



Designing Basics [Develop]

“Keeping the same art style and setting. Create an image set in the pacific northwest forest where some baby animals are sitting together thinking up of new design ideas.” ChatGPT

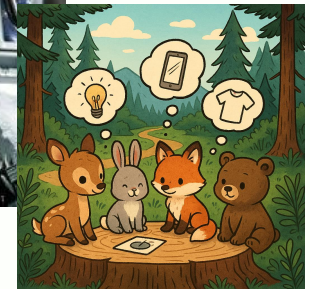
Today: Designing for HCD

- Lecture:
 - Mental models
 - Norman's Gulfs
 - Design Principles

Applications should be intuitive



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Mental models

- What user believes about the system.
- Based on prior knowledge, prior interactions, advertisement
- Predict how a system works → how they interact

Scenario: Warm Evening

Alex returns home from their theater performance on a hot evening and finds the living room uncomfortably hot.

In an attempt to cool the room quickly, Alex sets the thermostat to 45F, even though a comfortable temperature would be around 70F.

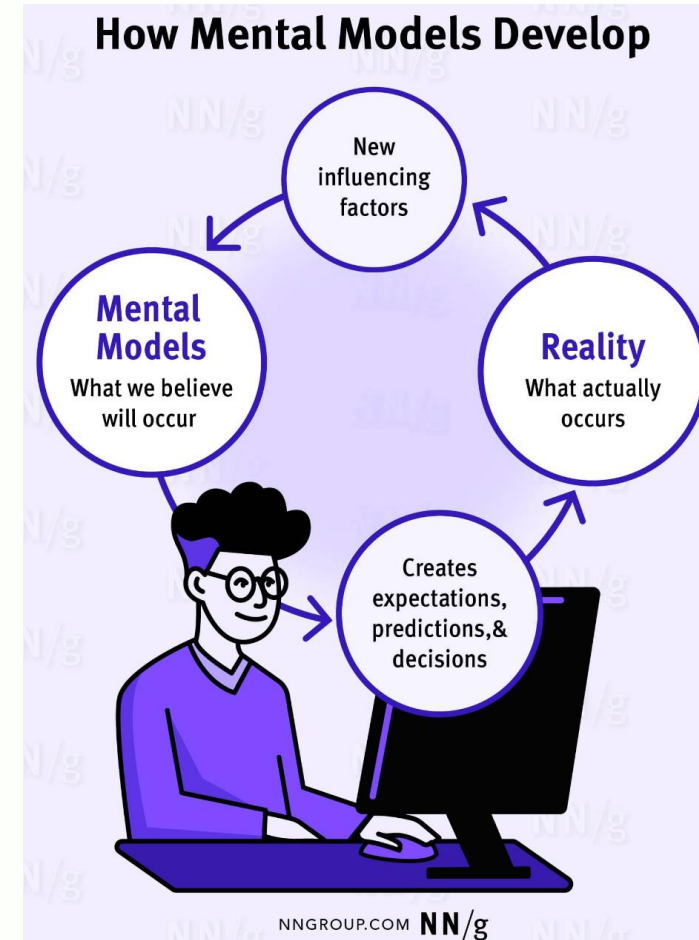
Is that the right process?

What is Alex's mental model?



Recall: Mental models

- Are based on Belief, not Facts
 - Unique to each user
 - Change over time
 - Has inertia to change
-
- Does it meet expectations?
 - Does it match the intended design?



Reduce Mental Model Gap

- Make the system conform
- Improve users' mental model
 - Labels
 - Instructions
 - Training (tutorial, demo, ...)
 - Metaphors



Thermostat Mental Model

✗ Faulty Mental Model (Faucet Metaphor):

Its **not** a **water faucet**—turn it up more and *more heat flows faster*, like turning a faucet wider to get more water.

✓ Better Metaphor: Oven Timer or Target Tracker


The thermostat is more like **an oven timer** or a **GPS target tracker**—you set the *destination* (temperature), and the system works steadily to get there.

