Intro to UX Design

Theory & Practice

R. Scott Granneman & Jans Carton

Slides

granneman.com/downloads/web-dev/Design-Intro-to-UX.pdf

chnsa.ws/intro-to-ux-slides

Notes

granneman.com/downloads/web-dev/Design-Intro-to-UX.txt

chnsa.ws/intro-to-ux-notes

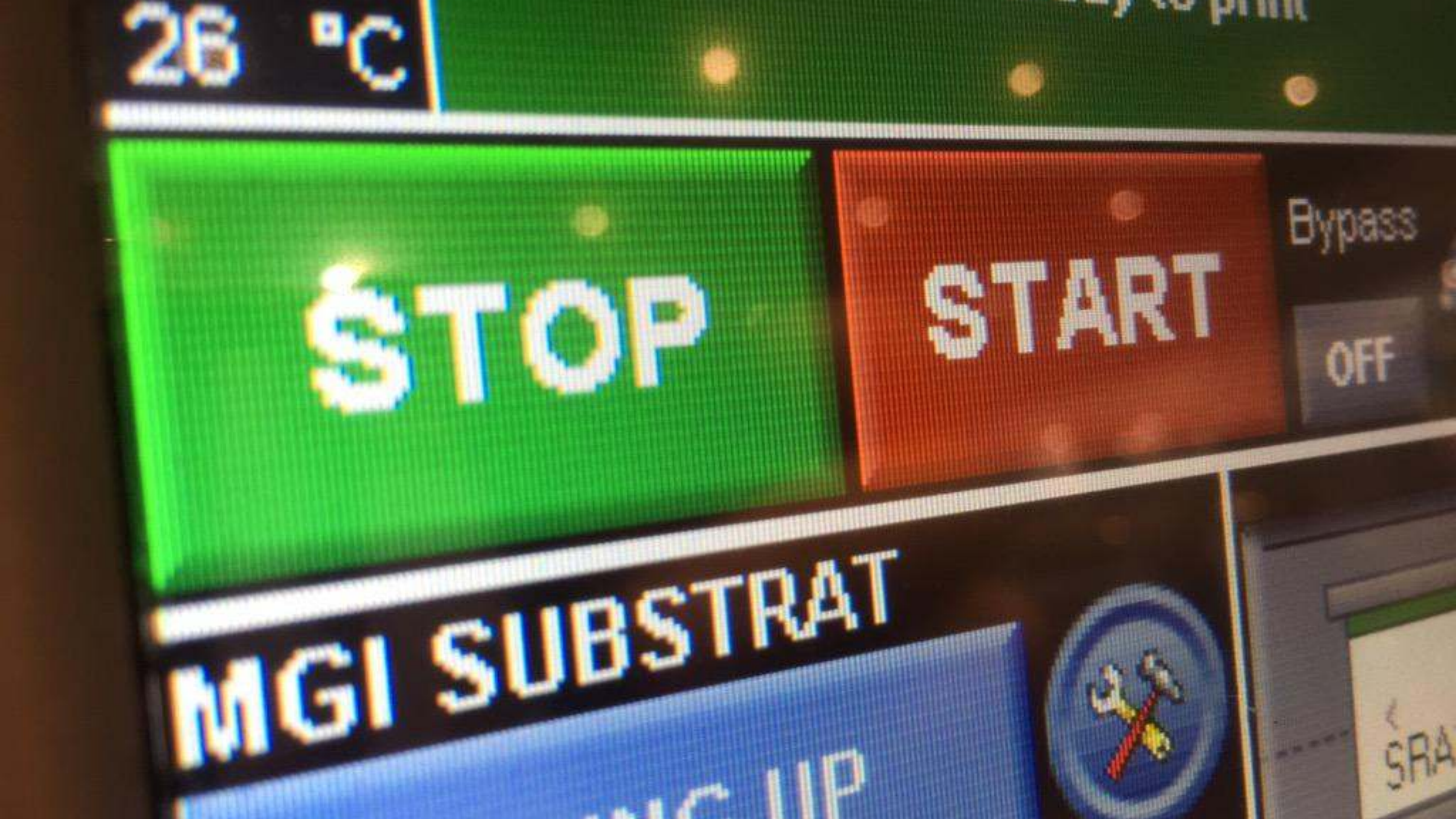
All of my presentations

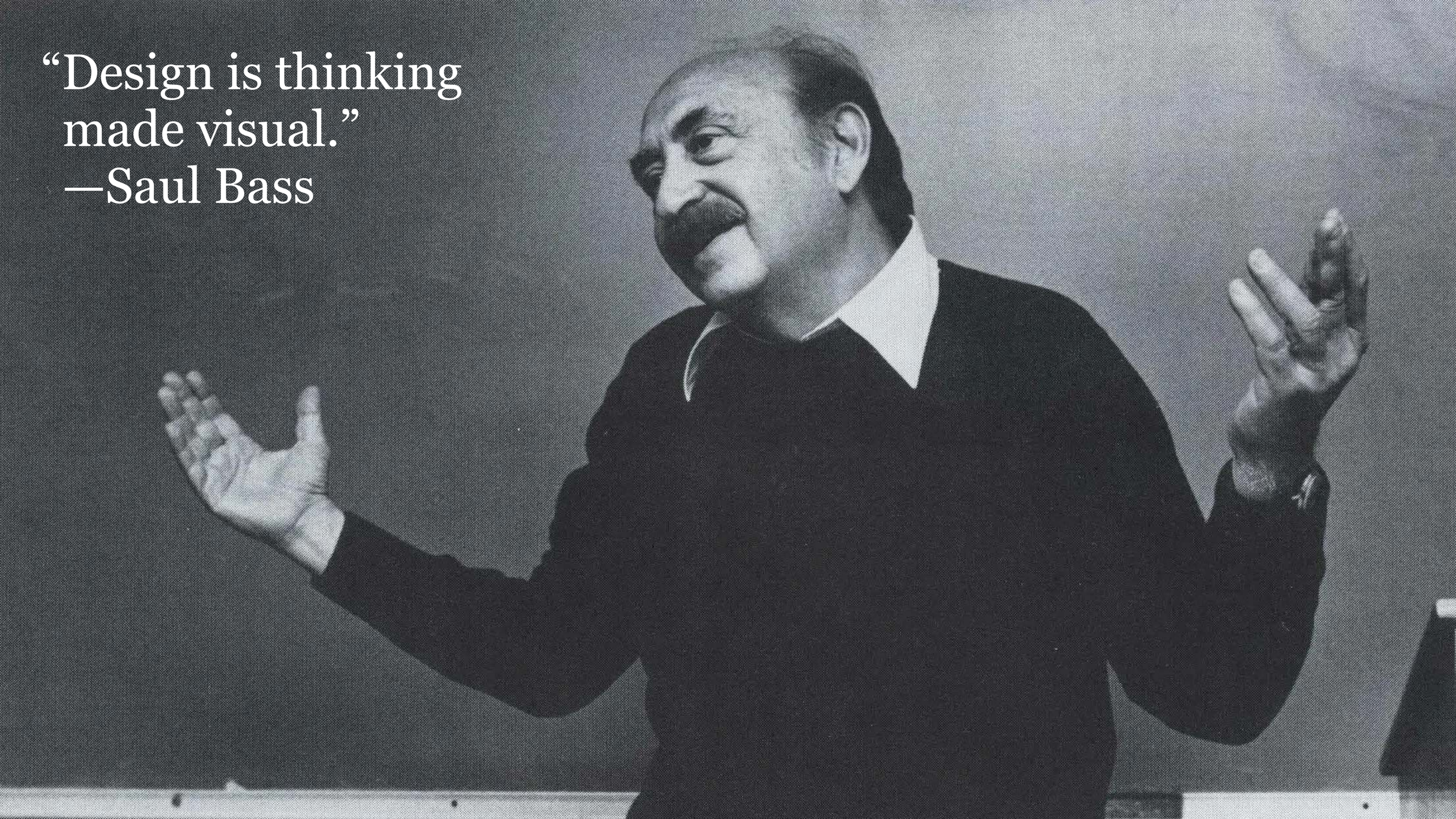
granneman.com/presentations/all-presentations

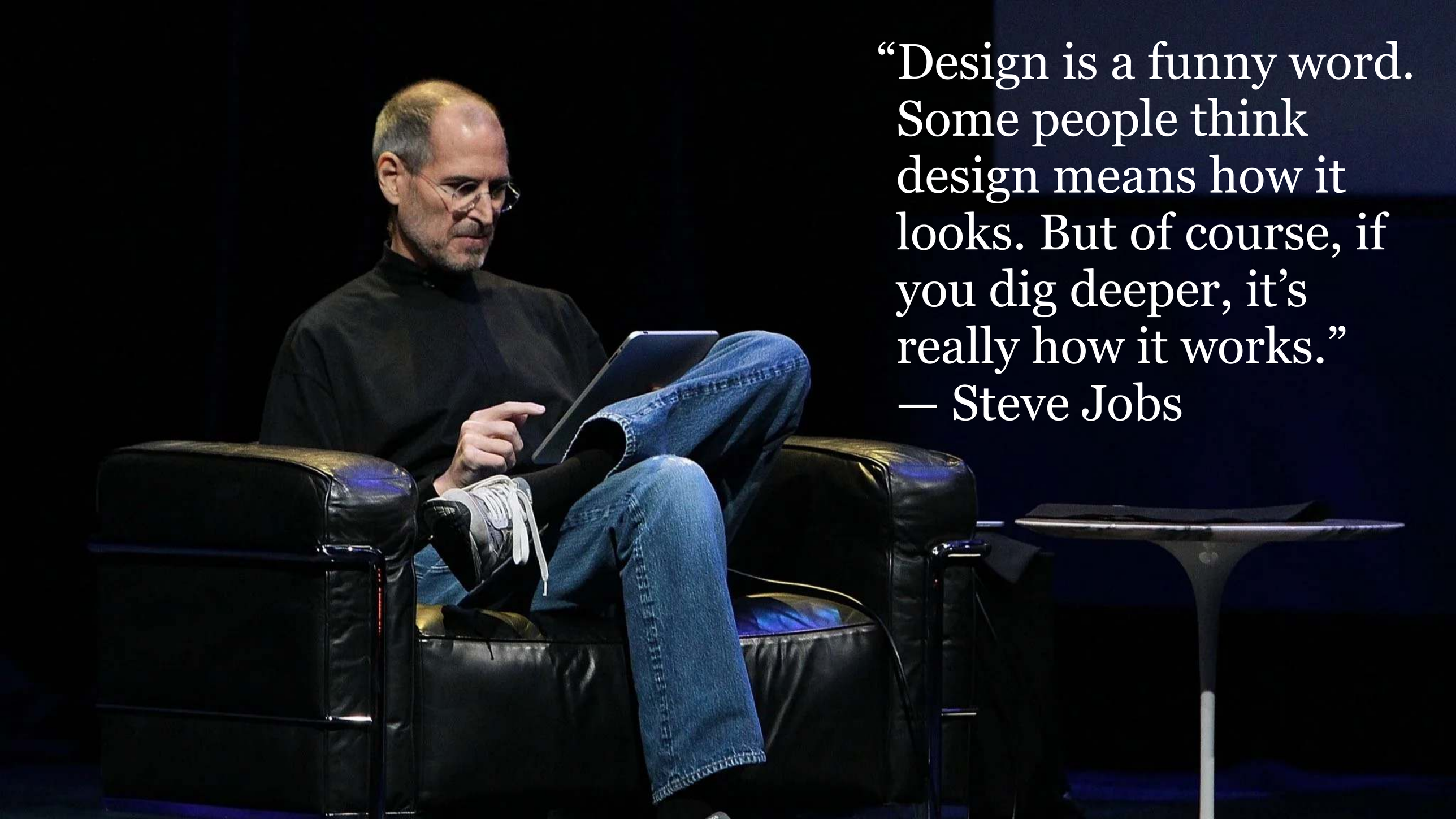
chnsa.ws/all-presentations


PUSH
IF THAT DOESN'T WORK
PULL
IF THAT DOESN'T WORK EITHER
THAT'S BECAUSE WE'RE CLOSED


PUSH


26 °C
STOP
START
Bypass
OFF
MGI SUBSTRAT


“Design is thinking
made visual.”
—Saul Bass


“Design is a funny word. Some people think design means how it looks. But of course, if you dig deeper, it’s really how it works.”
— Steve Jobs

What is UX?

When you start talking to people or reading about UX Design, you’re going to see a bunch of other related terms

HCI • HMI • HCD • UCD • UI • XD • Usability

A lot of people use some of these terms interchangeably

For instance, as you'll see, UX covers a lot more than just websites

Here, though, we'll mostly be looking at UX as it applies to websites, since the Web is the premier digital delivery tool of our time

Graphic Design

“Graphic design … consists in projecting visual communications intended to transmit specific messages to social groups, with specific objectives. … The role of the graphic designer in the communication process is … the interpretation, ordering, and presentation of visual messages.” —Wikipedia

The graphic designer can be involved with…

Web design • branding • color palettes • technical & artistic illustration • typography • signage • photography • layout & publishing • print production • packaging • iconography • infographics • image manipulation • storyboarding • video editing • 3D modeling • animation • VR • AR • presentation design • social media content • email newsletters • advertising • accessibility • programming • & more!

>267,200 working graphic designers in the United States

Projected that there will be ~21,100 job openings each year over the coming decade

Median annual salary in 2023 is $58,910

Industrial Design

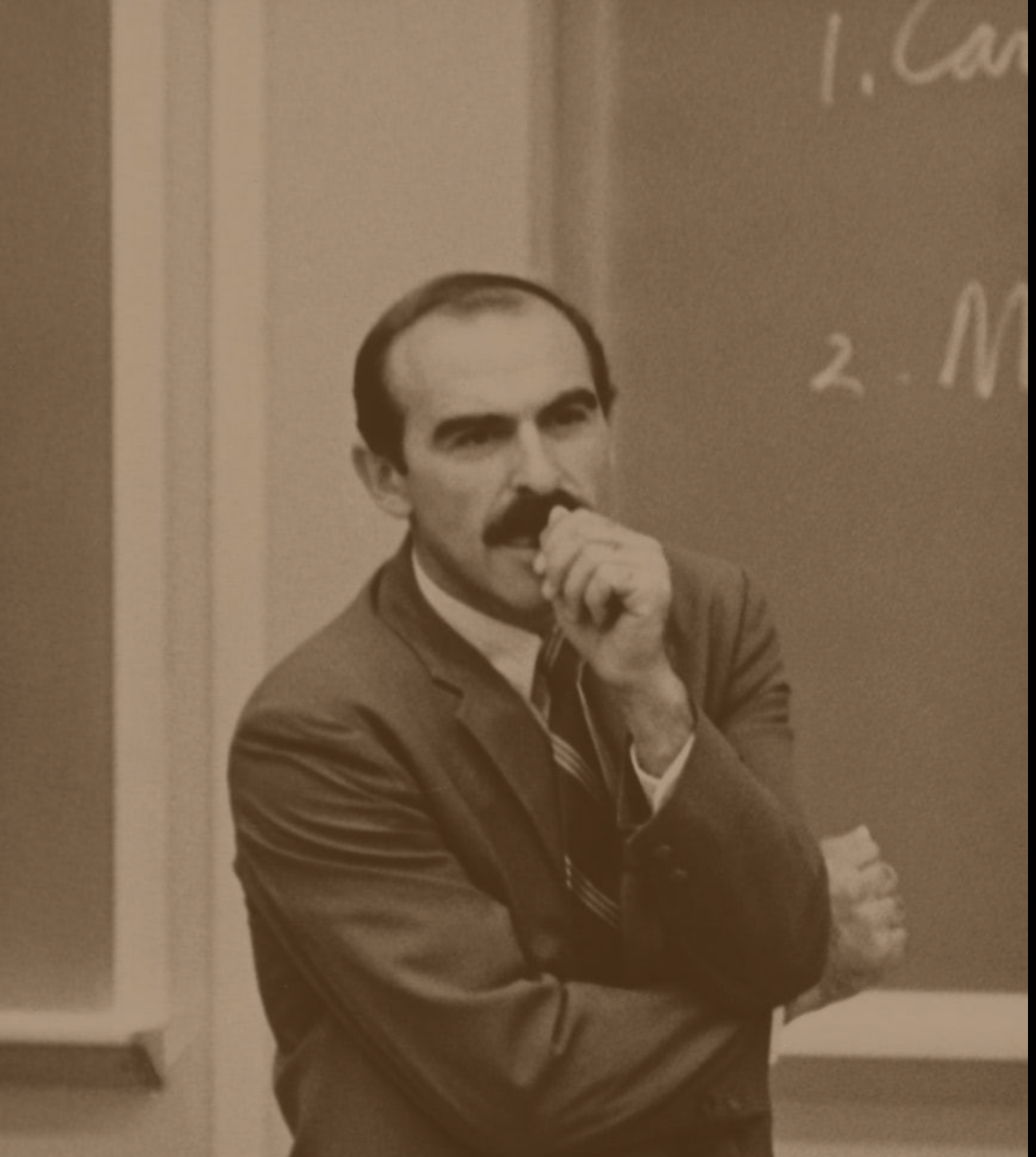
“Industrial Design is the professional practice of designing products, devices, objects, and services used by millions of people around the world every day. Industrial designers typically focus on the physical appearance, functionality, and manufacturability of a product… All of this ultimately extends to the overall lasting value and experience a product or service provides for end-users.” —Industrial Designers Society of America

Common Skills

- Drawing & sketching
- 3D Modeling
- 3D Rendering
- User Research
- Visual storytelling
- Rapid prototyping & testing
- Color, materials & finishes
- Basic engineering & fabrication
- Basic computer programming
- Manufacturing processes
- Marketing & branding

Practice Areas

- Automotive & transportation
- Consumer electronics
- Furniture
- Housewares
- Environments & retail
- Medical & healthcare
- Toys & accessories
- Commercial & industrial
- Personal & lifestyle
- Sports & recreation
- … and everything in between!



