DELETE_PACKAGES
Allows an application to delete packages.

The image shows a wall covered with numerous sticky notes and several large sheets of paper pinned together. The papers are titled "DOCUMENTS/STORAGE", "CAMERA", "LOCATION/MAP", "DATETIME", and "BILLING". The sticky notes contain various handwritten notes, some in different colors (yellow, pink, green, orange). The overall scene suggests a complex investigation or data collection project.

Design process

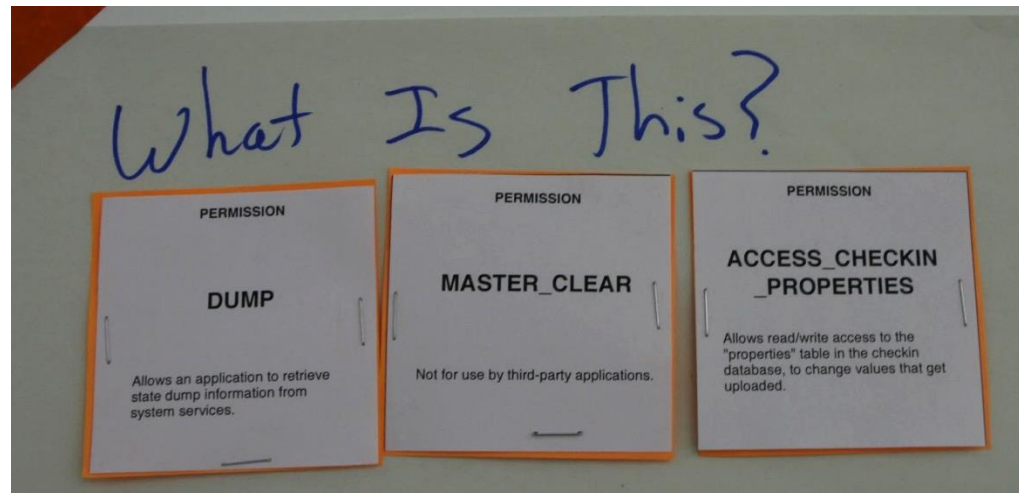




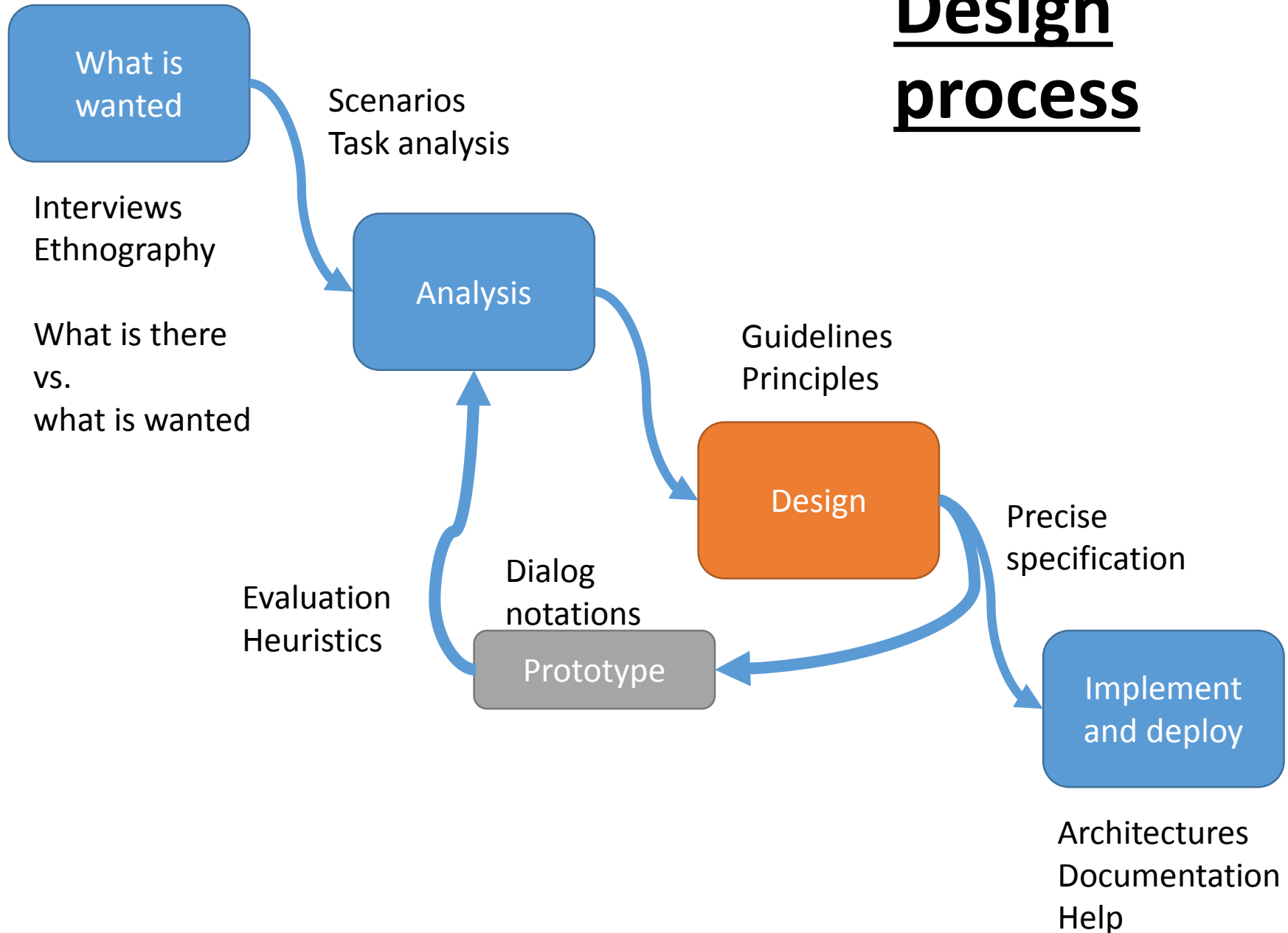


Outcomes

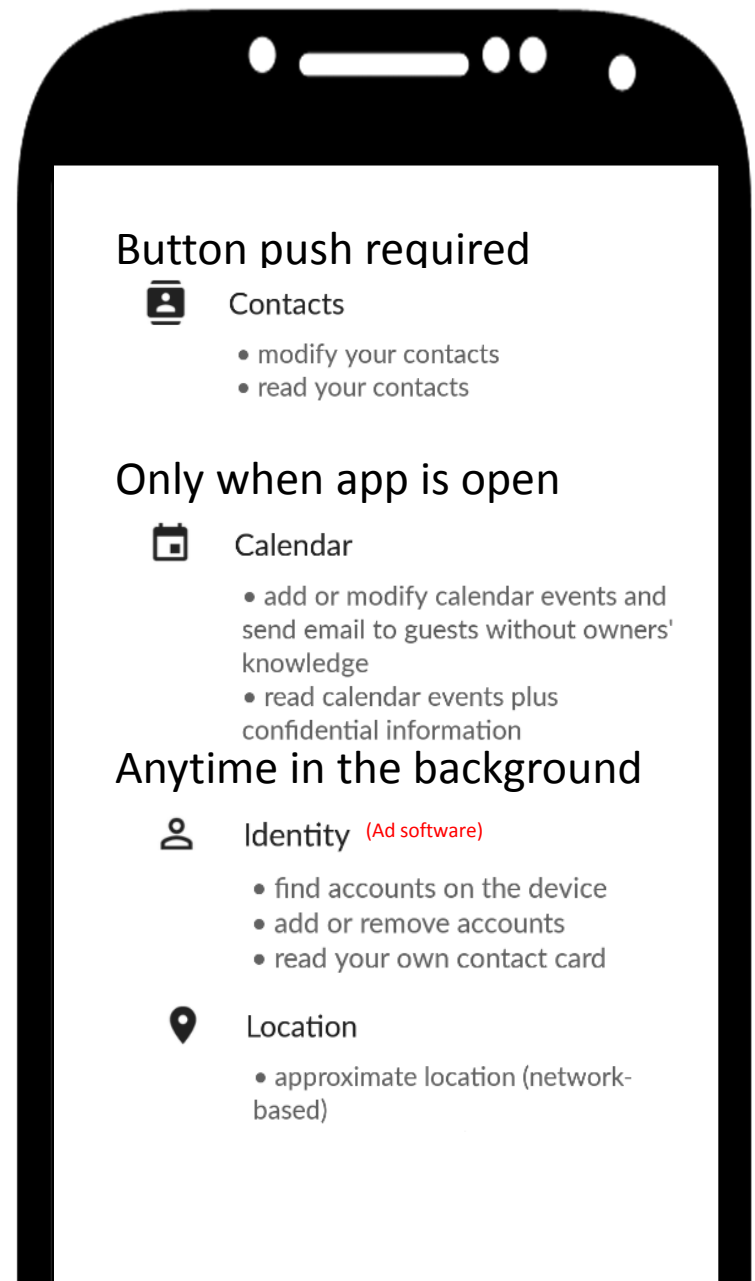
- “with my permission”
 - Button presses
 - Opening an app
- Background vs. foreground
 - When the permission is accessed is important
- Purpose
 - Ads
 - Uploading private data like contacts and device ID
- Sensitive permissions focused on input/output
- Confusing permissions



