ID principles and patterns

Univerzitet u Kragujevcu
Prirodno-matematički fakultet
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Iteraction design

- The goal of interaction design - Designing for maximum usability

Principles to support usability

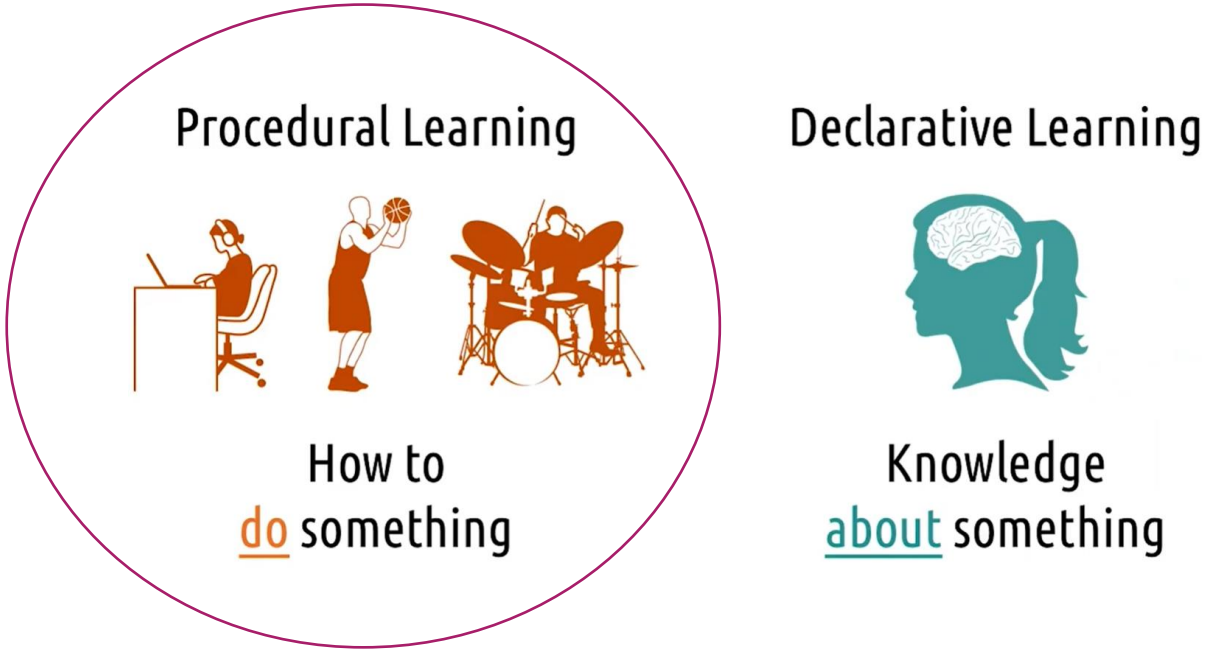
- Learnability
  - the ease with which new users can begin effective interaction and achieve maximal performance
- Flexibility
  - the multiplicity of ways the user and system exchange information
- Robustness
  - the level of support provided the user in determining successful achievement and assessment of goal directed behavior

Cognitive processes and Learnability

Human abbilites - continued

Cognitive processes

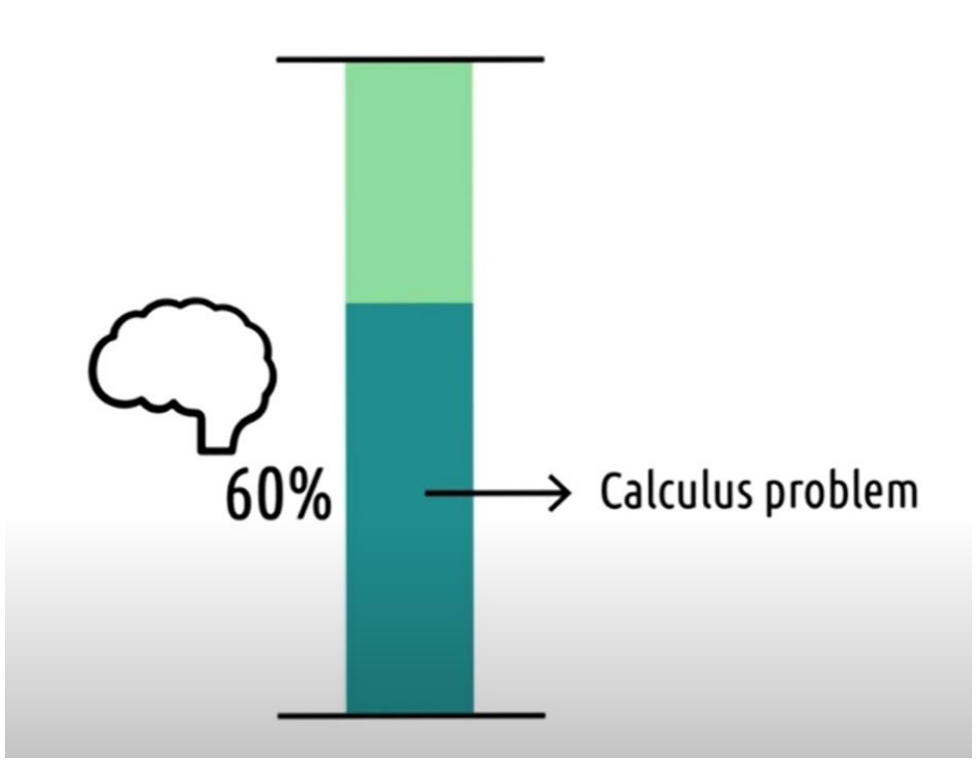
- Attention
- Perception and recognition
- Memory
- Learning
- Reading, speaking and listening
- Problem-solving, planning, reasoning and decision-making