“People don’t want to buy a quarter-inch drill. They want a quarter-inch hole.”
—Theodore Levitt,
Harvard Business School

>34,000 working industrial designers in the United States

Projected that there will be ~2,300 job openings each year over the coming decade

Median annual salary in 2023 is $76,250

Top 3 states employing industrial designers: California, Michigan, & New York

UX
User Experience Design

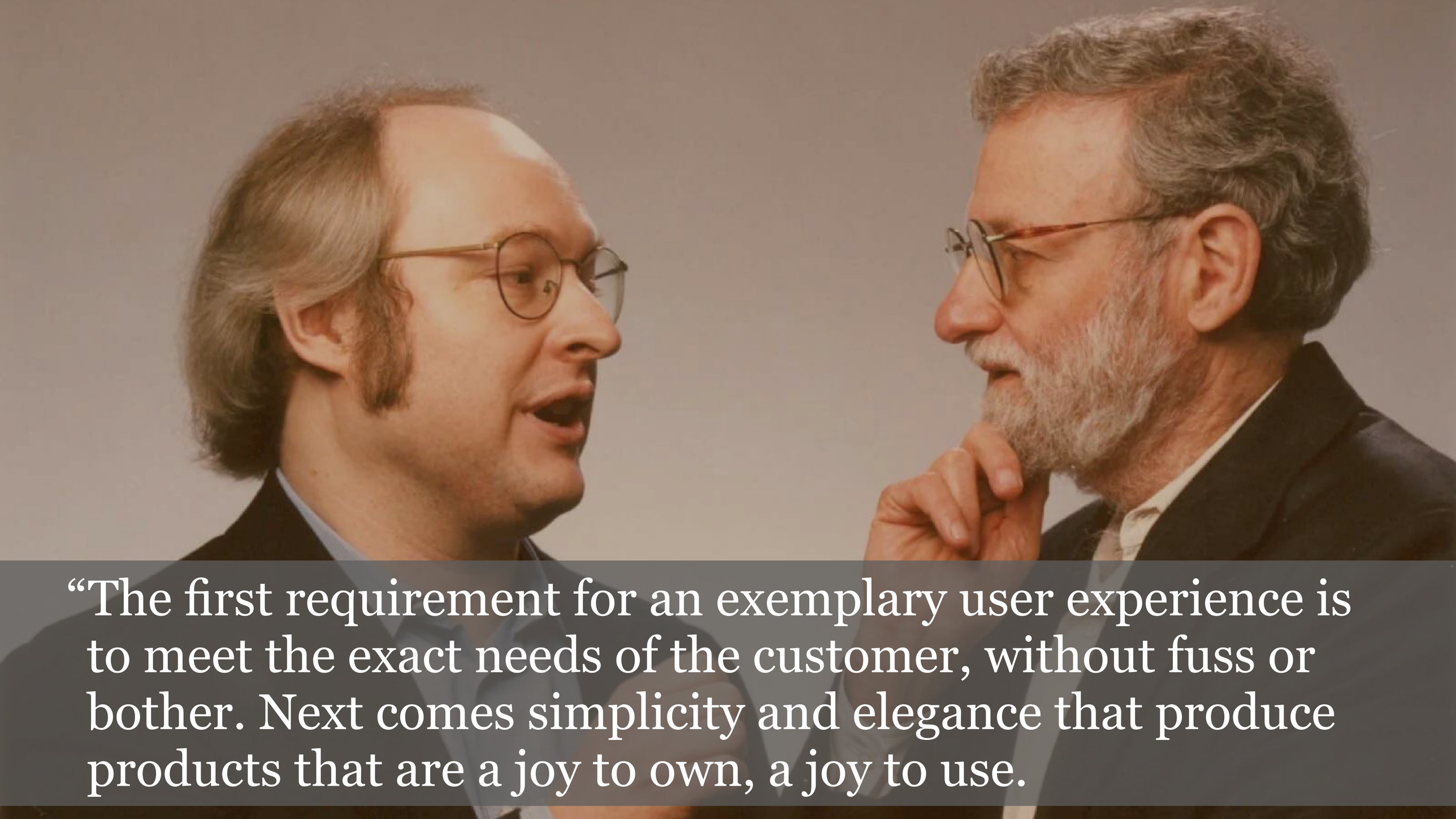
User Experience was a term using during 1970s & 80s, but mostly used by the *HCI* (Human Computer Interaction) community in relation to *UCD* (user-centered design)

In 1993, Don Norman joins Apple & selects his title as User Experience Architect

Because of the respect accorded Norman, the term became much more widely known & used

“I invented the term [User Experience] because I thought human interface and usability were too narrow. I wanted to cover all aspects of the person’s experience with the system including industrial design graphics, the interface, the physical interaction and the manual. Since then the term has spread widely, so much so that it is starting to lose it’s meaning.” —Don Norman

Jakob Nielsen & Don Norman of the Nielsen Norman Group



“The first requirement for an exemplary user experience is to meet the exact needs of the customer, without fuss or bother. Next comes simplicity and elegance that produce products that are a joy to own, a joy to use.

In order to achieve high-quality user experience … there must be a seamless merging of the services of multiple disciplines, including engineering, marketing, graphical and industrial design, and interface design.”

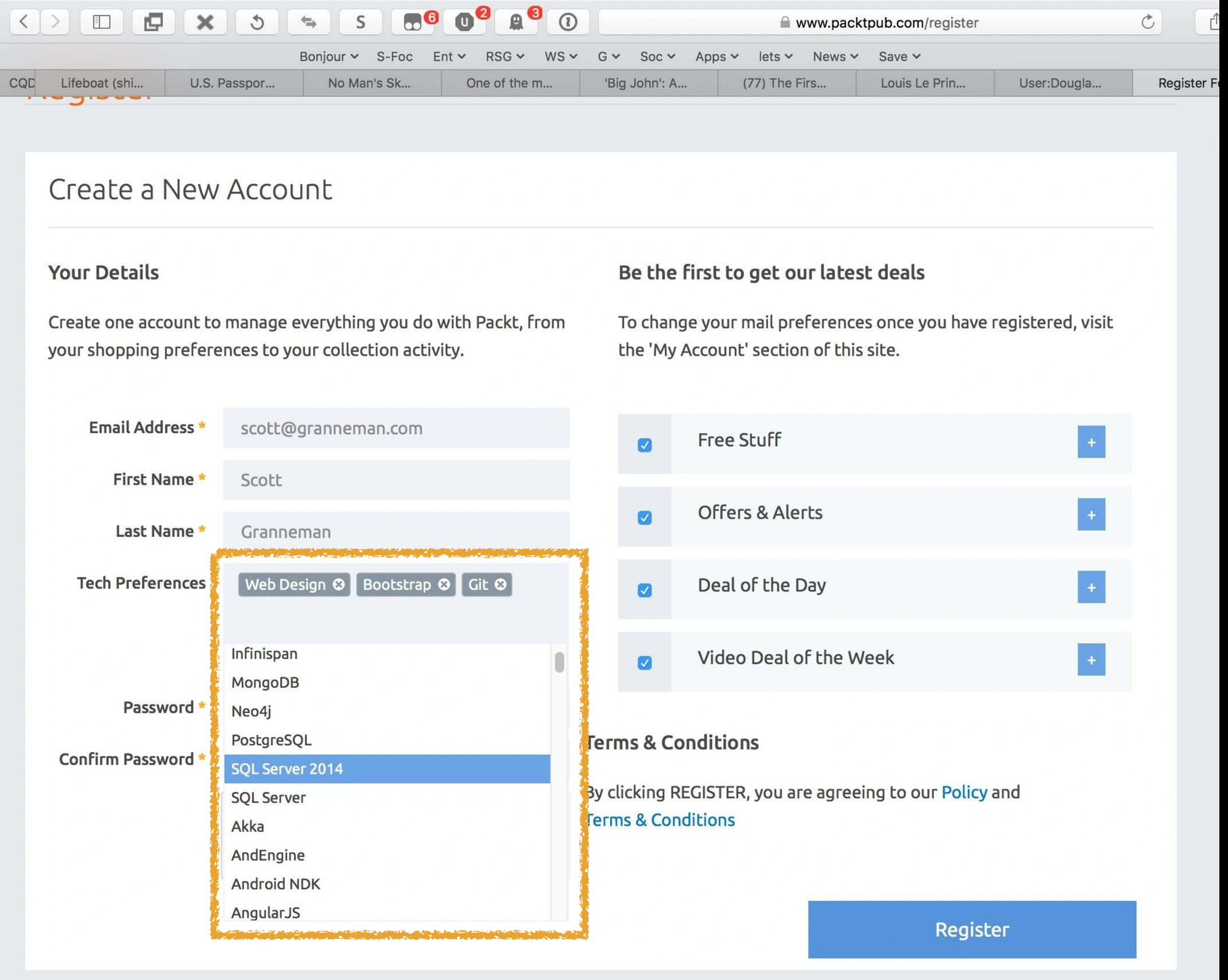
“A UX designer is someone who investigates and analyzes how users feel about the products he or she offers them. UX designers then apply this knowledge to product development in order to ensure that the user has the best possible experience with a product.”
—Interaction Design Foundation


UX
Conference
NN/g
Nielsen Norman Group

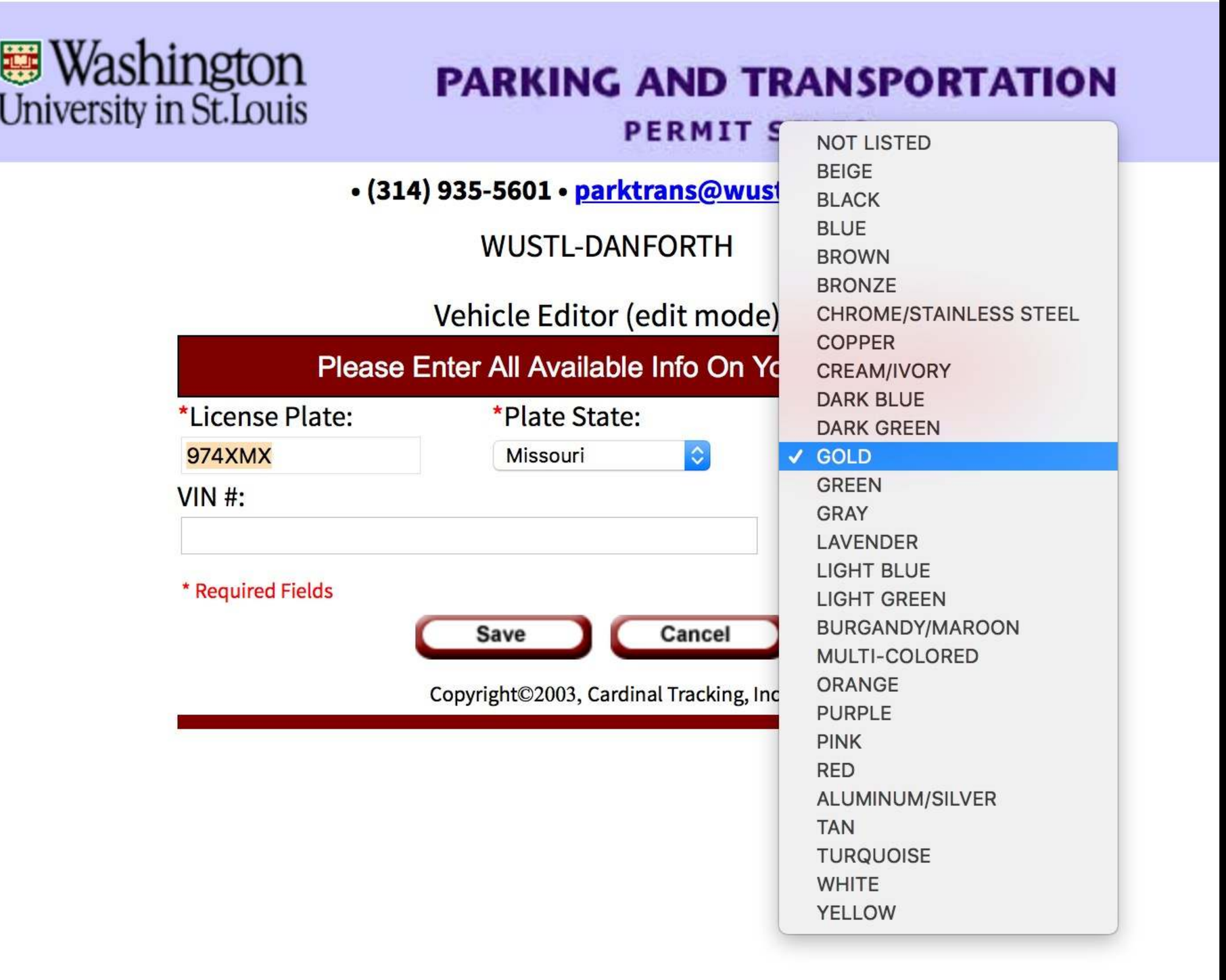

UX
Conference
NN/g
Nielsen Norman Group

Usability

“Usability can be described as the capacity of a system to provide a condition for its users to perform the tasks safely, effectively, and efficiently while enjoying the experience. … In human-computer interaction and computer science, usability studies the elegance and clarity with which the interaction with a computer program or a web site (web usability) is designed.” — Wikipedia