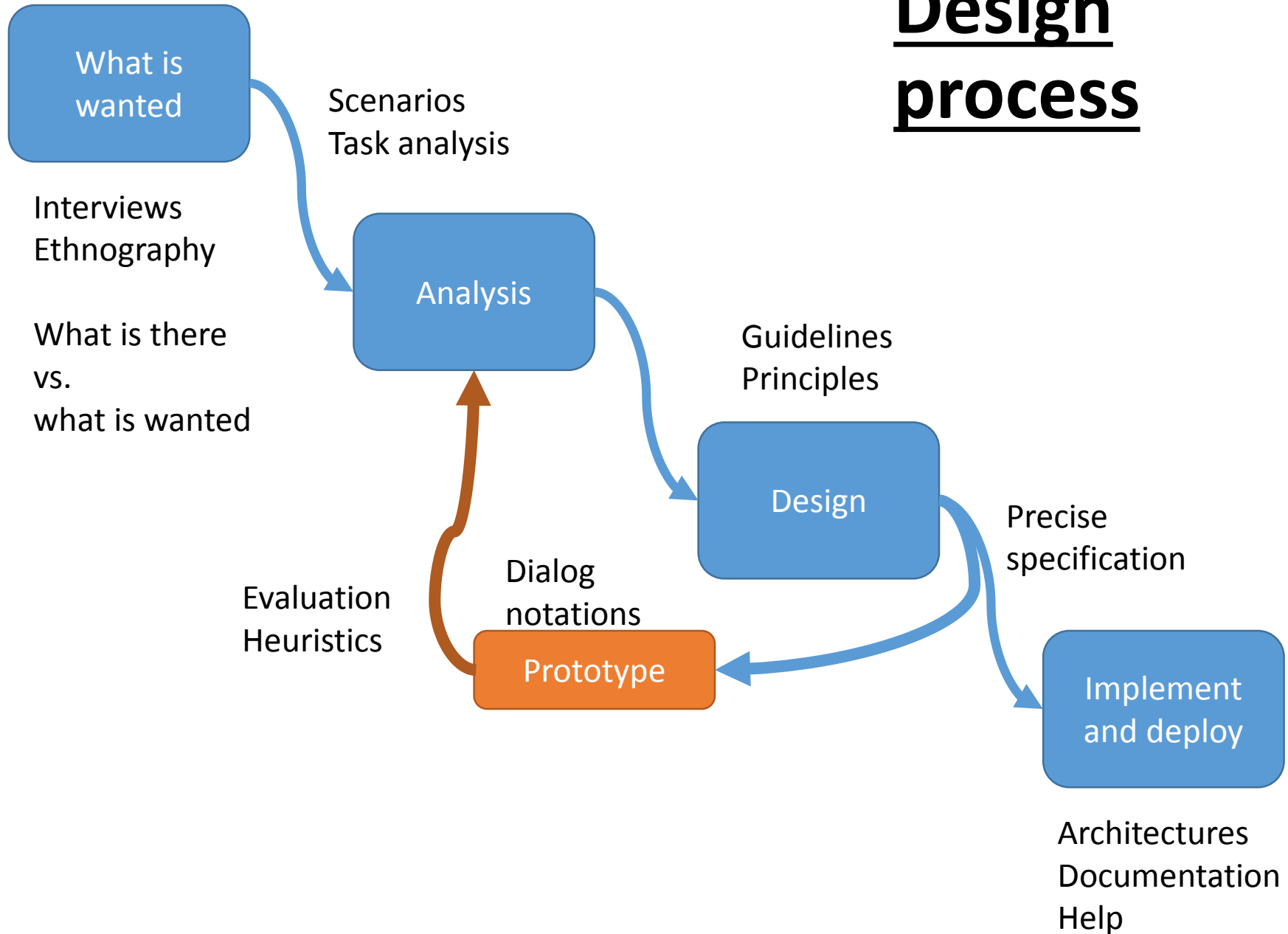
Design process



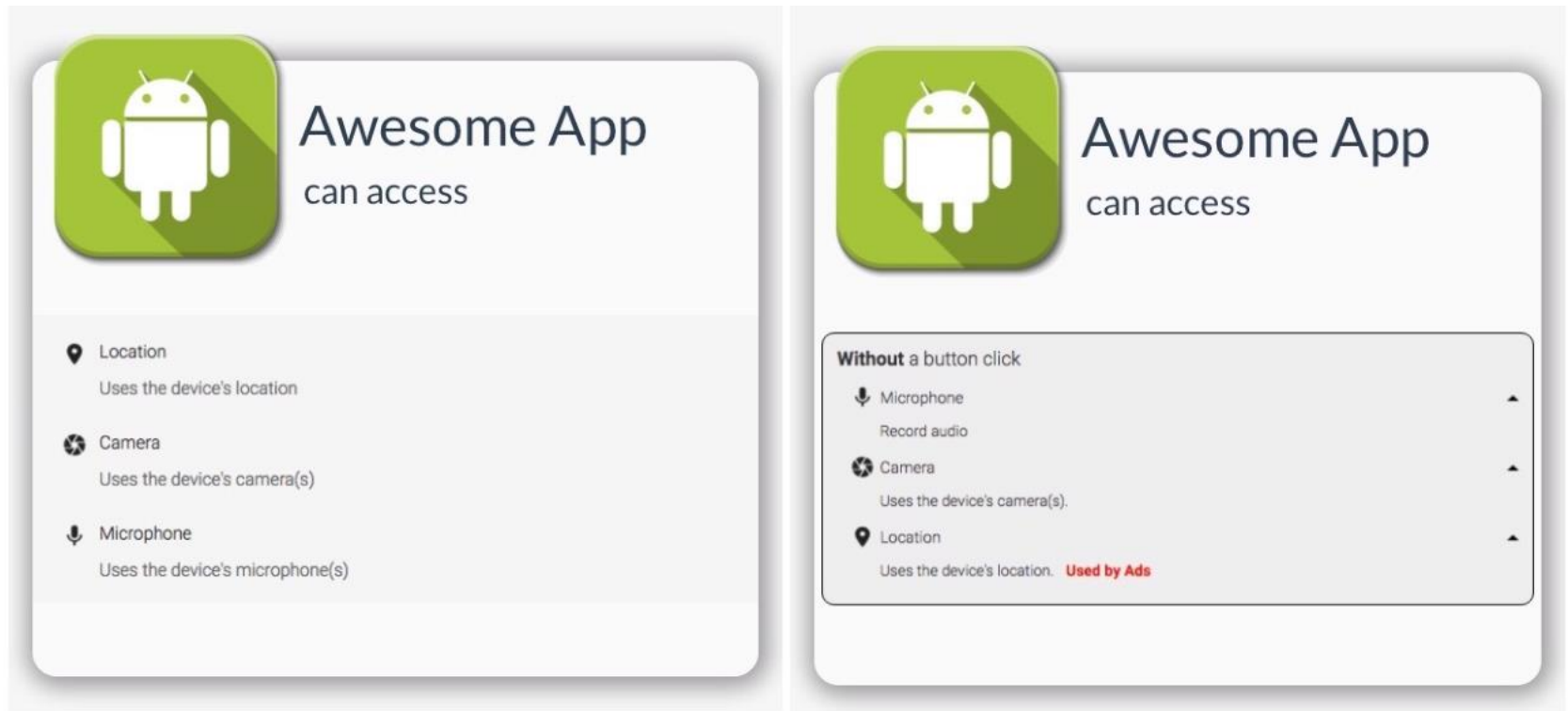
We designed an interface that shows permissions in context of when they can be used.