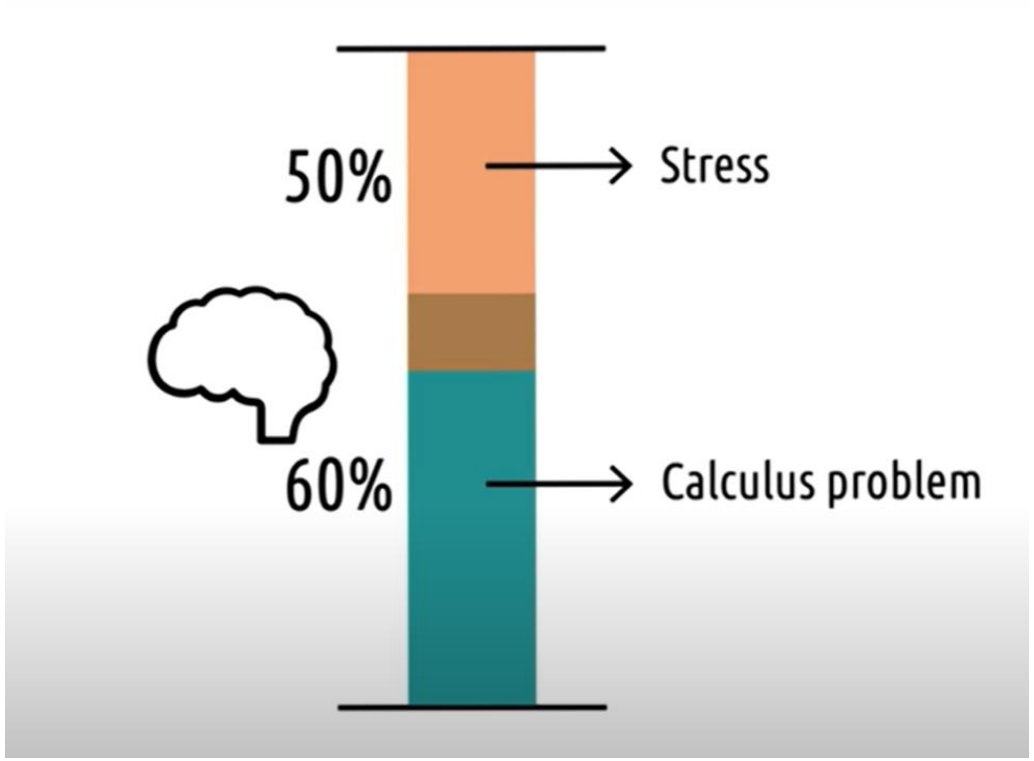


HCI

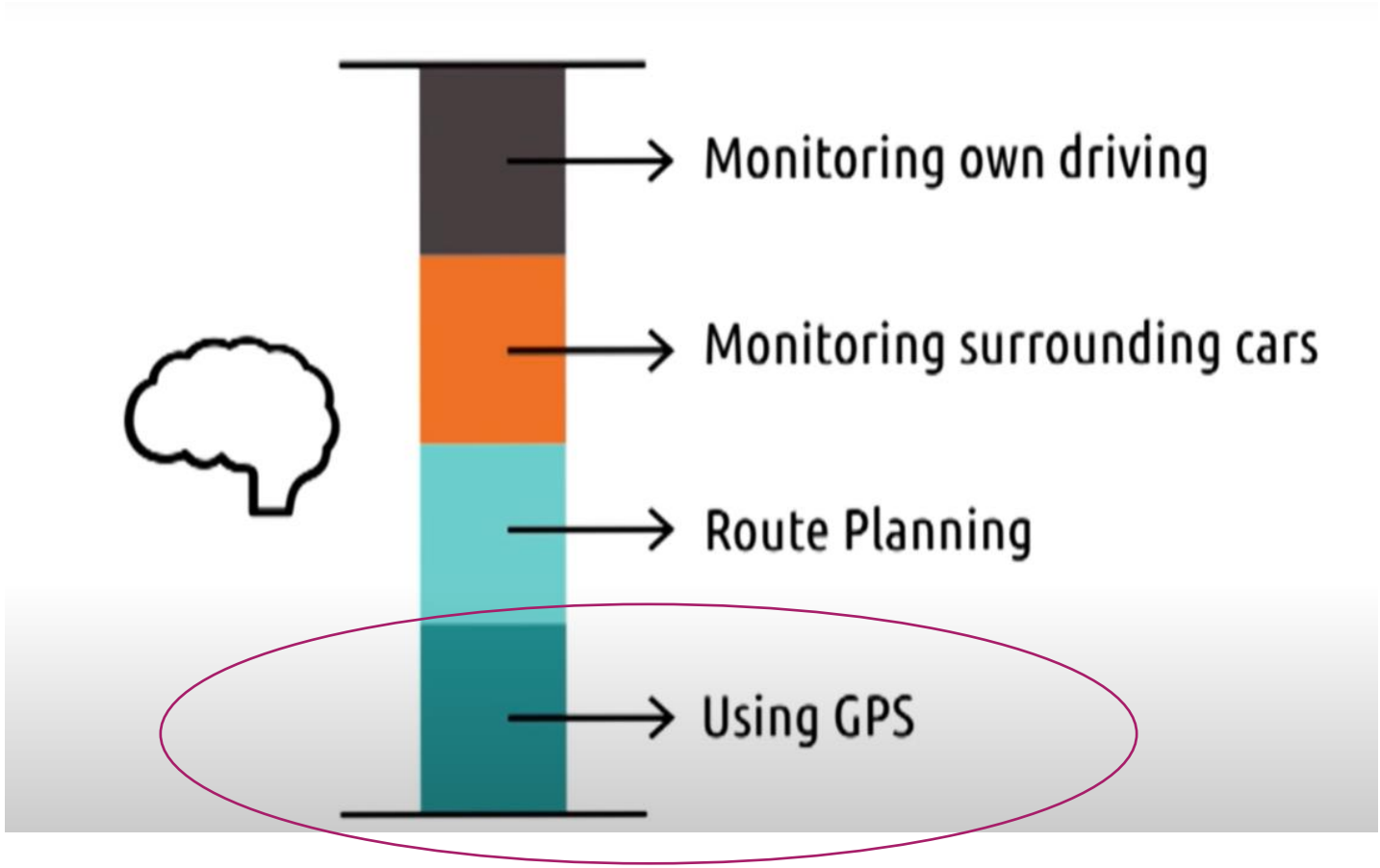
Cognitive load

Cognitive load



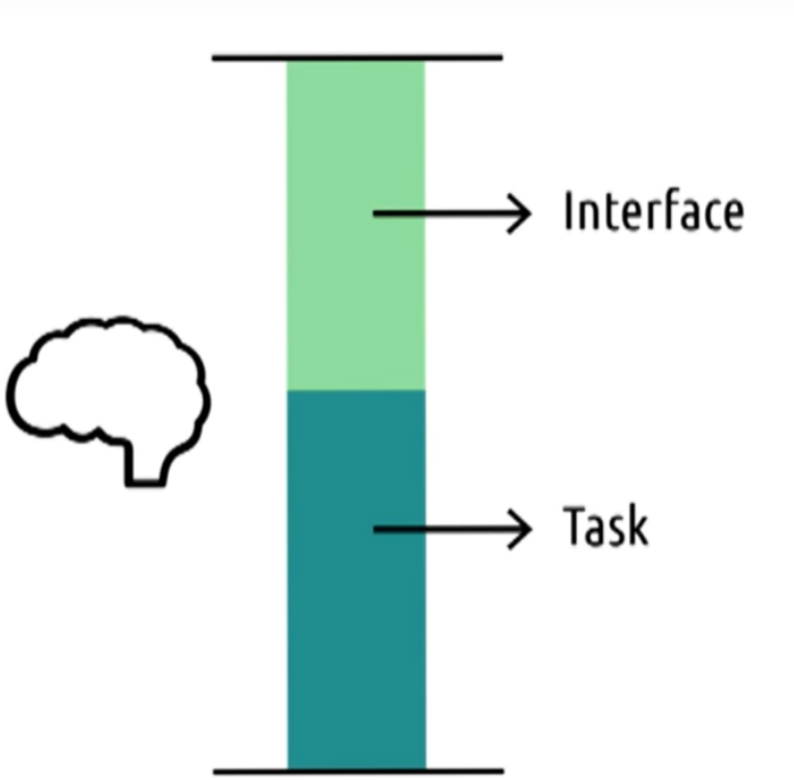


Cognitive load



HCI task

- Reduce cognitive load induced by the interface
- Understand contexts in which user performs his task
  - What else is competing for cognitive resources while user uses the interface?