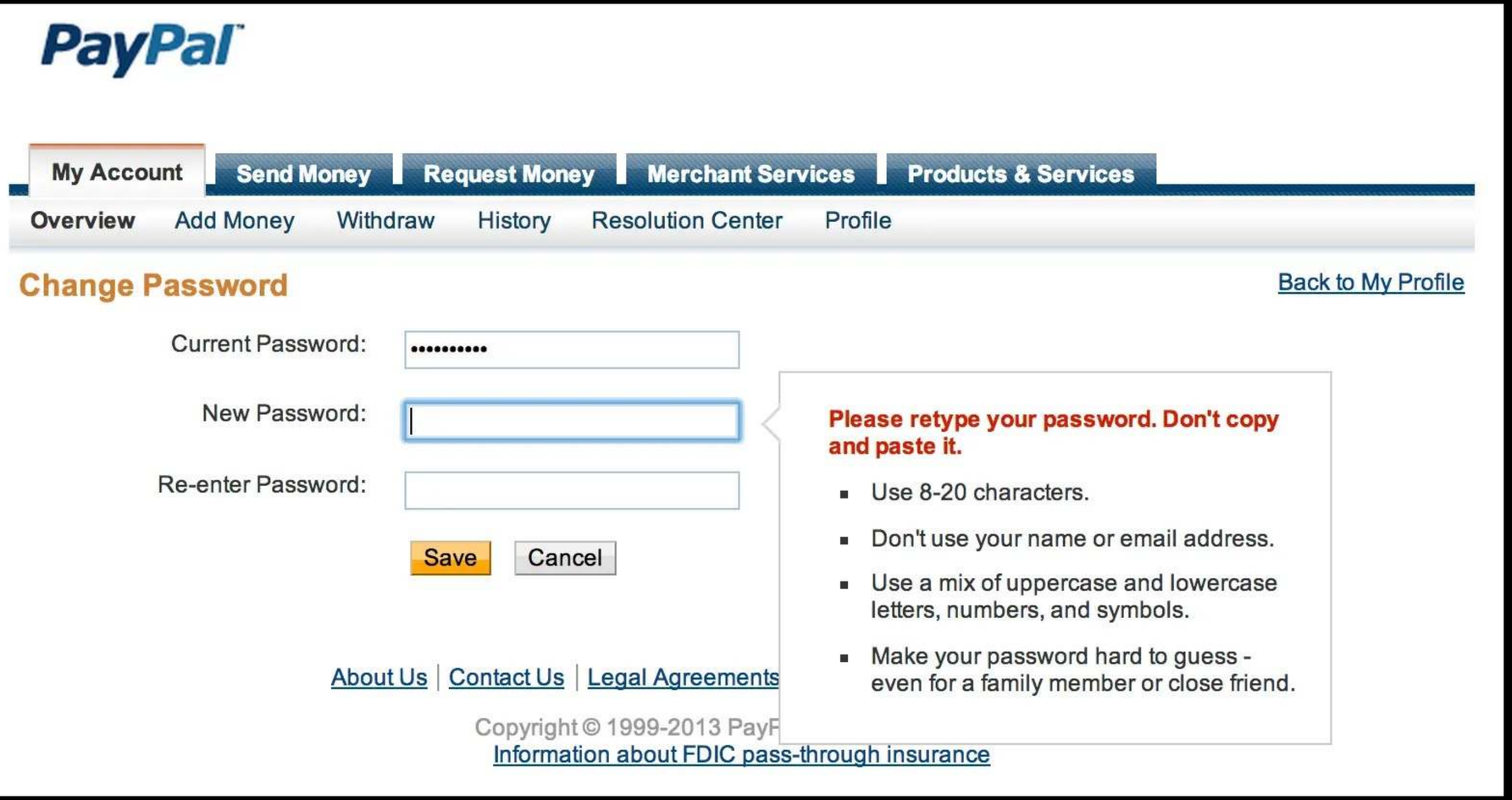


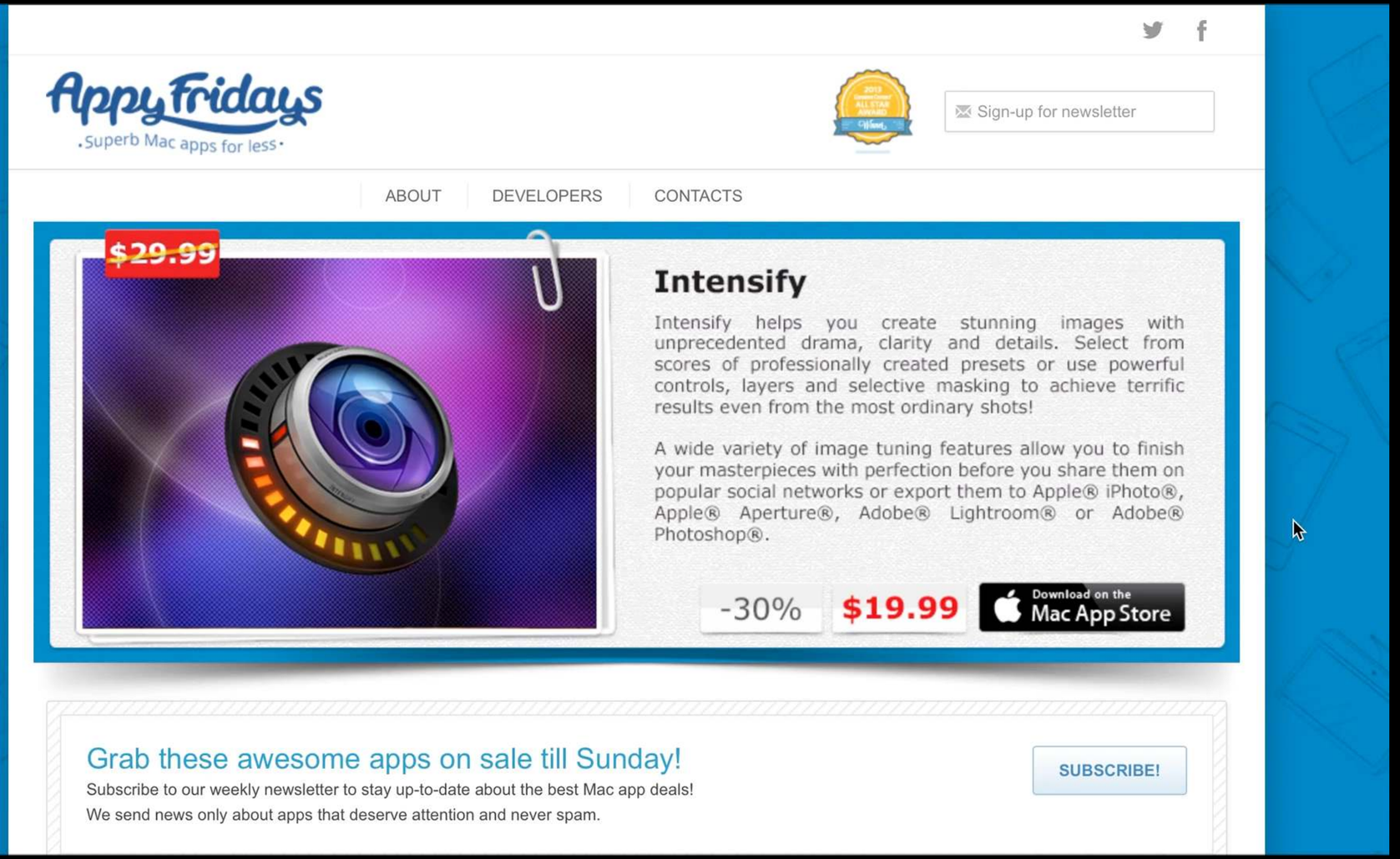
Several hundred choices, not in alphabetical order!



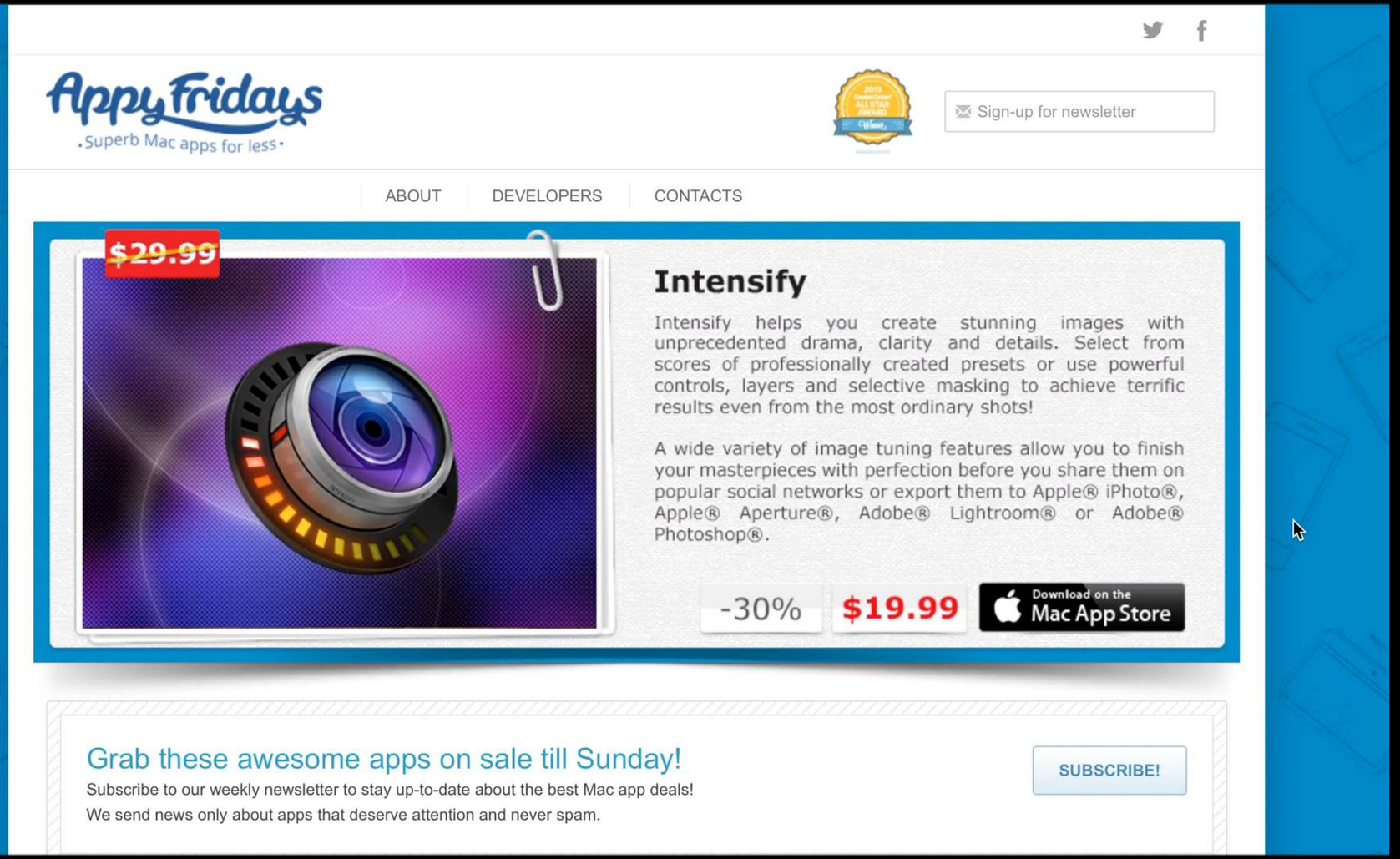
Again, why aren't these colors in alphabetical order?

This encourages the use of bad passwords that are easy to type





What do you expect to happen when you click a right arrow in a carousel?



What do you expect to happen when you click a right arrow in a carousel?

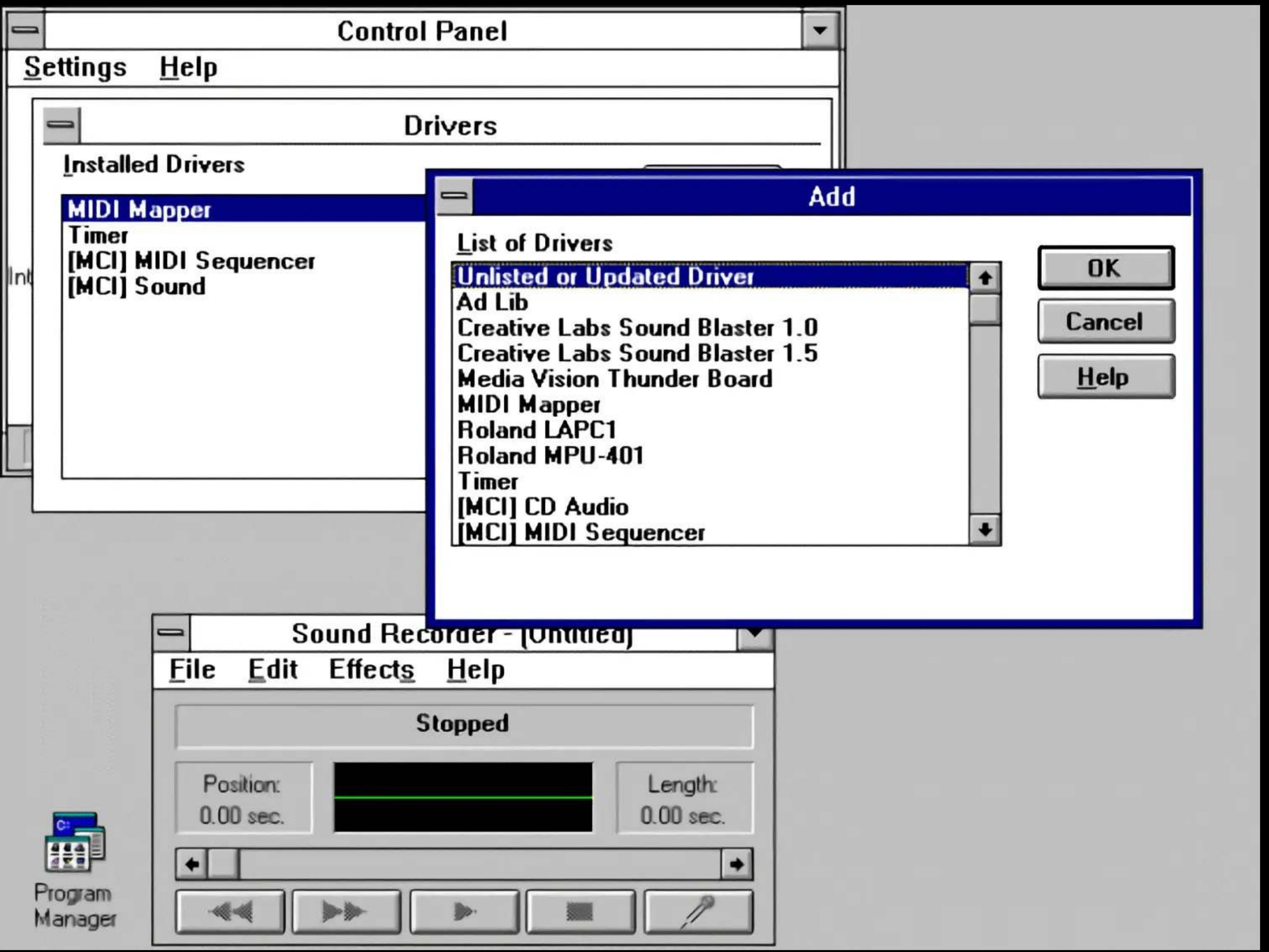
UI
User Interface Design

A user interface (UI) is any system’s point of contact with a human being

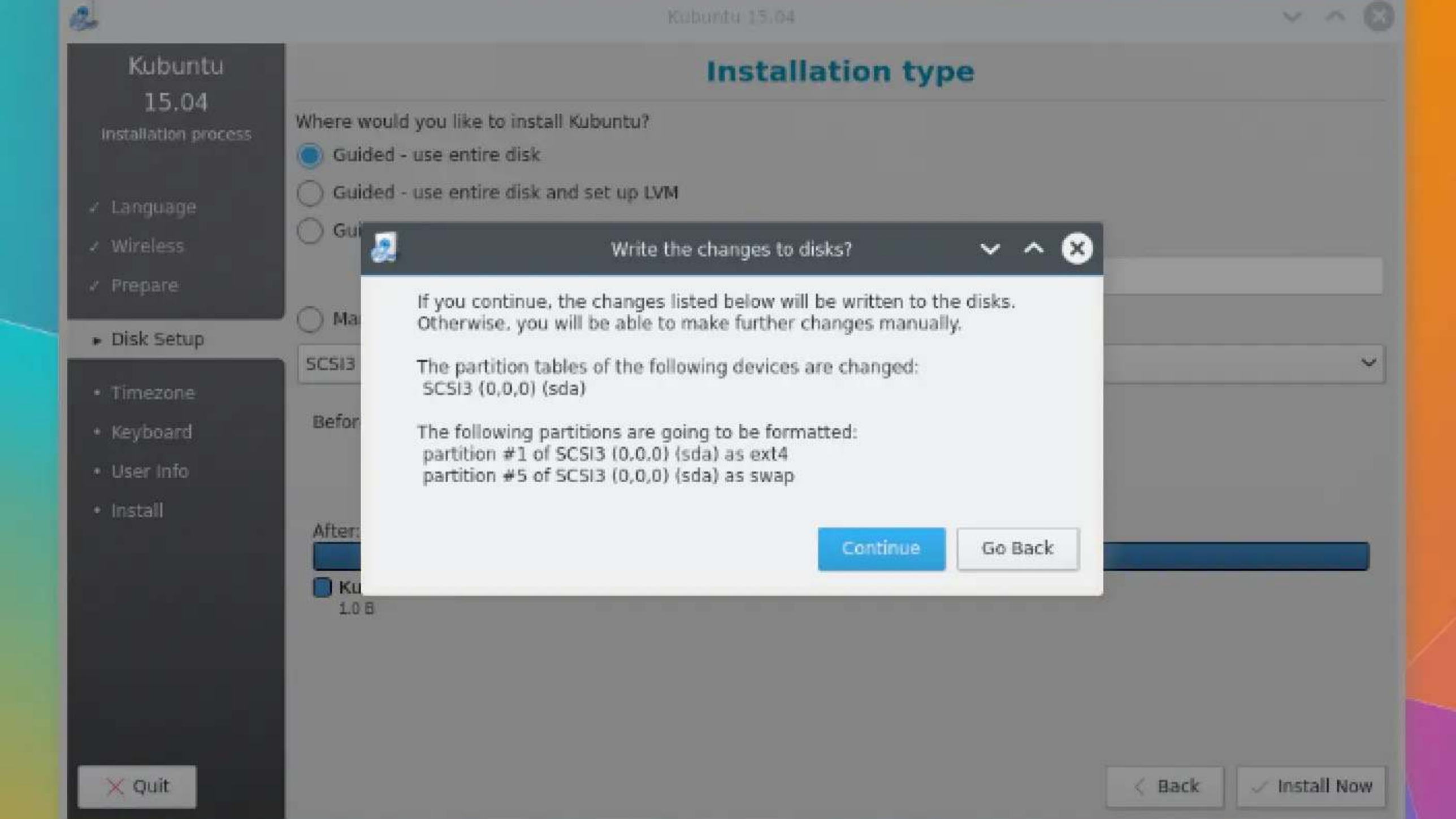
"User interface (UI) design is the process designers use to build interfaces in software or computerized devices, focusing on looks or style. Designers aim to create interfaces which users find easy to use and pleasurable. UI design refers to graphical user interfaces and other forms — e.g., voice-controlled interfaces. ... UI design is more concerned with the surface and overall feel of a design." —Interaction Design Foundation