Design process



Created two interfaces to A/B test



(a) Control group screen

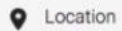
(b) Experiment group screen

Figure 5.1: Survey question screens



Awesome App

can access



Location

Uses the device's location



Camera

Uses the device's camera(s)



Microphone

Uses the device's microphone(s)



Awesome App

can access

Without a button click



Microphone

Record audio



Camera

Uses the device's camera(s).



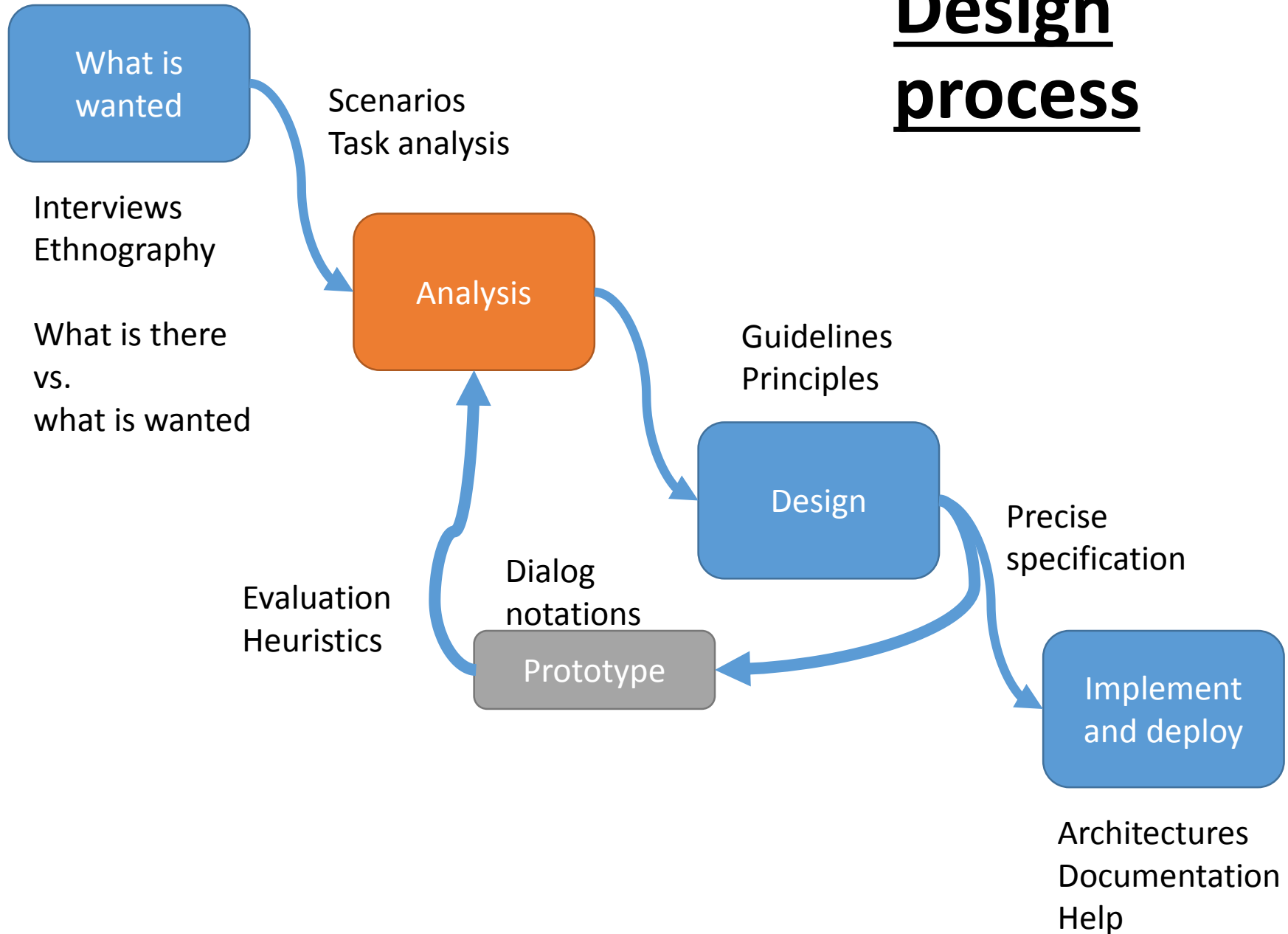
Location

Uses the device's location. **Used by Ads**

Which of the following can this app do?