Turning the thermostat higher doesn't make it arrive faster

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Big Spring Sale Medical Care Groceries Prime Video Amazon Basics Buy Again Today's Deals Keep Shopping For Big Spring Sale ends

Electronics Cell Phones & Accessories Cell Phones Accessories Cases Wearable Technology Deal:

 **WHOOP 4.0 12-Month Health Tracker (Sleep, Strain, Recovery)** 4 ★★★★★ 2,029 \$239⁰⁰ ✓prime

Sports & Outdoors > Exercise & Fitness > Fitness Technology > Activity & Fitness Trackers



✓ **Added to cart**
Color: Black/Midnight Zen

Cart Subtotal: \$69⁹⁵

[Proceed to checkout \(1 item\)](#)

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Amazon's Choice

10K+ bought in past month

Big Spring Deal

-30% \$69⁹⁵

List Price: \$99.95

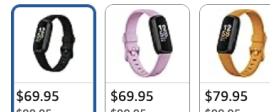
Or **\$11.66** /mo (6 mo). Select from 3 plans

✓prime

FREE Returns

May be available at a lower price from [other sellers](#), potentially without free Prime shipping.

Color: **Black/Midnight Zen**



In Stock

Quantity: 1

[Add to cart](#)

[Buy Now](#)

- ☐ **2-Year Protection Plan** for \$9.99
- ☐ **3-Year Protection Plan** for \$11.99
- ☐ **Amazon Complete Protection**

What metaphors can you spot?

2. 🏷️ "Big Spring Deal" and "List Price \$99.95 → \$69.95"

- **Metaphor:** In-store sales tags/price markdowns
- **Mental Model Support:** Maps to how we understand discounts in brick-and-mortar stores (e.g., red sale signs).
- **Goal:** Creates urgency and perceived value.

3. 📦 "FREE delivery," "In Stock," and "Ships from Amazon.com"

- **Metaphor:** Warehouse/order fulfillment model
- **Mental Model Support:** Reinforces that users are dealing with inventory like in a physical logistics system.
- **Goal:** Builds trust and expectation of prompt delivery.

4. 🔄 "Buy Again"

- **Metaphor:** Repeat purchase behavior
- **Mental Model Support:** Mimics going back to a favorite store to pick up the same item again.
- **Goal:** Makes reordering cognitively easy and fast.

5. ★ Star Ratings

- **Metaphor:** Hotel/movie star reviews
- **Mental Model Support:** Lets users quickly gauge product popularity/quality using a widely understood metric.
- **Goal:** Social proof to encourage buying.


6. 🔔 "Set reminder" (for price tracking)

- **Metaphor:** Alarm clock or personal assistant reminder
- **Mental Model Support:** Like setting a reminder on your phone or calendar.
- **Goal:** Helps retain customer interest even if they're not ready to buy.

These metaphors:

- Create **intuitive expectations** for interaction.
- Reduce the **gulf of execution** (users know what actions to take).
- Improve **learnability** and **efficiency** in navigation and decision-making.

What's wrong with this picture?



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MY BAG (2)



v4 Bento Bag® - Personal Item Bag


\$248.00

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2

+

REMOVE



Navidium Shipping Protection ⓘ

from Damage, Loss & Theft for \$8.25

Get peace of mind with Delivery Guarantee in the event your delivery is damaged, stolen, or lost during transit.