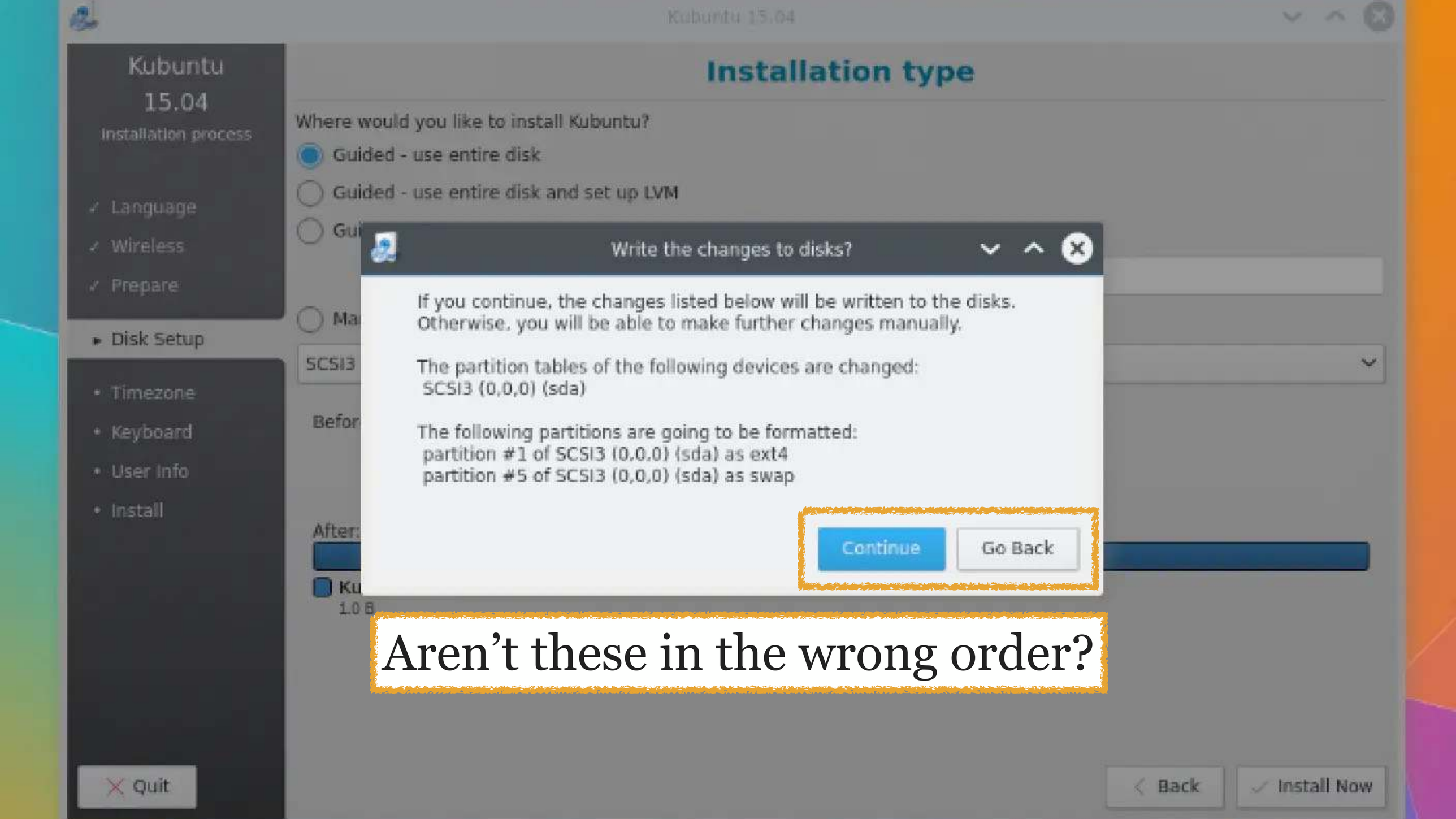
The Calculator app on the original iPhone was inspired by Braun's ET66, designed by Dieter Rams

From 1987 to 2007 — a 20-year journey

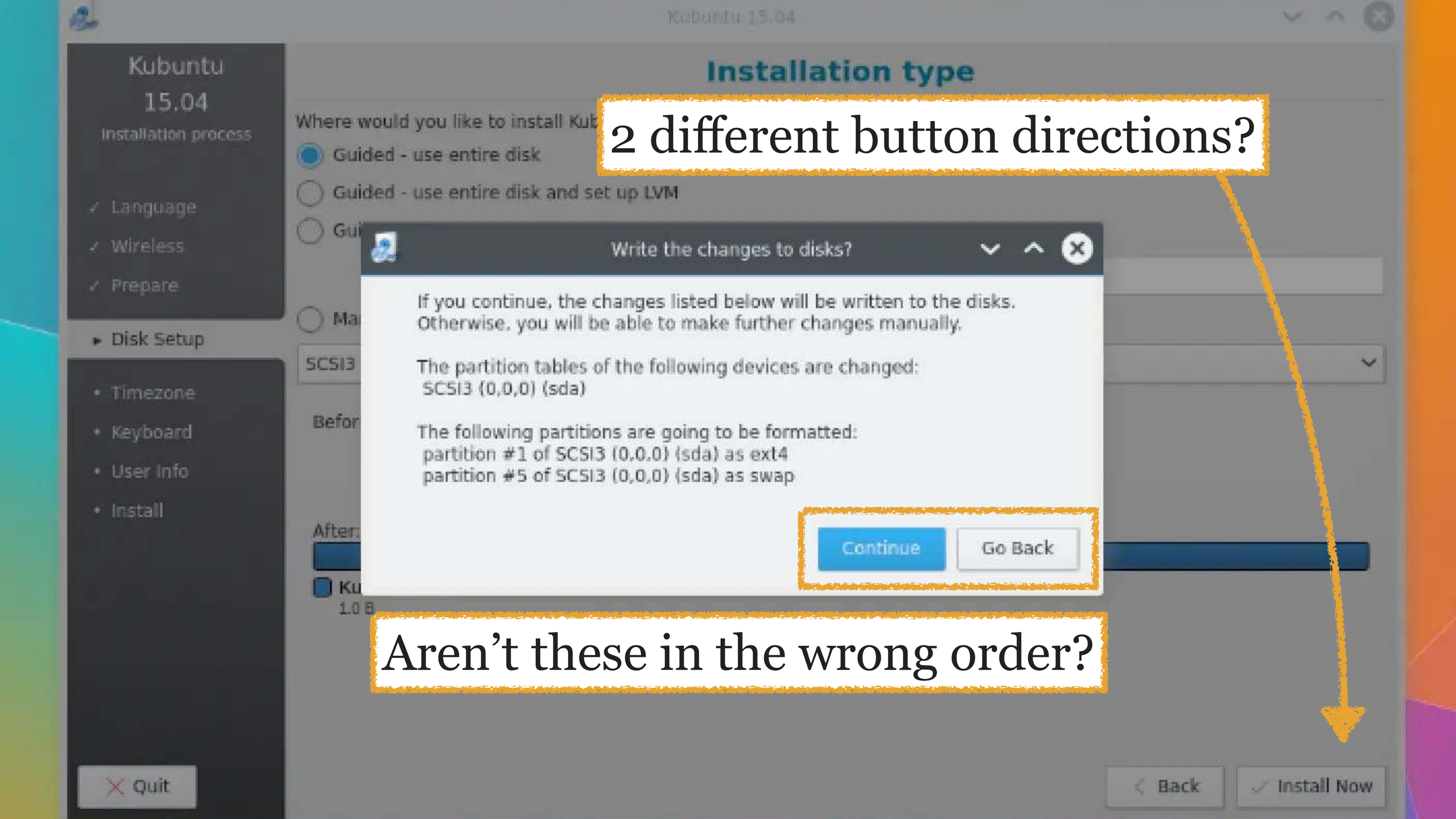


We tend to think of computers when we think of UI


Kubuntu 15.04
Kubuntu
15.04
Installation process
Language
Wireless
Prepare
Disk Setup
Timezone
Keyboard
User Info
Install
Quit
Installation type
Where would you like to install Kubuntu?
Guided - use entire disk
Guided - use entire disk and set up LVM
Write the changes to disks?
If you continue, the changes listed below will be written to the disks.
Otherwise, you will be able to make further changes manually.
The partition tables of the following devices are changed:
SCSI3 (0,0,0) (sda)
The following partitions are going to be formatted:
partition #1 of SCSI3 (0,0,0) (sda) as ext4
partition #5 of SCSI3 (0,0,0) (sda) as swap
Continue
Go Back
Back
Install Now



Aren't these in the wrong order?


Kubuntu 15.04
Kubuntu
15.04
Installation process
Language
Wireless
Prepare
Disk Setup
Timezone
Keyboard
User Info
Install
Quit
Installation type
Where would you like to install Kub
Guided - use entire disk
Guided - use entire disk and set up LVM
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1.0 B
Write the changes to disks?
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Continue
Go Back
Back
Install Now
2 different button directions?
Aren’t these in the wrong order?

Voice needs UI as well!

Discoverability
No visible menus or buttons to guide the user

Memory load
Users have to remember commands or phrases

Turn-taking & interruptibility
Does the system allow interruptions? Does it listen too long or not long enough?

Ambiguity & misunderstanding
Spoken language is vague, messy, & full of homophones & nuance

Feedback & confirmation
Without visuals, how do users know if their command was understood correctly?

Context awareness
System needs to understand who, when, or where is speaking: “Play my playlist” (who is “my”?)

Visual support might be needed
Some tasks need visual support, e.g., shopping

Accessibility
Not everyone speaks clearly or is fluent in the expected language

Privacy & security
Speaking out loud isn’t always private, & the device is always listening

Latency
System needs to respond quickly to input & with answers

Physical UI is very important too

Includes buttons, knobs, switches, dials, sliders, handles, touchscreens, & more

- Physical UI is very important too

- Includes buttons, knobs, switches, dials, sliders, handles, touchscreens, & more

Affordances
Does the object suggest what it does? A flat square button with no label or texture — do you push, swipe, or twist it?

Feedback
Does the user get confirmation something happened?

Ergonomics
Is the interface comfortable and usable by all?

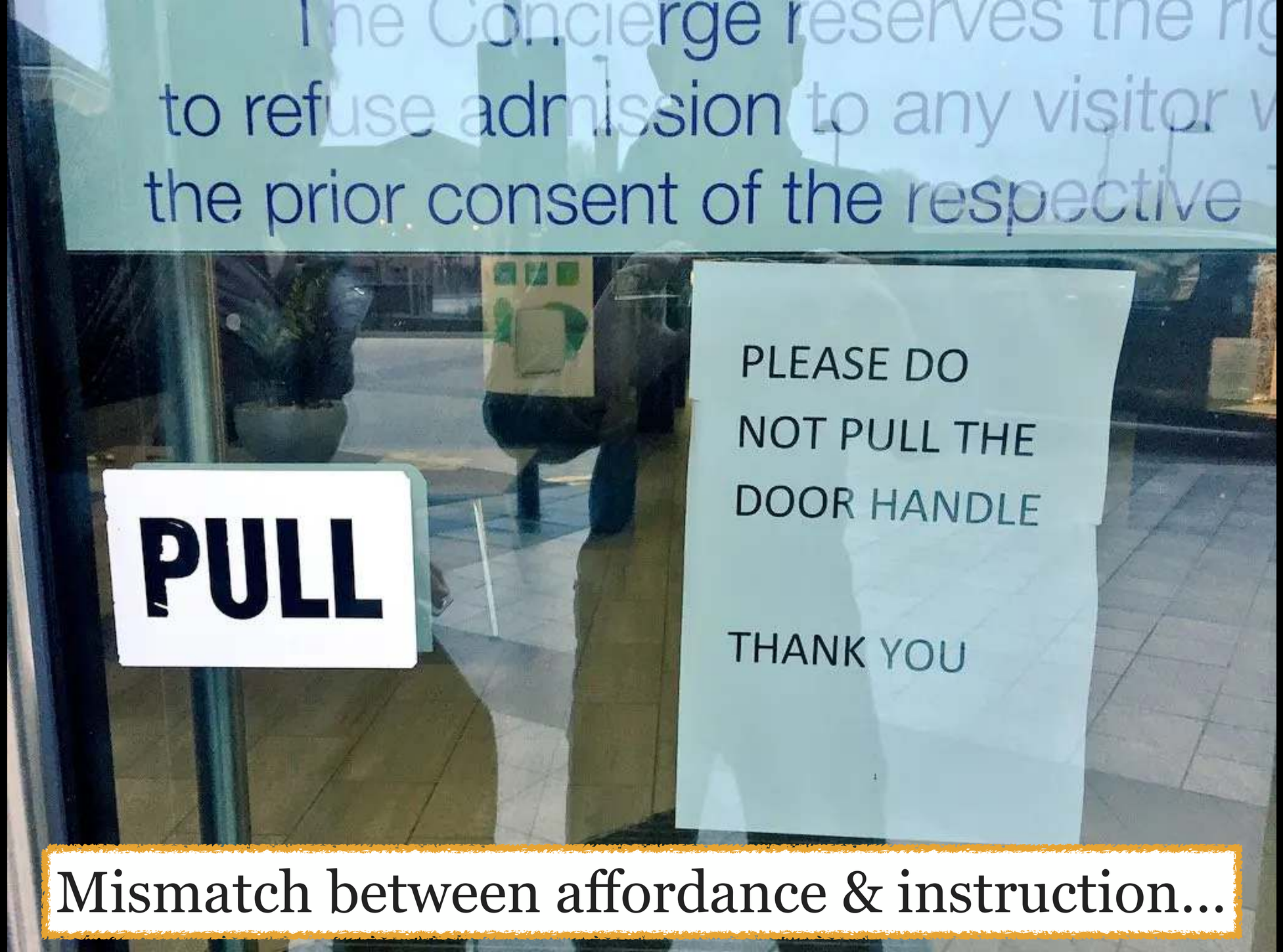
Placement & reachability
Can the user find & access the control easily, e.g., emergency stop buttons 👍 vs touch panels in cars 👎?

Consistency & standards
Do controls behave as expected, like other, similar controls?

Precision vs. speed
Does the interface support the right kind of input, e.g., knobs for precision & toggles for binary choices?