| | Absolutely Impossible | Impossible | Neutral | Possible | Absolutely Possible |
|---|--------------------------|-----------------------|-----------------------|-----------------------|------------------------|
| Charge purchases to your credit card at any time. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Get your location. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Allow ads to know your location. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Load ads. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Write on the SD card | | | | | |

Design process



The results:

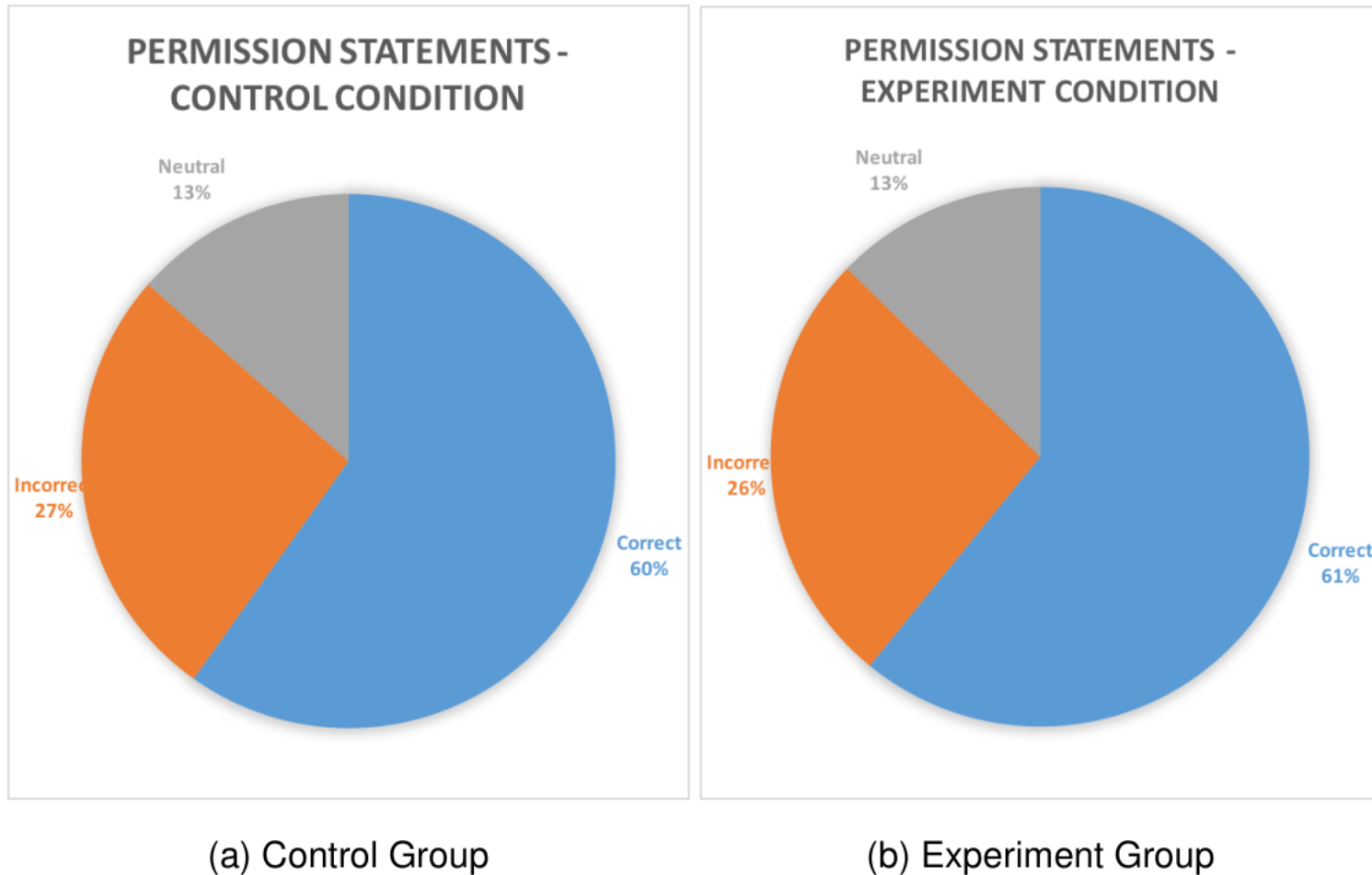
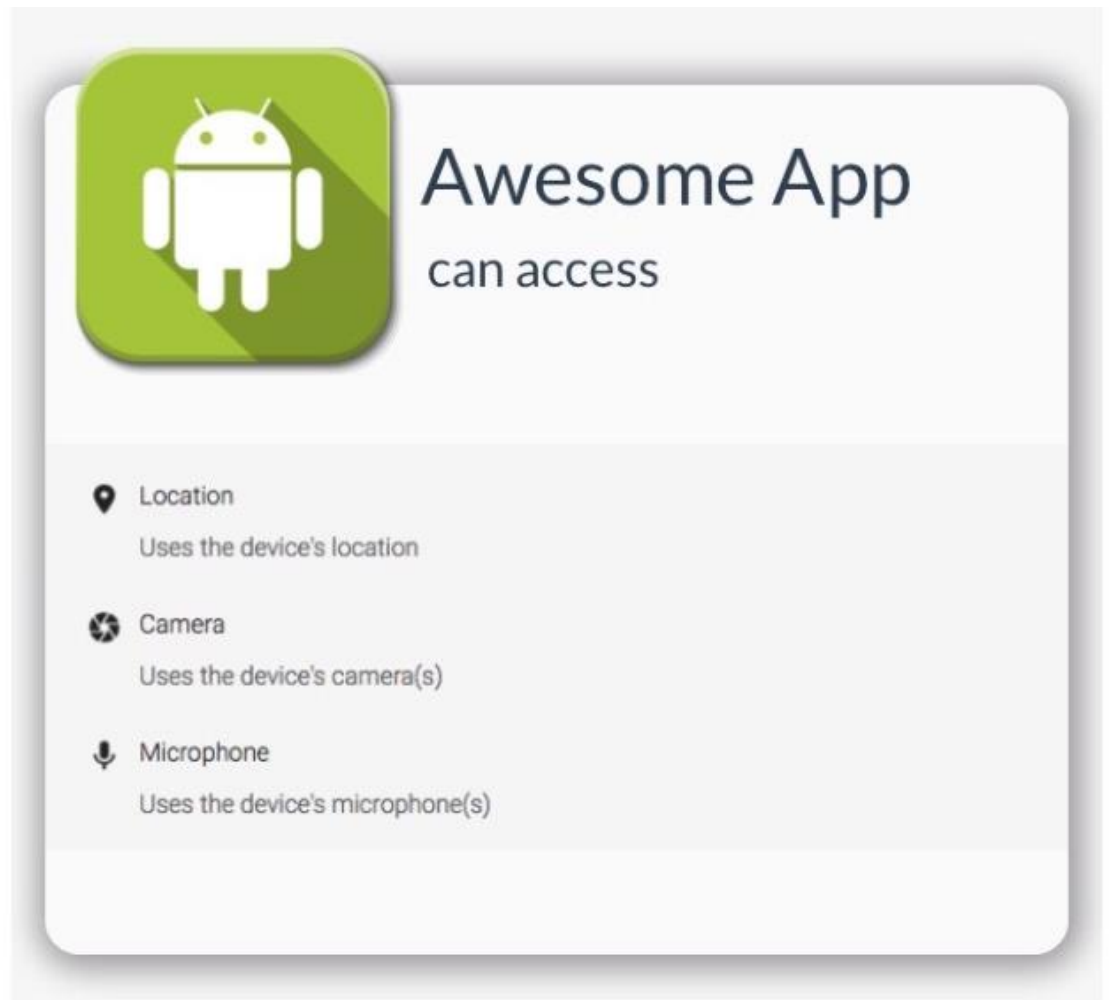