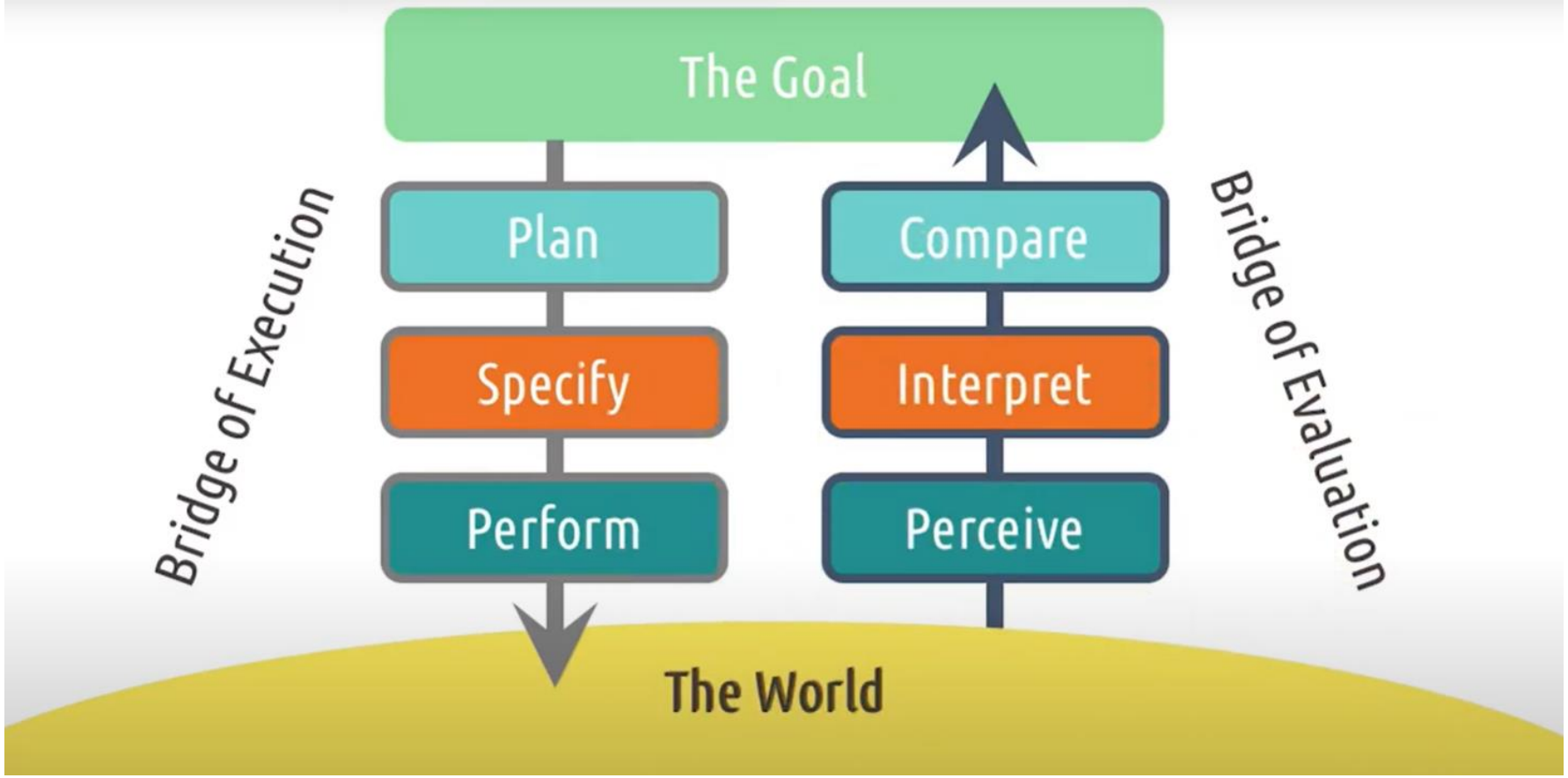
Optimizing cognitive load

- Emphasize essential content and minimize clutter
  - Make information salient (noticeable) when it needs attending to
  - Use color, oredering, spacing, ...
- Support perception
  - Icons should enable user to readily distinguish their meaning