Visibility & legibility
Can users see & understand what controls do, e.g., tiny fonts & similar controls that do different things?

Durability & maintenance
Will this break or wear out with real-world use?

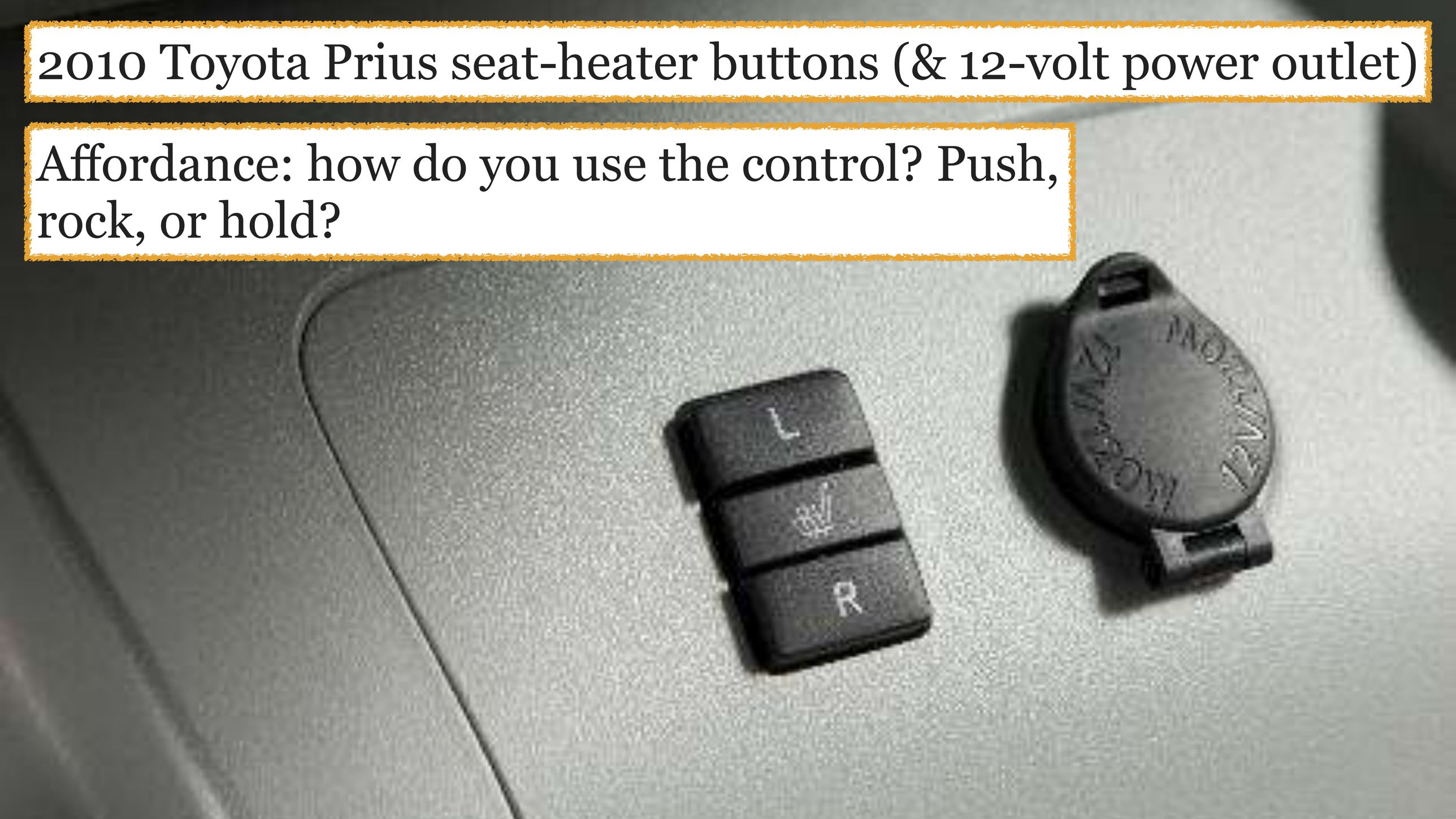


Mismatch between affordance & instruction…

2010 Toyota Prius seat-heater buttons (& 12-volt power outlet)

2010 Toyota Prius seat-heater buttons (& 12-volt power outlet)

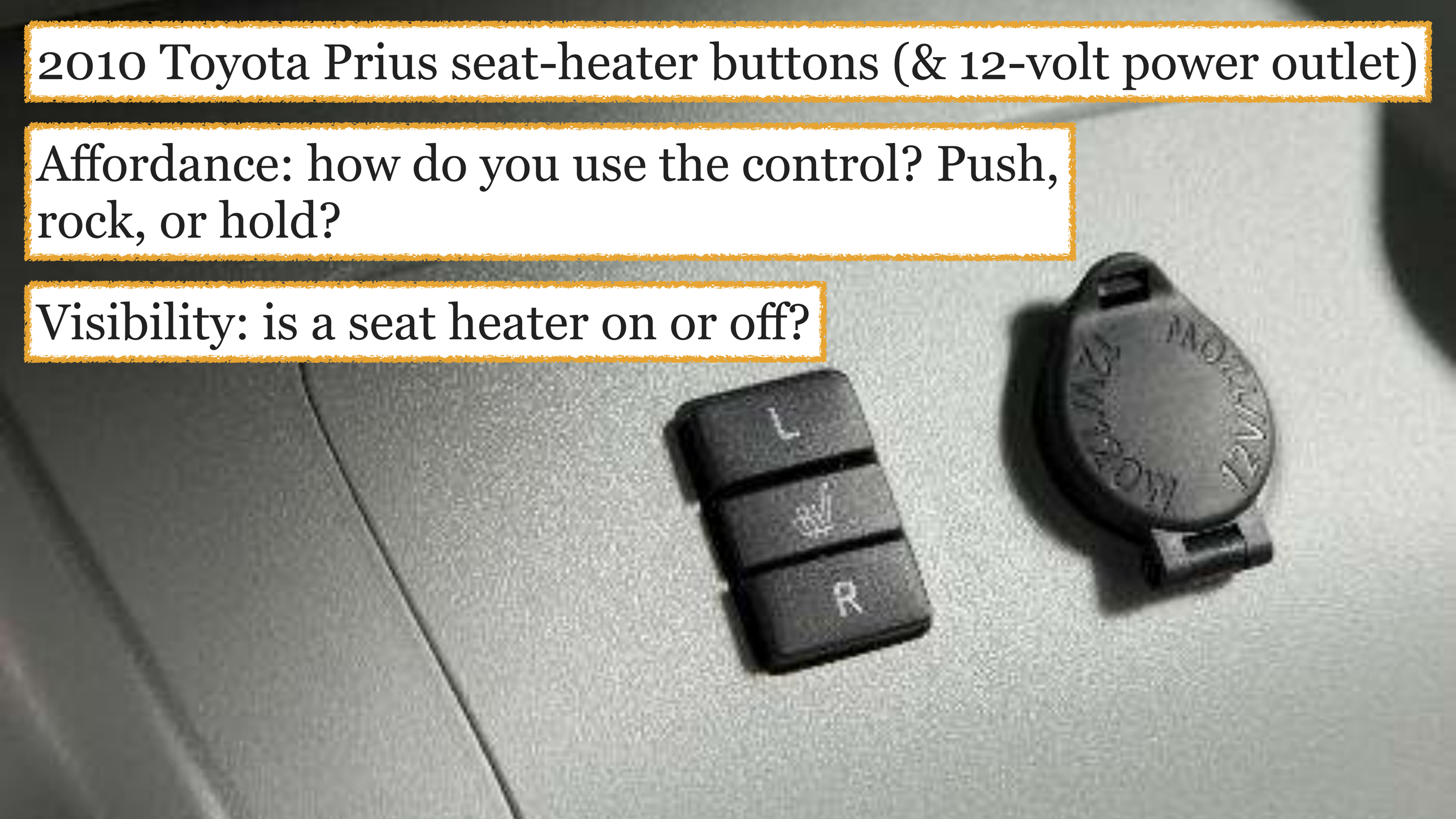
Affordance: how do you use the control? Push, rock, or hold?



2010 Toyota Prius seat-heater buttons (& 12-volt power outlet)

Affordance: how do you use the control? Push, rock, or hold?

Visibility: is a seat heater on or off?

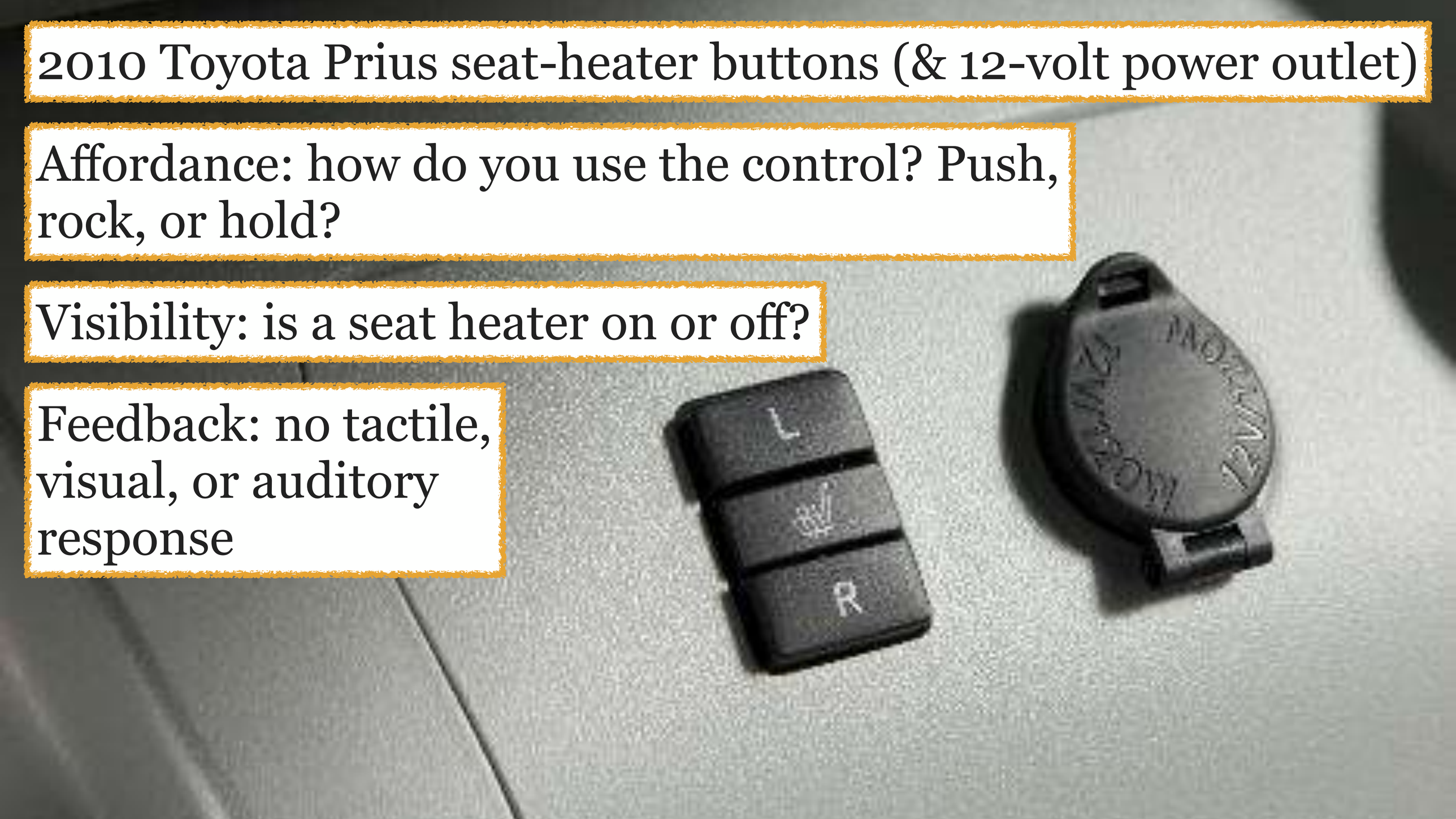


2010 Toyota Prius seat-heater buttons (& 12-volt power outlet)

Affordance: how do you use the control? Push, rock, or hold?

Visibility: is a seat heater on or off?

Feedback: no tactile, visual, or auditory response



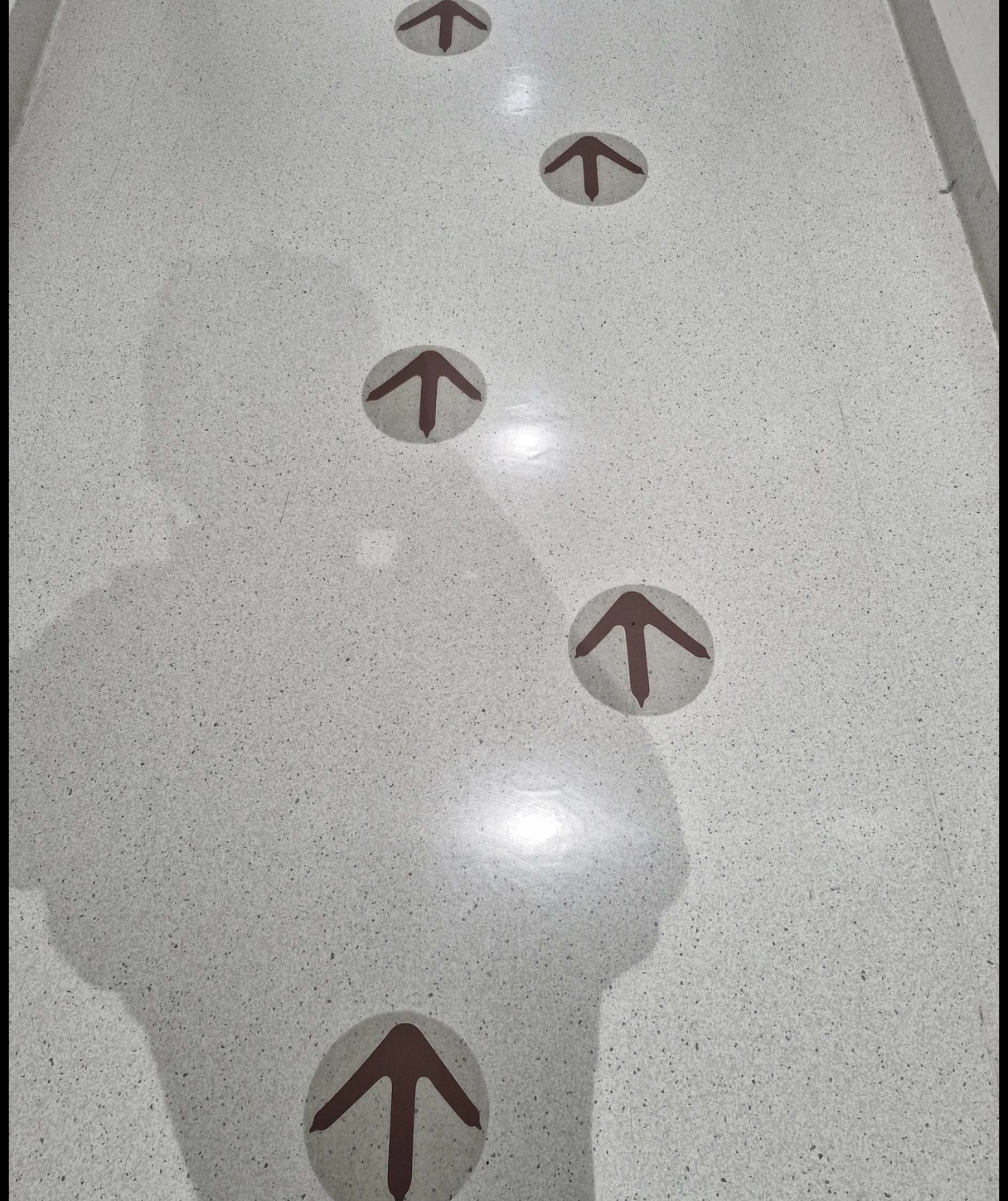
2010 Toyota Prius seat-heater buttons (& 12-volt power outlet)

Affordance: how do you use the control? Push, rock, or hold?

Visibility: is a seat heater on or off?