☒

SUBTOTAL

\$504.25

CHECKOUT

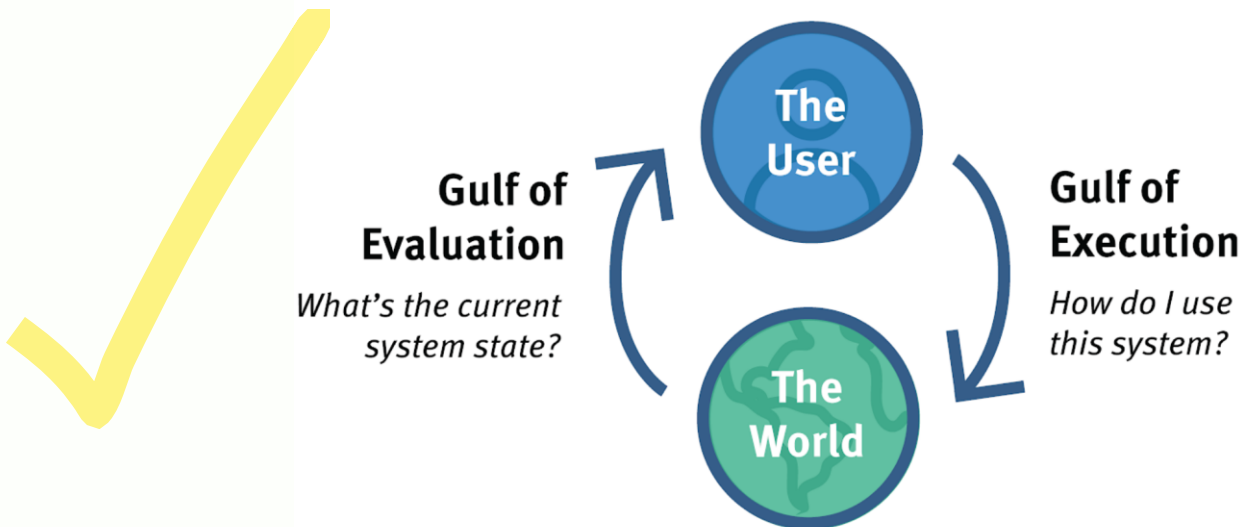
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<https://www.nngroup.com/articles/mental-models/>

The 2 UX Gulfs

Challenges people need to overcome to successfully interact with the system:

- **Gulf of Evaluation** – Understanding the state of the system
- **Gulf of Execution** – Taking action to accomplish a specific goal



Gulfs caused by:

Breakdowns in:

Evaluation:

- Perceiving the system-status indicator
- Interpreting what it means

Execution

- Planning an action based on understanding
- Manipulating the controls

Successful execution usually depends on correct evaluation

How to bridge these gulfs- make things intuitive?

- What are the gulfs with this interface?
- How would you do it? Design your solution.

On your own [5 min]



“Google Nest Pro Thermostat E is for Everyone. It’s beautifully designed to blend right into any home. The frosted display shows you the temperature when you’re close, and fades into the background when you walk away.”

Design Principles:

1. Visibility of user's options/actions.
2. Feedback
3. Constraints
4. Consistency
5. Affordance

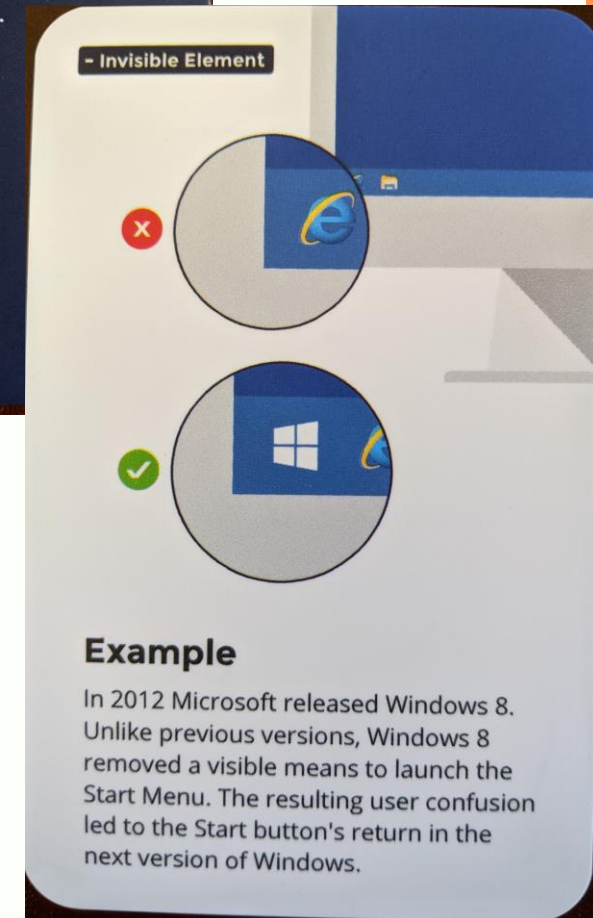
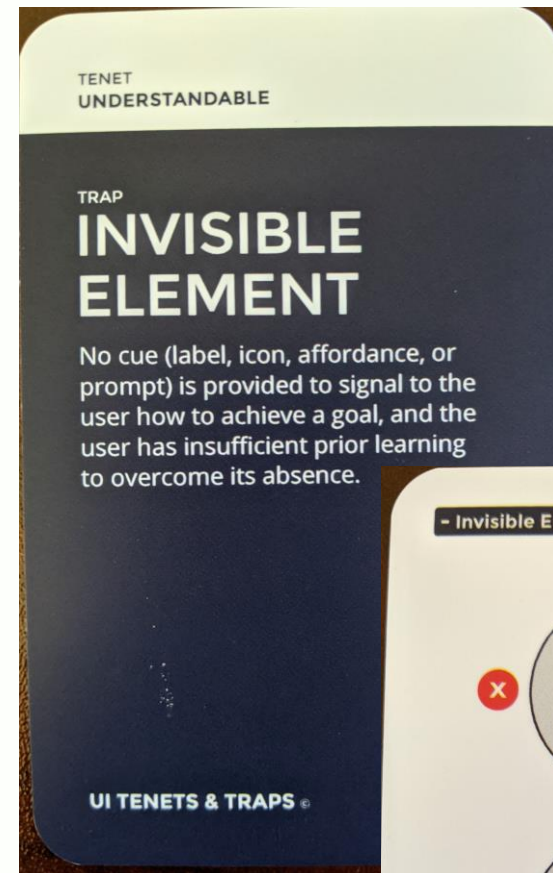
Visibility

What options or actions are available

Examples:

- Good: Car controls
- Bad: Trap Card 1

Bridges gulf of ?



Feedback

What happens when you taken an action

Examples:

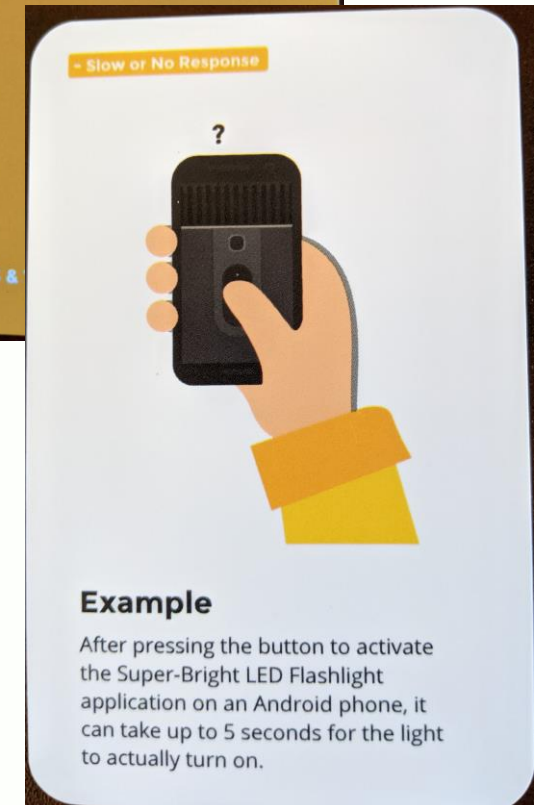
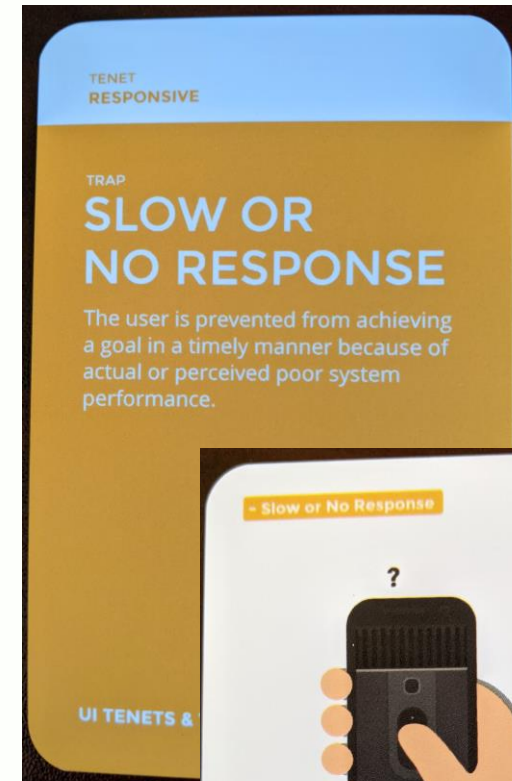
- Good: Cutting bread, writing with a pen – no lag in feedback
- Bad: Trap Card 12