Figure 5.2: Permission Statements Results: Correct, Incorrect and Neutral

27% of people think they know what this screen says and are wrong.

13% are uncertain what this screen really means.



(a) Control group screen

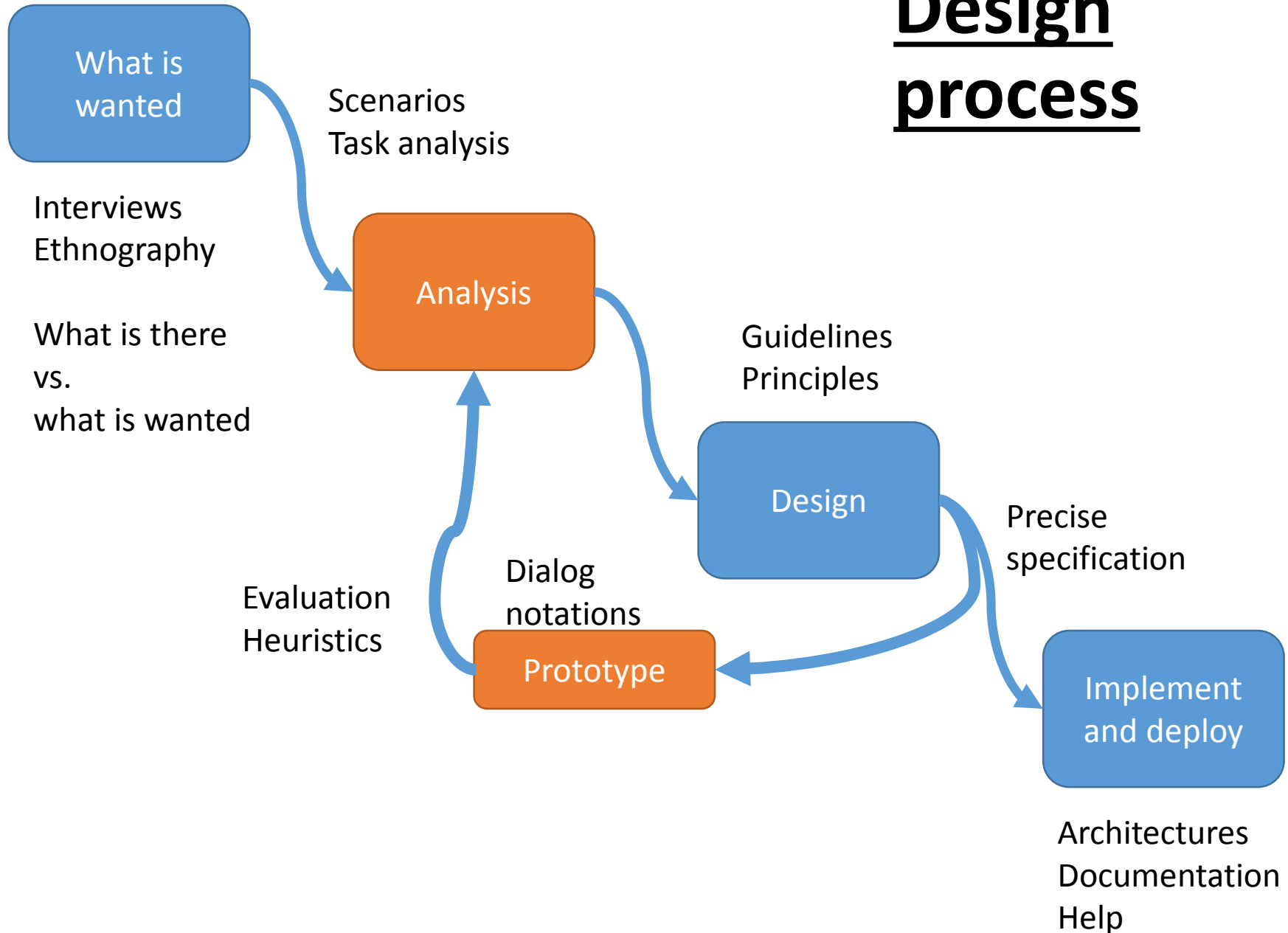
Case study from Nielsen Group

<https://www.nngroup.com/articles/fancy-formatting-looks-like-an-ad/>

Problem:

Why can't people find the population of the United States on the Censuses Bureau site?

Design process



[Income, Poverty & Health Insurance](#)[SEARCH](#) ☒ [FAQs](#) ☐ [Census.gov](#)[GO](#)[Data Finders](#)[Population Clocks](#)**U.S. 302,740,627**World **6,615,157,975**

00:47 GMT (EST+5) Aug 31, 2007

[Population Finder](#)

city/ town, county, or zip

or state

Select a state

[GO](#)[Find An Area Profile with QuickFacts](#)

Select a state to begin...

Select a state

[Latest Economic Indicators](#)

- [New Home Sales](#)
- [Advance Report on Durable Goods](#)
- [Manufacturers' Shipments, Inventories, and Orders](#)

[Economic Indicators](#)

Select an indicator

Select an indicator

86% of users failed to find the population of the US on this page.
Why?

[Census 2000](#) • [2010 Census](#) • [Census 2000](#)
• [Summary File 4 \(SF 4\)](#) • [Summary File 3](#)[American Community Survey](#) • [Projections](#) •
[Time](#) | [State Median Income](#) • [Poverty](#) •
[International](#) • [Generators](#) • [More](#)[Economic Indicators](#) •[Form](#) • [NAICS](#) • [Survey of Business Owners](#)[Industry](#)[Government](#) • [E-Stats](#) • [Foreign Trade](#) | [Export Codes](#) •
[Local Employment Dynamics](#) • [More](#)[Geography](#)[Maps](#) • [TIGER](#) • [Gazetteer](#) • [More](#)[Newsroom](#)[Releases](#) • [Facts For Features](#) • [Minority Links](#) •
[Broadcast & Photo Services](#) • [Embargo News Release](#)
[Subscription](#) • [More](#)[Special Topics](#)[Hurricane Data and Emergency Preparedness](#) •
[Census Calendar](#) • [Training](#) • [For Teachers & Students](#) •
[Statistical Abstract](#) • [FedState](#) • [USA.gov](#)[Publications](#)[Are You in a Survey?](#)[About the Bureau](#)[Regional Offices](#)[Doing Business with Us](#)[Related Sites](#)[Statistics of U.S. Businesses](#)

The website does quite a few things correctly

- Most common task is large, obvious, and red
- Sections of the page are clearly labeled
- There is a search box
- Lots of navigation cues
- Sidebars clear
- Good use of grouping



Methodology options:

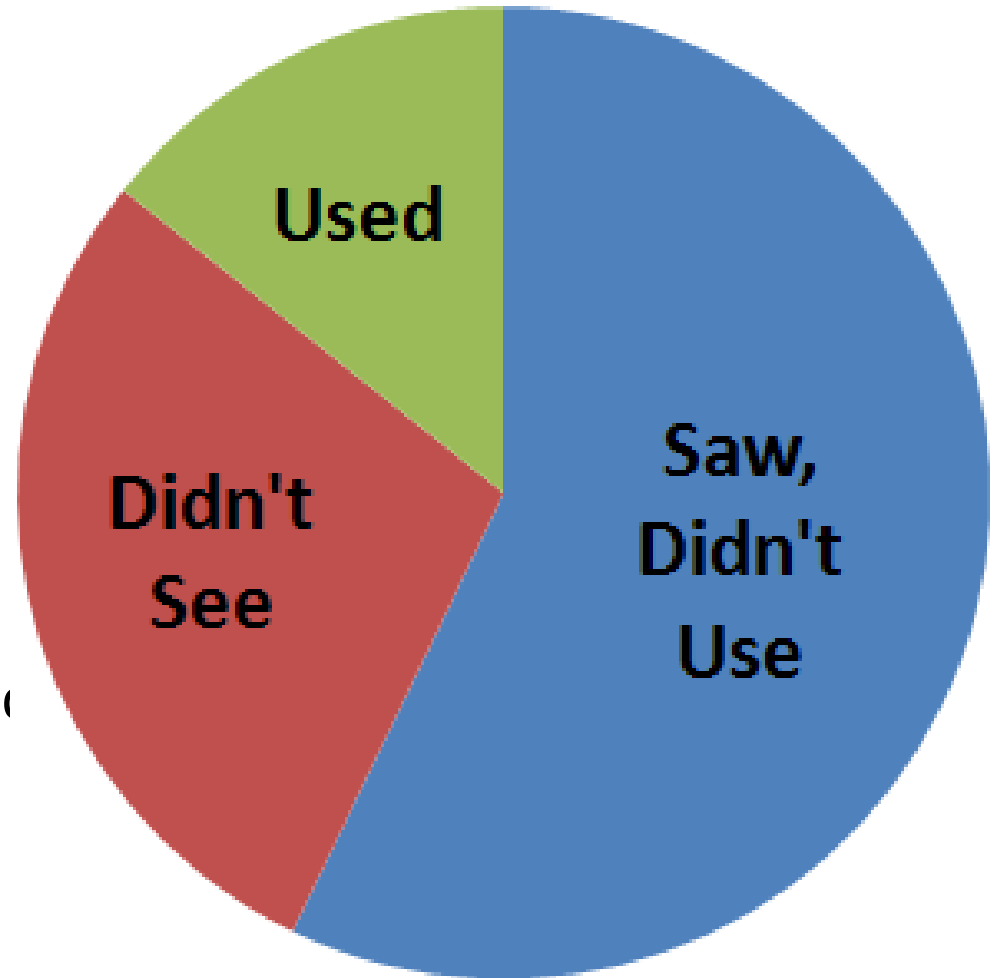


- Think aloud (best choice)
 - Good: lots of data articulated, people can tell you what they are looking for
 - Bad:
- Heuristic
 - Good: No need to find a participant
 - Bad: Looking at the site there are no obvious heuristics seriously broken, so any result would be an educated guess
- GOMS – Not really appropriate
- Contextual Inquiry – Unlikely to be a contextual issue

These researchers decided to use an eye tracker in addition to asking the participant to complete the task in a lab

People didn't use the feature

- Only 14% of participants used the Population Check feature
- Why?
 - It looks like an advertisement
 - It uses terms like “Population Clocks” and “Data Finder” rather than “US Population”



U.S. Census Bureau

Subjects A to Z | FAQs | Privacy Policy | Help

A

SEARCH FAQs Census.gov

U.S. Census 2000

Population Clocks
U.S. 301,465,607
World 6,504,759,506
10:41 GMT (EST+5) Mar 26, 2007

Data Finders

Population Finder

city, town, county, or zip
or state
Select a state

Find An Area Profile with QuickFacts

Select a state to begin
Select a state

Latest Economic Indicators

- New Home Sales
- Housing Starts/Building Permits

Economic Indicators

Select an indicator
Select an indicator

People & Households

- Estimates • American Community Survey • Projections • Housing • Income | State Median Income • Poverty • Health Insurance • International • Genealogy • More

Business & Industry

- Economic Census • Economic Indicators • Census with Your Firm • NAICS • Survey of Business Owners • Government • E-Stats • Foreign Trade | Export Codes • Local Employment Dynamics • More

Geography

- Maps • TIGER • Gazetteer • More

Newsroom

- Releases • Facts For Features • Minority Links • Broadcast & Photo Services • Embargo Request • More

Special Topics

- Hurricane Data and Emergency Preparedness • Census Calendar • Training • For Teachers • Statistical Abstract • FedStats • USA.gov

NEW - Annual Capital Expenditures Survey 2005

USCENSUSBUREAU
Helping You Make Informed Decisions

Accessibility | Information Quality | Data Protection & Privacy Policy | FOIA | U.S. Dept of Commerce

U.S. Census Bureau

Subjects A to Z | FAQs | Privacy Policy | Help

B

SEARCH FAQs Census.gov

U.S. Census 2000

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10:40 GMT (EST+5) Mar 26, 2007

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Subjects A to Z | FAQs | Privacy Policy | Help

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CW2 Questions

Questions?