Feedback: no tactile, visual, or auditory response

Mapping: vertical layout doesn't map with left & right!

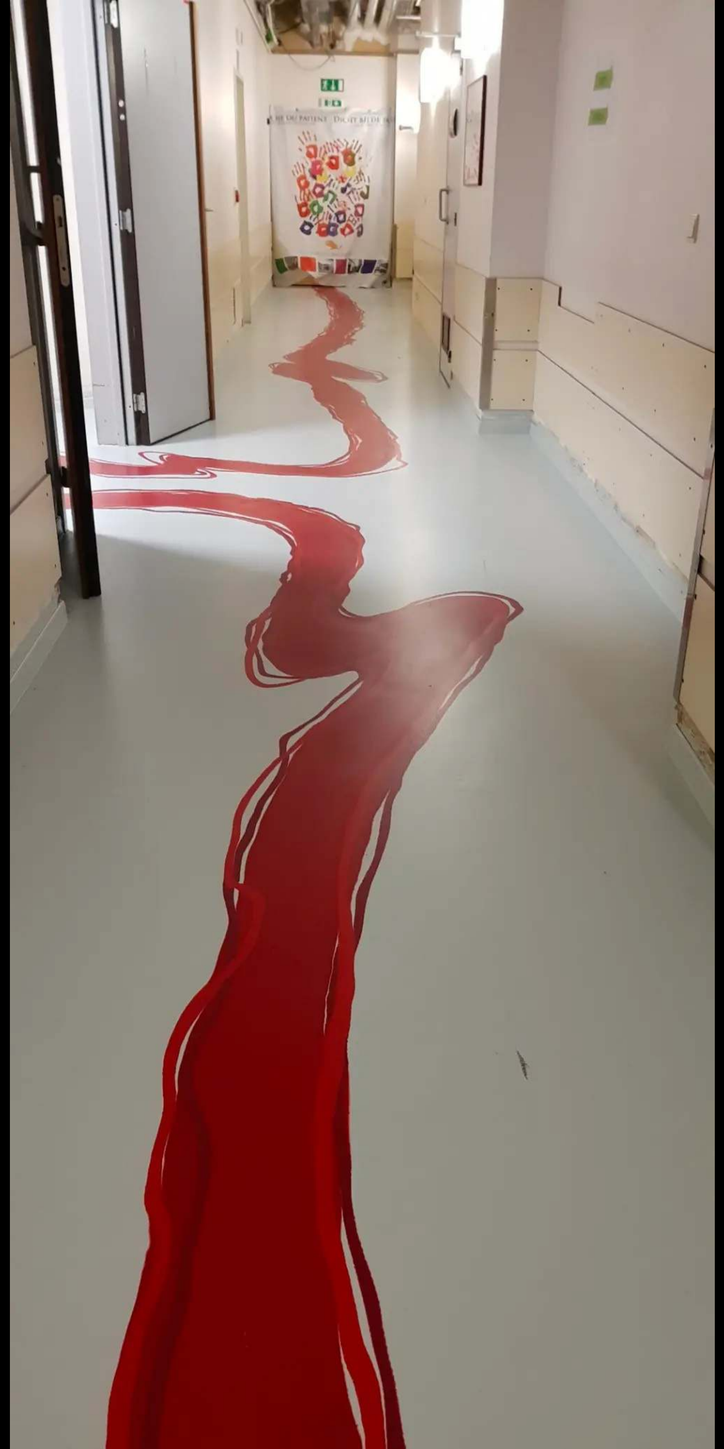


Kiwi footprints used as directional markers

You are supposed to go ↓

Confusing affordance — no visual cue about the actual direction

Subverted conventions — “arrows” point in the wrong direction



This is at a children’s hospital!!!

Red, smeared, apparently dragged → dead, bloody body! → so use clear, fun shapes (e.g., footprints or paw prints)

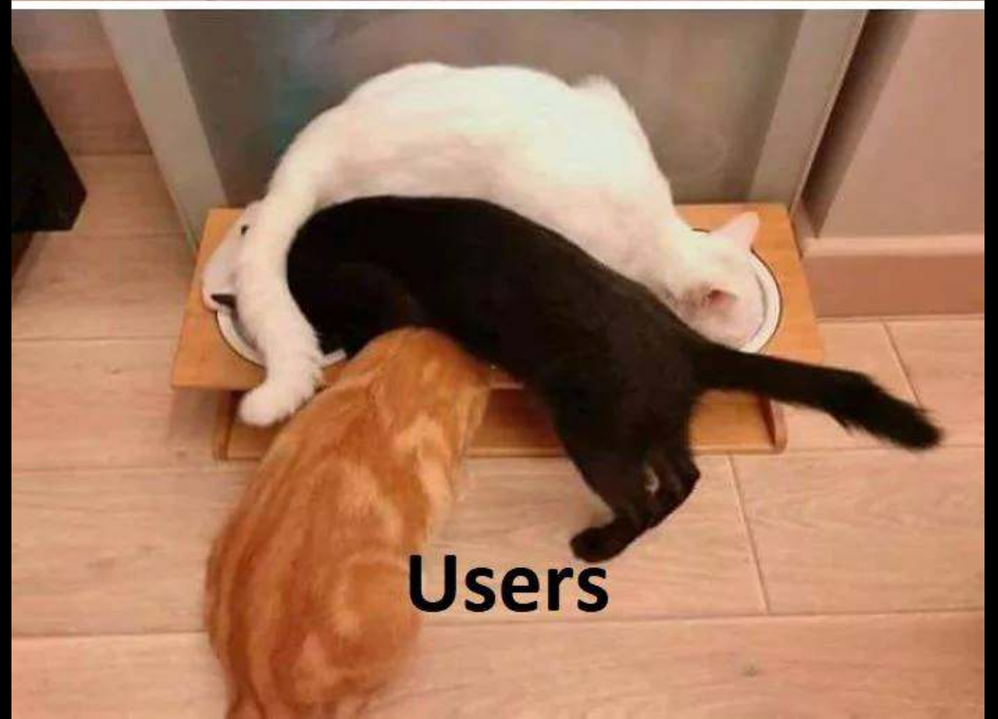
Context matters — hospitals are emotional, sometimes scary places, & blood can be *really* scary (+ murder!)

Other user interfaces

- *gestures*
  e.g., hand waves to open doors
- *non-voice auditory*
  e.g., beeps & boops
- *environmental*
  e.g., lighting, automated faucets & dryers
- *cognitive*
  e.g., heads-up displays, smart glasses
- *multimodal*
  combinations of any of the above, e.g., smartwatches
  combine buttons + touch + haptics

“Unlike User Interface Design, which focuses solely on the design of a computer interface, UX Design encompasses all aspects of a user’s perceived experience with a product or website, such as its usability, usefulness, desirability, brand perception, and overall performance.” —Wikipedia


Developer: Makes a simple, intuitive UI


Users

“Every time you redesign your app, you vaporize all the experience built up by everyone who’s been using the current version. It better be fucking worth it.”
—Athena Lilith Martin

HCD
Human-Centered Design

Human-centered design has 4 principles:

1. People-centered

2. Understand and solve the right problems, the root problems

3. Everything is a system of interconnected parts

4. Small & simple interventions: continually prototype, test and refine your proposals to make sure that your small solutions truly meet the needs of the people you focus on

XD
(Experience Design)

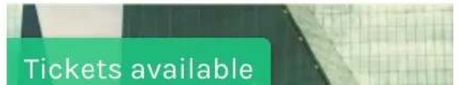
XD describes a hybrid discipline that focuses on environmental & multi-sensorial design, particularly in the area of digital displays & installations

AMERICAS

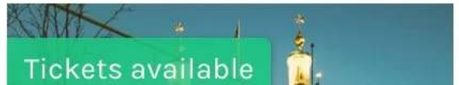
Atlanta

Boston

Dallas

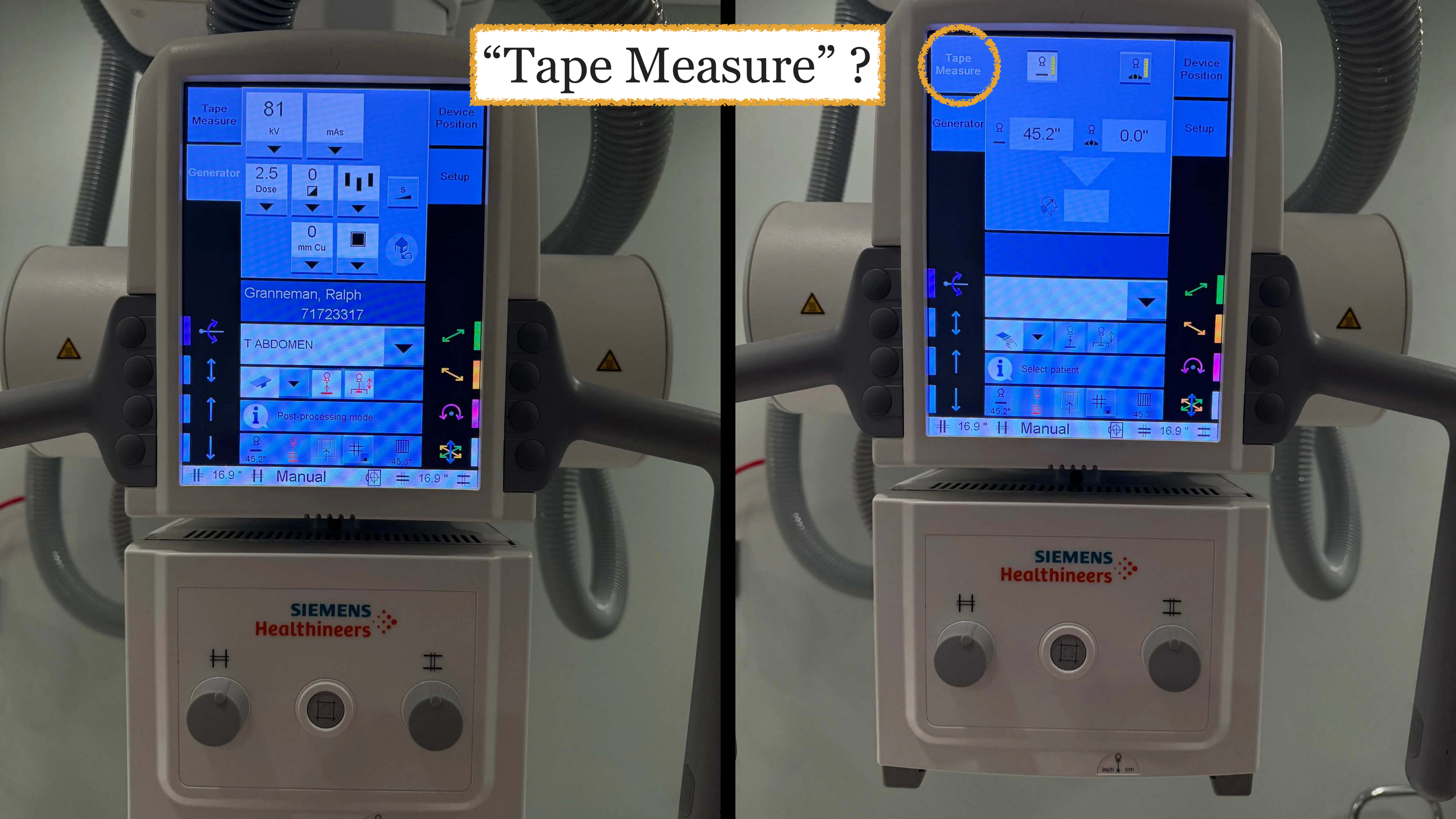


Cincinnati



Houston

Complexity & Difficulty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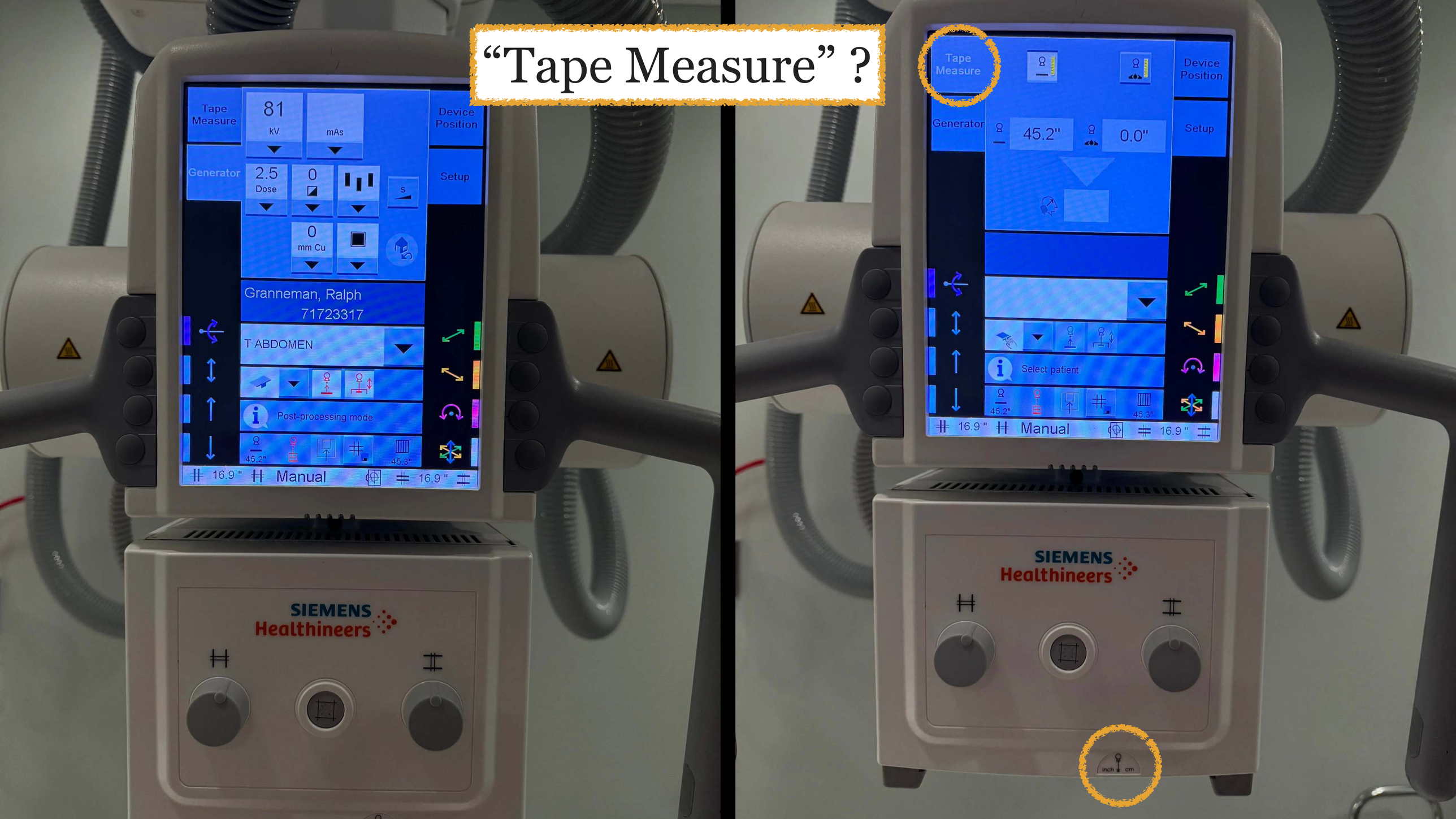
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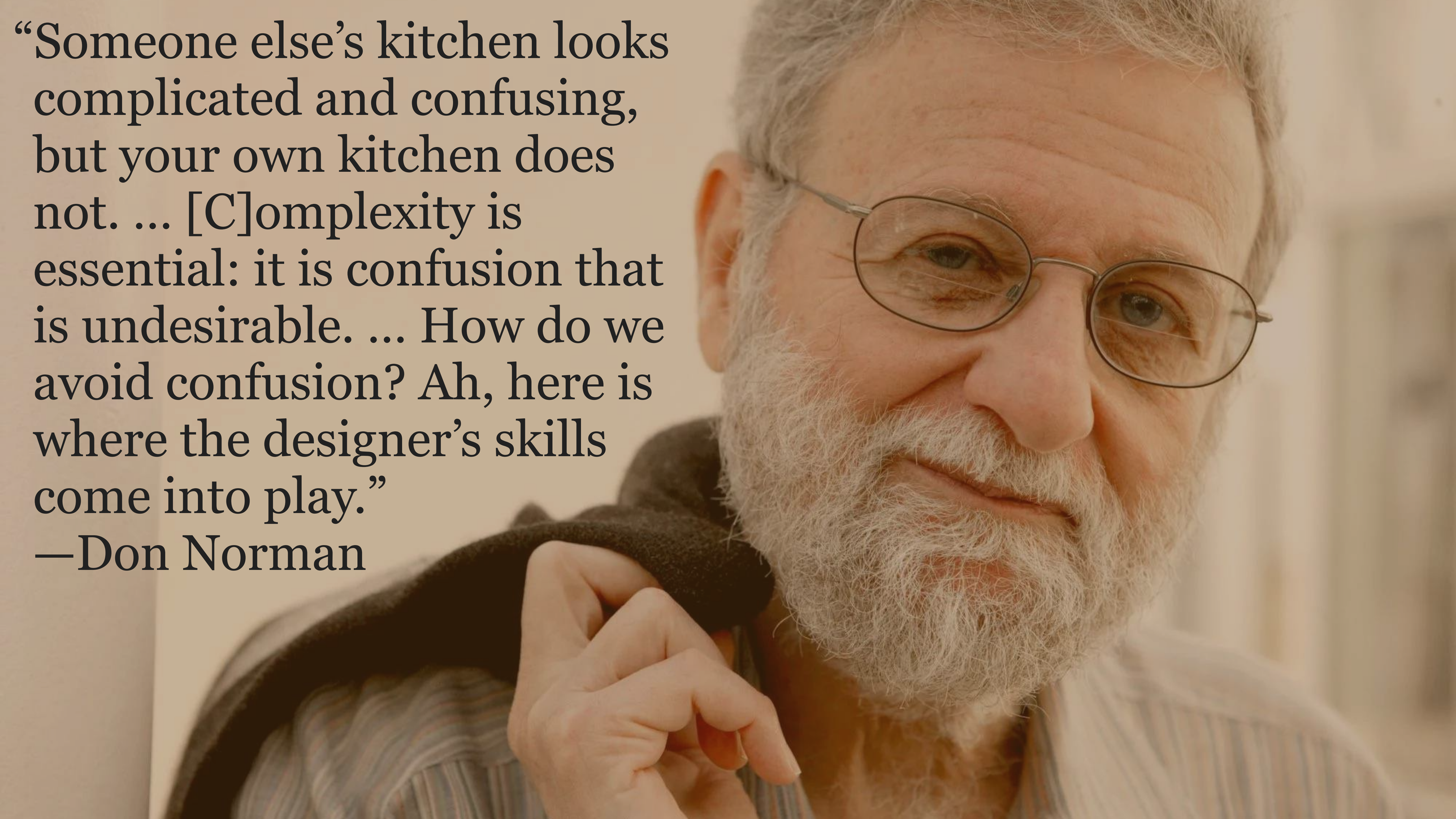