Bridges gulf of ?

Costly click: Man accidentally buys 28 Tesla cars online worth 1.4 million euros



HTAuto
DRIVE YOUR PASSION



Constraints

Making some errors impossible

Examples

- Good: Greying out some options, templates for phone, menus instead of cmd to prevent syntax errors
- Bad: Trap card 11

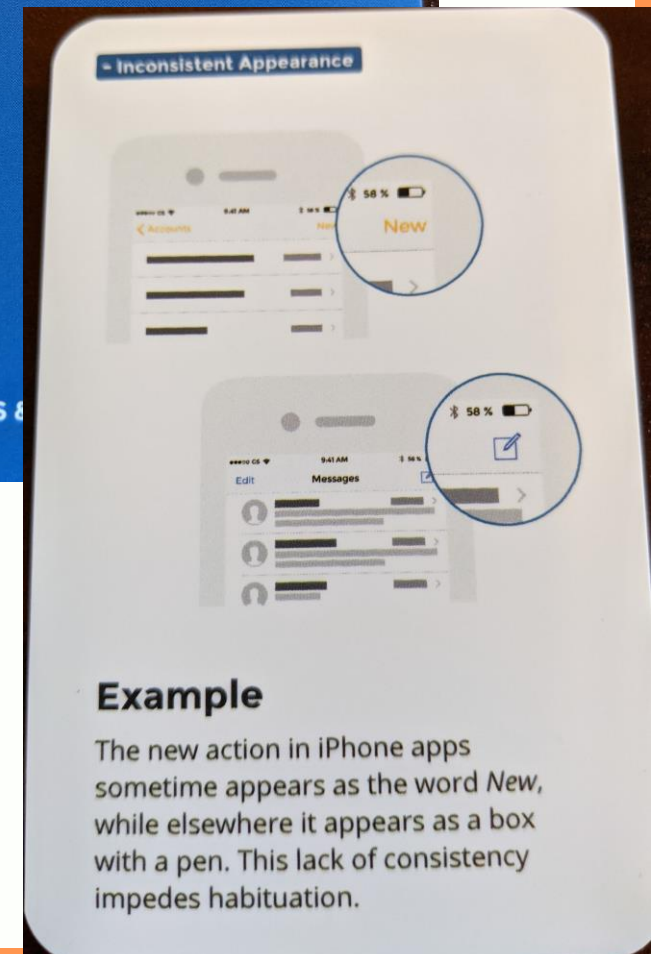
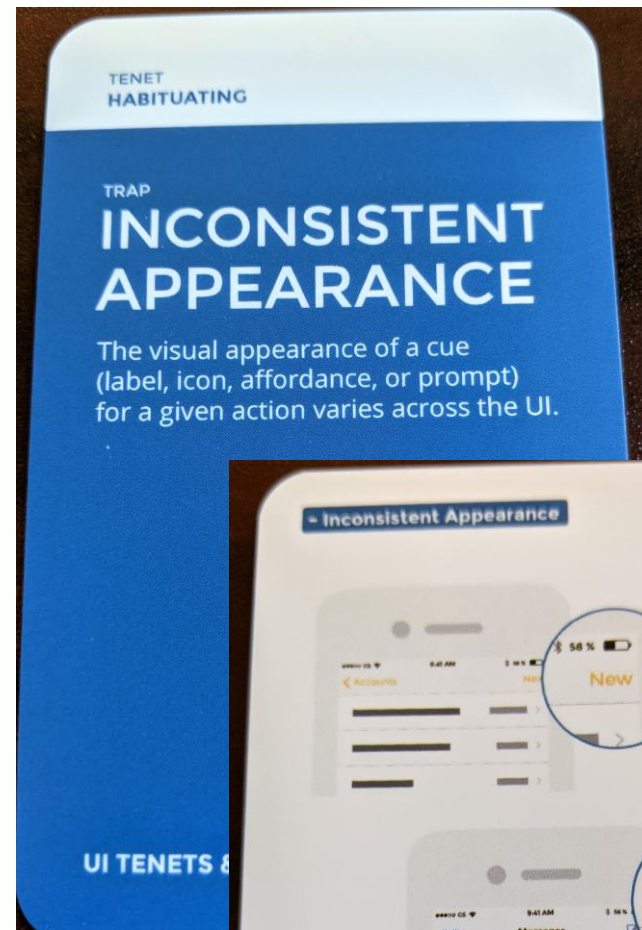
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Consistency