“Someone else’s kitchen looks complicated and confusing, but your own kitchen does not. … [C]omplexity is essential: it is confusion that is undesirable. … How do we avoid confusion? Ah, here is where the designer’s skills come into play.”
—Don Norman

Should anything be purposely difficult to use?

Should anything be purposely difficult to use?

Don Norman, in *The Design of Everyday Things*, points out several situations in which it is *necessary*

Doors to keep people — or other things — in or out

The Walking Dead, S01E01

Security systems
& areas
available only to
authorized users

*Monsters vs.
Aliens* (2009)

Security systems
& areas
available only to
authorized users

*Monsters vs.
Aliens* (2009)

Dangerous equipment

Monsters vs. Aliens (2009)

Dangerous equipment

Monsters vs. Aliens (2009)

Dangerous operations that could lead to injury or death

Secret doors, cabinets, & safes

Gene Wilder & Teri Garr in *Young Frankenstein* (1974)

Deliberate disruptions of normally routine actions


FOAM
EXTINGUISHER
3 LTR FOAM
70B
USE UPRIGHT
RIENDLY


VZOR 70 CAL 7.65
MADE IN CZECHOSLOVAKIA


Are you sure you want to permanently erase the items in the Trash?
You can't undo this action.

Controls that require 2 people to operate them simultaneously & apart

WarGames (1983)

CTER 12 354
CSOT 11 691
DODD 25 610
OSPC 48 955
STRS 36 °
ATTA
DFMB
LPDS
LSTP

Child-proof cabinets & bottles for medications & dangerous substances

Games in which you have to figure out what to do & how to do it

Lambda Core, from Half-Life (1998)

Games in which you have to figure out what to do & how to do it

Lambda Core, from Half-Life (1998)

All those designs are purposefully difficult, however…

“First, even deliberately difficult designs aren’t entirely difficult. Usually there is one difficult part, designed to keep unauthorized people from using the device; the rest of it should follow the normal principles of good design.” —Don Norman

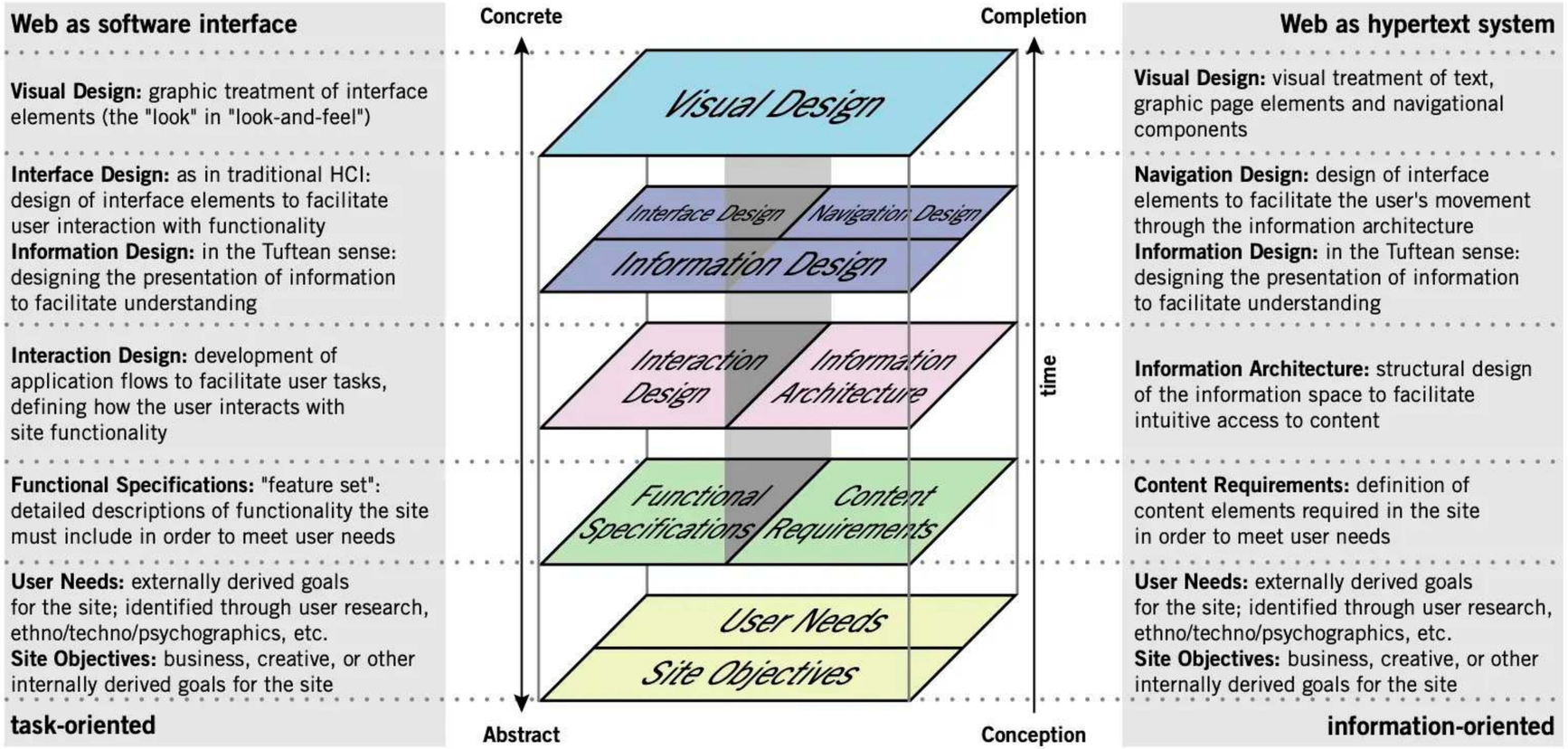
Our Course

The Elements of User Experience

Jesse James Garrett
jjg@jjg.net

30 March 2000

A basic duality: The Web was originally conceived as a hypertextual information space; but the development of increasingly sophisticated front- and back-end technologies has fostered its use as a remote software interface. This dual nature has led to much confusion, as user experience practitioners have attempted to adapt their terminology to cases beyond the scope of its original application. The goal of this document is to define some of these terms within their appropriate contexts, and to clarify the underlying relationships among these various elements.

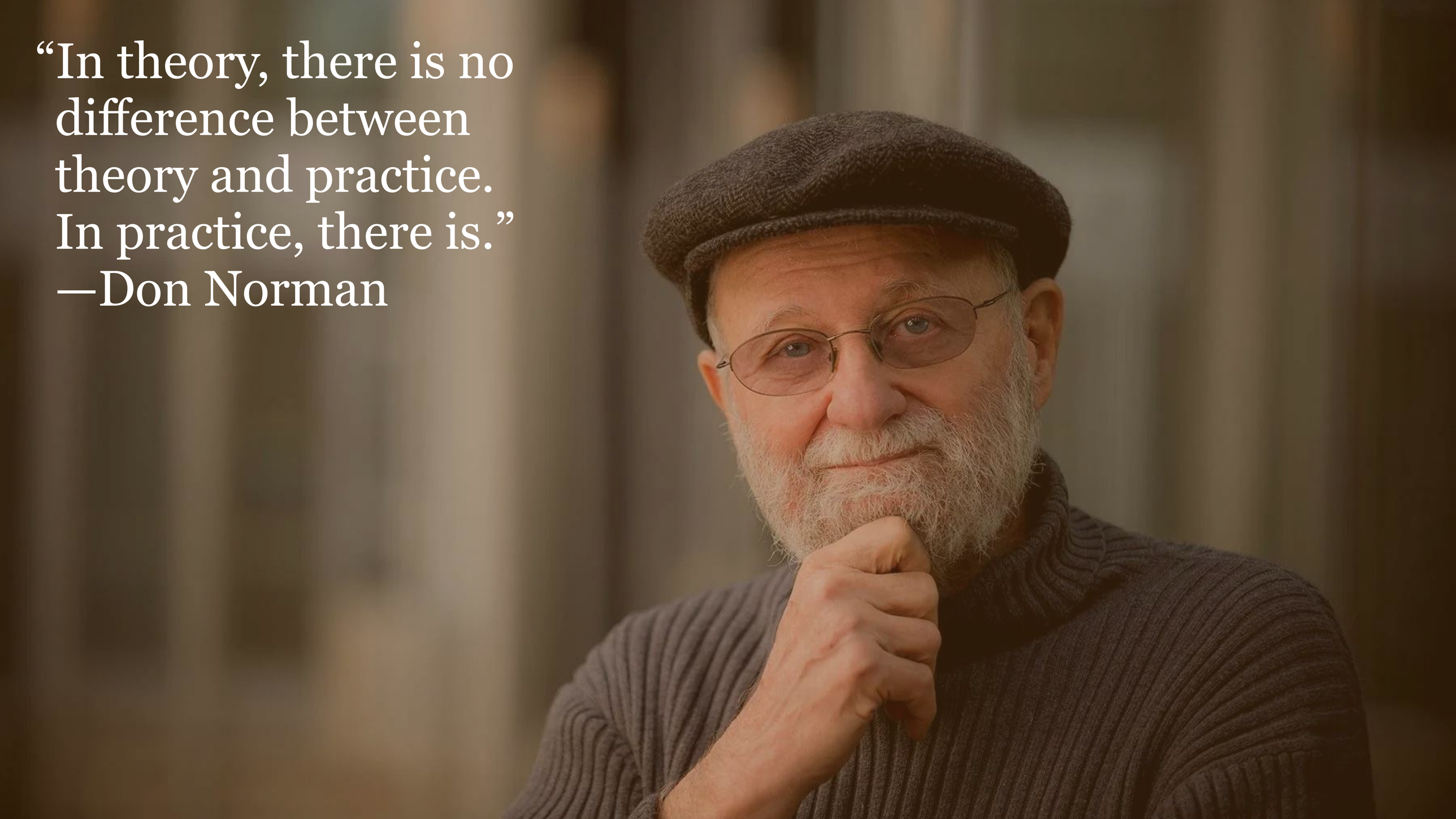


This picture is incomplete: The model outlined here does not account for secondary considerations (such as those arising during technical or content development) that may influence decisions during user experience development. Also, this model does not describe a development process, nor does it define roles within a user experience development team. Rather, it seeks to define the key considerations that go into the development of user experience on the Web today.

http://www.jjg.net/ia/

Our course progressions

1. Theory → Practice
2. Information Architecture → Wireframing & Prototyping → User Interface Design
3. Content! Content! Content!
4. Past → Present → Future


“In theory, there is no difference between theory and practice. In practice, there is.”
—Don Norman

5 Whys

Developed at Toyota Motor Corp. in 1930s

How do you find the underlying cause for a specific problem?

Use the 5 Whys, an iterative interrogative technique

Often, what seems like the immediate problem is just a symptom

The actual problem — the *root cause* — lies much deeper & is often a process that isn't working well or doesn't even exist

The robot stopped

Why? The circuit overloaded, making a fuse blow.

Why? There was insufficient lubrication on the bearings, so they locked up.

Why? The oil pump on the robot wasn’t circulating enough oil.

Why? The pump intake was clogged with metal shavings.

Why? *There was no filter on the pump*.

The caterer delivered food 2 hours late.

Why? We didn’t prepare the purchase order on time.

Why? We did not get all approval signatures on time.

Why? We prepared the PO 3 days before the event.

Why? Because we forgot to prepare a Purchase Order.

Why? *We don’t have a checklist to clearly identify the tasks we need to complete at what time.*

Some rules when using 5 Whys

Use paper or whiteboard instead of computers

Distinguish causes from symptoms

Look for the cause step by step & don’t jump to conclusions

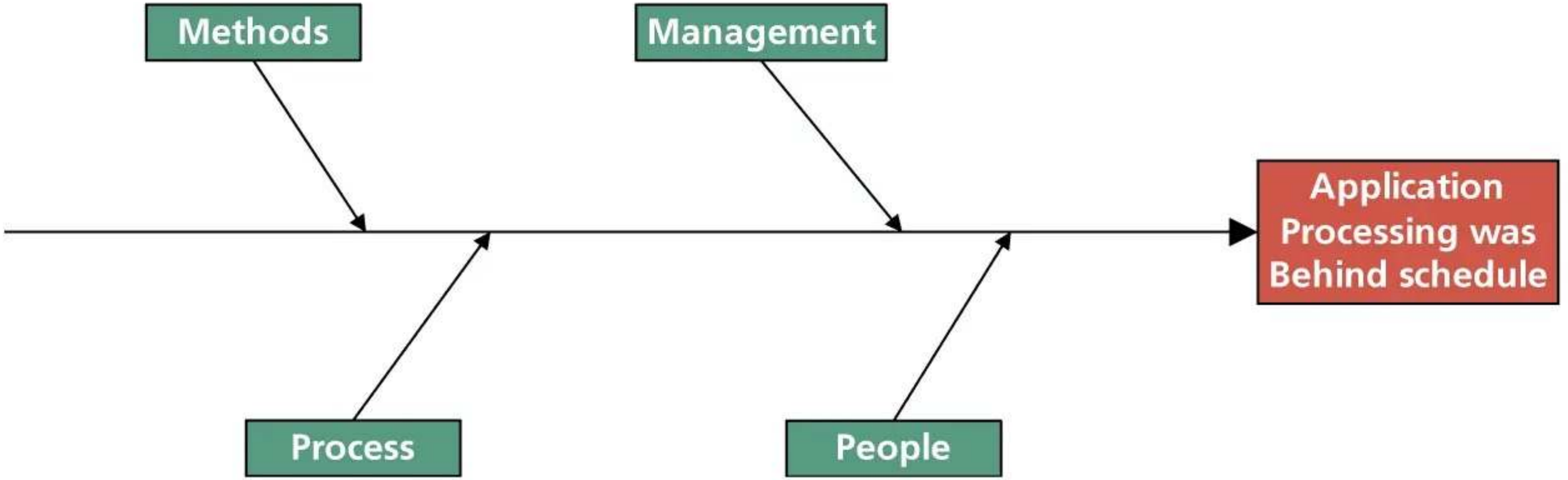
Base statements on facts & knowledge

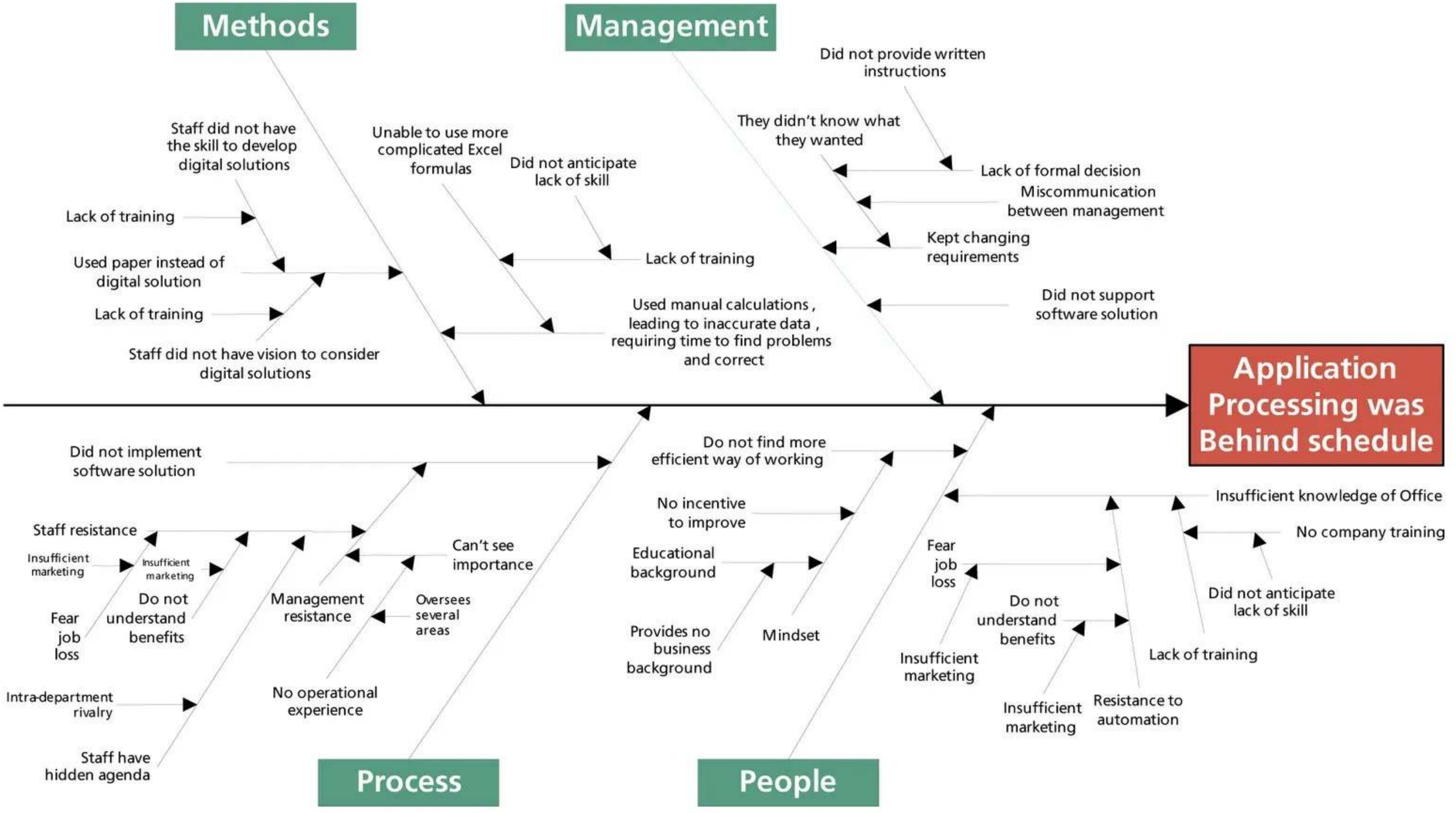
The root cause can never be things that cannot be improved or specific people; e.g., “human error”, “worker inattention”, or “Shannon in Accounting… again!”

5 Whys technique is very handy at the start of a design process, when you’re trying to understand the nature of the problem

Often clients bring solutions — your job is to ask “Why?” until you get at the root cause or need

Another way to help visualize your 5 Whys analysis is the Fishbone (or Ishikawa) Diagram


Methods
Management
Application Processing was Behind schedule
Process
People


Methods
Management
Process
People
Application Processing was Behind schedule
Staff did not have the skill to develop digital solutions
Lack of training
Used paper instead of digital solution
Lack of training
Staff did not have vision to consider digital solutions
Unable to use more complicated Excel formulas
Did not anticipate lack of skill
Lack of training
Used manual calculations , leading to inaccurate data , requiring time to find problems and correct
Did not provide written instructions
They didn't know what they wanted
Lack of formal decision
Miscommunication between management
Kept changing requirements
Did not support software solution
Did not implement software solution
Staff resistance
Insufficient marketing
Insufficient marketing
Fear job loss
Do not understand benefits
Management resistance
Can't see importance
Oversees several areas
No operational experience
Intra-department rivalry
Staff have hidden agenda
Do not find more efficient way of working
No incentive to improve
Educational background
Provides no business background
Mindset
Insufficient knowledge of Office
No company training
Fear job loss
Do not understand benefits
Did not anticipate lack of skill
Insufficient marketing
Lack of training
Insufficient marketing
Resistance to automation

Other common categories:

- 3Ms & P: Methods, Materials, Machinery, People
- 4Ps: Policies, Procedures, People, Plant
- 6Ms: Machine, Method, Materials, Measurement, Man, Mother Nature (Environment)
- 8Ps: Price, Promotion, People, Processes, Place/Plant, Policies, Procedures, Product (or Service)*
- 4Ss: Surroundings, Suppliers, Systems, Skills*

*Recommended for service industry

You can also use a spreadsheet for more complex or multiple branching 5 Whys analysis

5-Why Analysis

Problem: Processing of job requests delayed

Why 1	Why 2	Why 3	Why 4	Why 5	Root Cause	Recurrence Prevention

5	Why 1	Why 2	Why 3	Why 4	Why 5
6	There is no computerized solution to handle job	There was staff resistance	They were not explained the full benefits of the	There was a lack of communication.	
7			They feared being made redundant	They thought the computer system was designed to replace them.	
8			They were uncomfortable about changing the way they worked	They had always been doing it this way	
9				The positive aspects of the change were not communicated.	
10	There was no formal set of procedures to handle job requests, and procedures were passed on by mouth as opposed to being documented.	There was no system in place to do so.	The company grew at an exponential rate that there was no time to document anything.	There was insufficient planning	

	Why 1	Why 2	Why 3	Why 4	Why 5
6	There is no computerized solution to handle job	There was staff resistance	They were not explained the full benefits of the	There was a lack of communication.	We assumed that the benefits were obvious.
7			They feared being made redundant	They thought the computer system was designed to replace them.	Because we didn't tell them how it would help make their jobs easier.
8			They were uncomfortable about changing the way they worked	They had always been doing it this way	All the work was done manually prior
9				The positive aspects of the change were not communicated.	We assumed that the benefits were obvious.
10	There was no formal set of procedures to handle job requests, and procedures were passed on by mouth as opposed to being documented.	There was no system in place to do so.	The company grew at an exponential rate that there was no time to document anything.	There was insufficient planning	Top management were too busy fire fighting and dealing with operational work, rather than developing a strategy

5	Why 1		Why 2		Why 3		Why 4		Why 5	Root Cause
6	There is no computerized solution to handle job	→	There was staff resistance	→	They were not explained the full benefits of the	→	There was a lack of communication.	→	We assumed that the benefits were obvious.	Insufficient communication
7				→	They feared being made redundant	→	They thought the computer system was designed to replace them.	→	Because we didn't tell them how it would help make their jobs easier.	Insufficient communication
8				→	They were uncomfortable about changing the way they worked	→	They had always been doing it this way	→	All the work was done manually prior	No culture of change and sense of insecurity among staff.
9						→	The positive aspects of the change were not communicated.	→	We assumed that the benefits were obvious.	Assumptions made on our side led to insufficient communication.
10	There was no formal set of procedures to handle job requests, and procedures were passed on by mouth as opposed to being documented.	→	There was no system in place to do so.	→	The company grew at an exponential rate that there was no time to document anything.	→	There was insufficient planning	→	Top management were too busy fire fighting and dealing with operational work, rather than developing a strategy	Poor work delegation and advanced planning

	Why 1	Why 2	Why 3	Why 4	Why 5	Root Cause	Recurrence Prevention
6	There is no computerized solution to handle job applications	There was staff resistance	They were not explained the full benefits of the system	There was a lack of communication.	We assumed that the benefits were obvious.	Insufficient communication	Develop a communication strategy to show the benefits of a computerized system.
7			They feared being made redundant	They thought the computer system was designed to replace them.	Because we didn't tell them how it would help make their jobs easier.	Insufficient communication	In the communication strategy, emphasize how the computer system will complement their jobs and assist them, and not replace them.
8			They were uncomfortable about changing the way they worked	They had always been doing it this way	All the work was done manually prior	No culture of change and sense of insecurity among staff.	Include change management in implementation plan. Also, assure staff that comprehensive training will be offered to allay fears of
9				The positive aspects of the change were not communicated.	We assumed that the benefits were obvious.	Assumptions made on our side led to insufficient communication.	Develop a communication strategy to show the benefits of a computerized system.
10	There was no formal set of procedures to handle job requests, and procedures were passed on by mouth as opposed to being	There was no system in place to do so.	The company grew at an exponential rate that there was no time to document anything.	There was insufficient planning	Top management were too busy fire fighting and dealing with operational work, rather than developing a strategy	Poor work delegation and advanced planning	Develop vision, and coordinate resources to free up management to engage in strategic planning. Hire more people as necessary, and implement a computerized system.

What Can I Do With UX?

Solve real-world problems … & specialize if you want

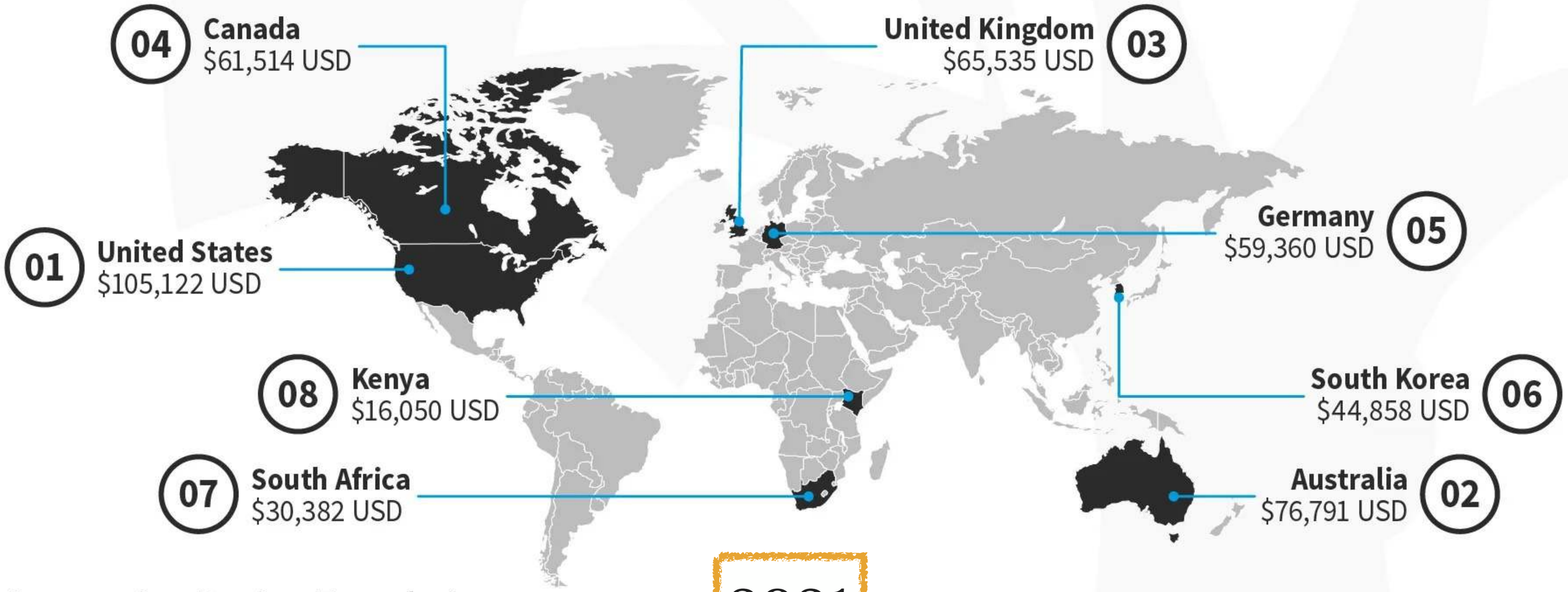
Be creative *and* logical

Principles, knowledge, & skills are more important than tools

You can often work remotely

It’s a growing field with high demand & good pay

UX Designer Salaries Around the World



2021

Interaction Design Foundation
interaction-design.org

Sources: glassdoor.com • indeed.com • salaryexplorer.com • statistica.com • bls.gov

Median annual salary in 2023 is $93,028

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I see many designers of my generation frustrated because UX boot camps and design thinking courses made us believe we'd all guide organizations towards user-centred solutions, only to realize many companies hire us to execute, not to transform.

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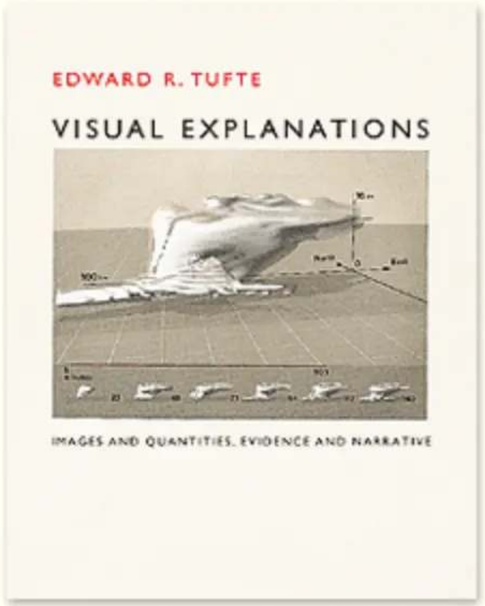

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granneman.com
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Intro to UX Design

Theory & Practice

R. Scott Granneman & Jans Carton

Changelog

2025-09-22 1.7: Removed *UCD User-Centered Design*, *HCI Human-Computer Interaction*, & *HMI Human-Machine Interface sections*; added details to *Graphic Design*, *UI User Interface Design*, & *Complexity & Difficulty*; removed slides from *UX User Experience Design*; updated theme to Granneman 1.14

2025-01-15 1.6: Added some cartoons & illustrations; updated theme to Granneman 1.13; minor fixes & corrections

2024-09-13 1.5: Added quote by Steve Jobs; added details about Industrial Designer careers; added career info for various professions

Changelog

2024-09-02 1.4: Added quote that companies want UX designers to execute, not transform

2024-02-26 1.3: Added door with a label of Pull; added *HMI Human-Machine Interface* to *What is UX?*

2024-01-13 1.2: Added Saul Bass quotation; added QR codes; added Ira Glass video at end

Changelog

2023-12-07 1.1: Switched theme to Granneman 1.12; minor fixes & formatting; broke 7 Stages of Execution up into 3 slides; added quotation by Athena Lilith Martin; added Braun calculator to illustrate UI; added slide re: how Braun calculator inspired Calculator app on original iPhone

2022-01-18 1.0: Created slide deck

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