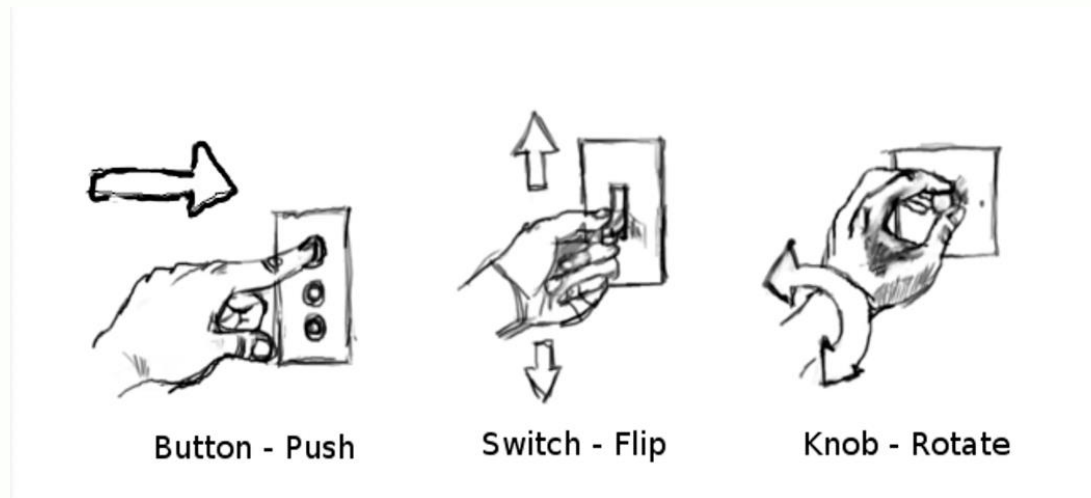
- **Internal**: within your system
- **External**: with other systems and the physical world
- Examples
 - Microsoft suite: Word <-> power point, etc.
 - Bad: Trap card 24

Bridges gulf of ?



Affordance

- Match between what an object *can do* and your *capability*
 - *Anti-affordances: DND, Apple Focus*
 - *Hidden affordances: You just don't know its possible*



Affordances feed into system functionality: level of control on light?

Affordance (a bit more)

- Signifiers: Communication of *what actions are possible* and *how they should be done*; If signifiers are not perceived, they fail to function.



Design Principles

1. Visibility of user's options/actions. [Gulf. Eval]
2. Feedback [Gulf. Eval]
3. Constraints [Gulf. Exe]
4. Consistency [Gulf. Eval]
5. Affordance [Gulf. Exe]

There are trade-offs

- More constrain, less visible
- More affordance/visible, more clutter
- More consistency/ sometimes less usable

...

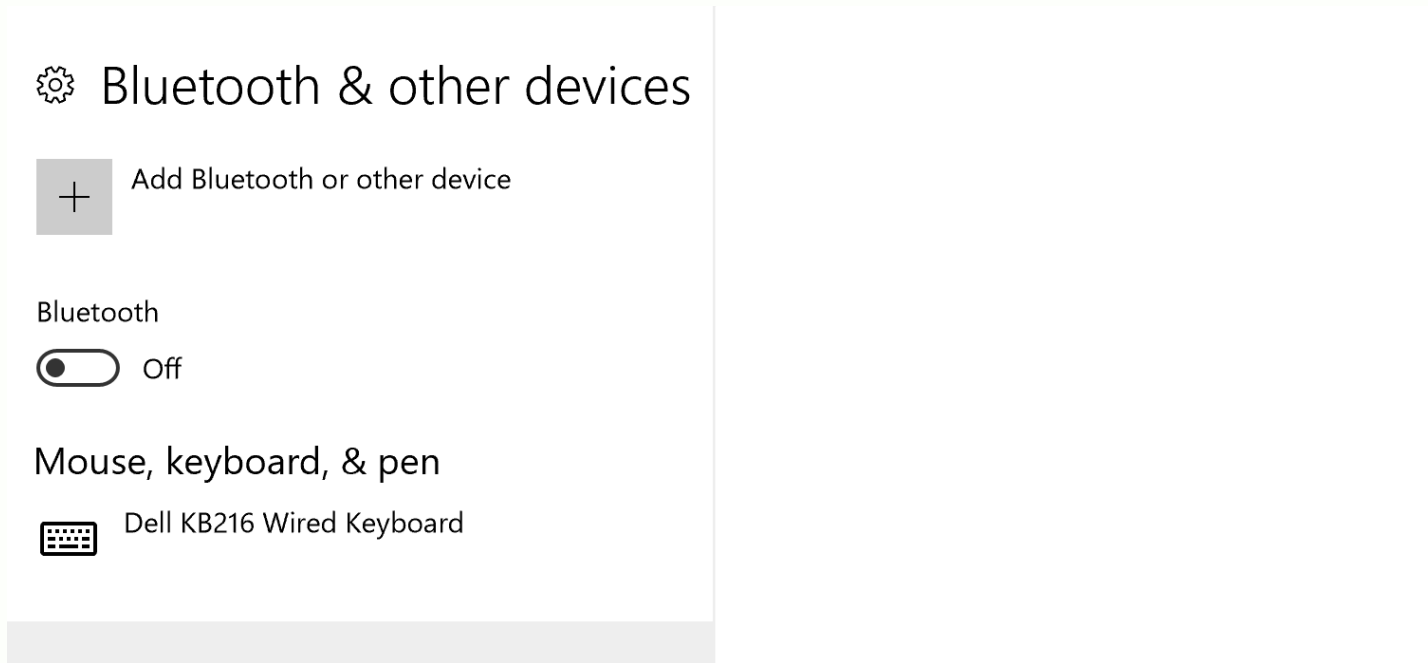


You will use Design Principles

- In class for:
 - Designing your interface and interactions
 - Evaluating teams in “design gallery”, next week
 - Next: Activity

Next Class: Ideation

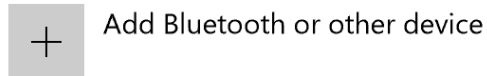
Connect Bluetooth [x] to computer



Where do you think are the challenges a non-techie user may face in this example?

The two UX Gulfs

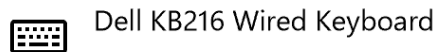
Bluetooth & other devices



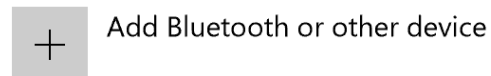
Bluetooth



Mouse, keyboard, & pen



Bluetooth & other devices



Bluetooth



Now discoverable as "DESKTOP-ISFRCAL"

Mouse, keyboard, & pen