  - Grouping (bordering, spaceing, ...)
  - Sounds should be audible and distinguishable
  - Text should be legible and distinguishable from teh background
- Use multiple modalities, modalities should complement each other
- Give the user control of the pace
- Offload tasks

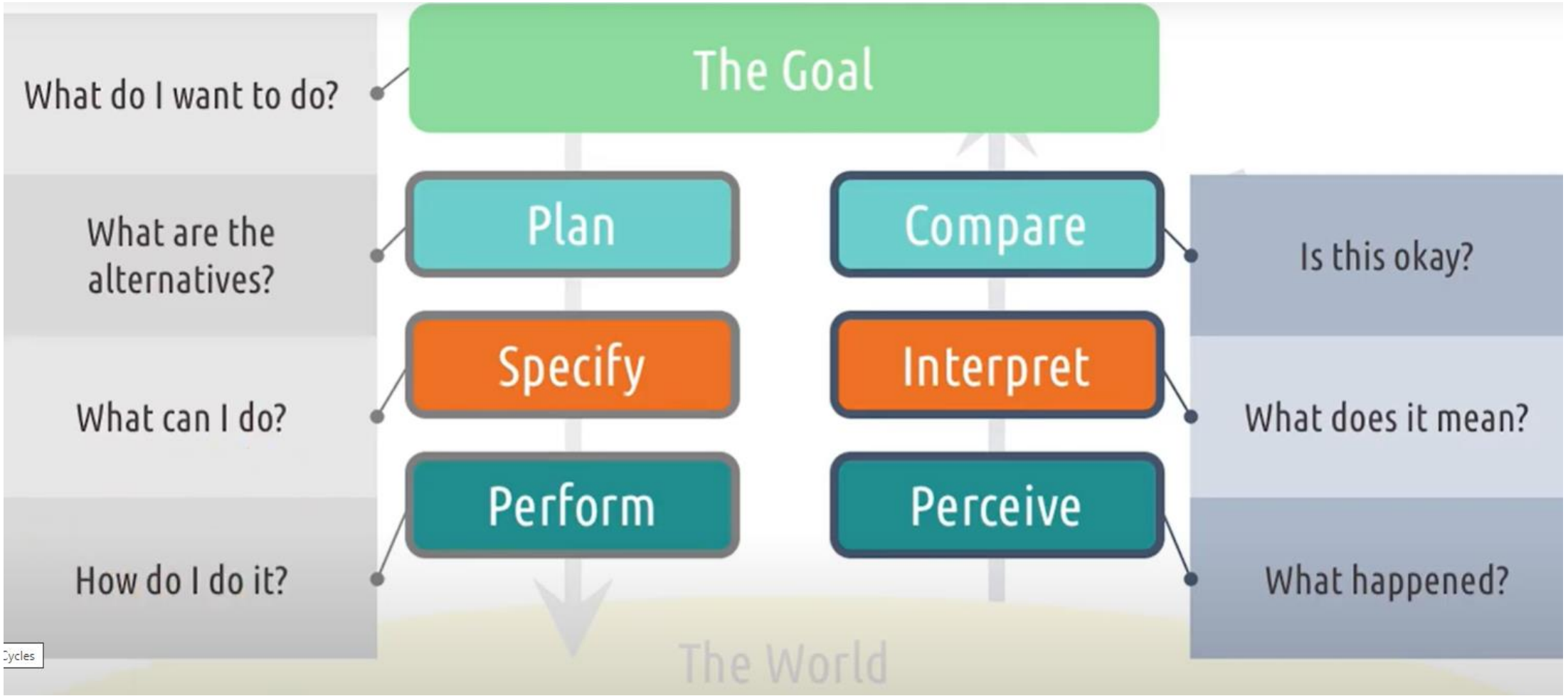
Feedback Cycles

Feedback cycle

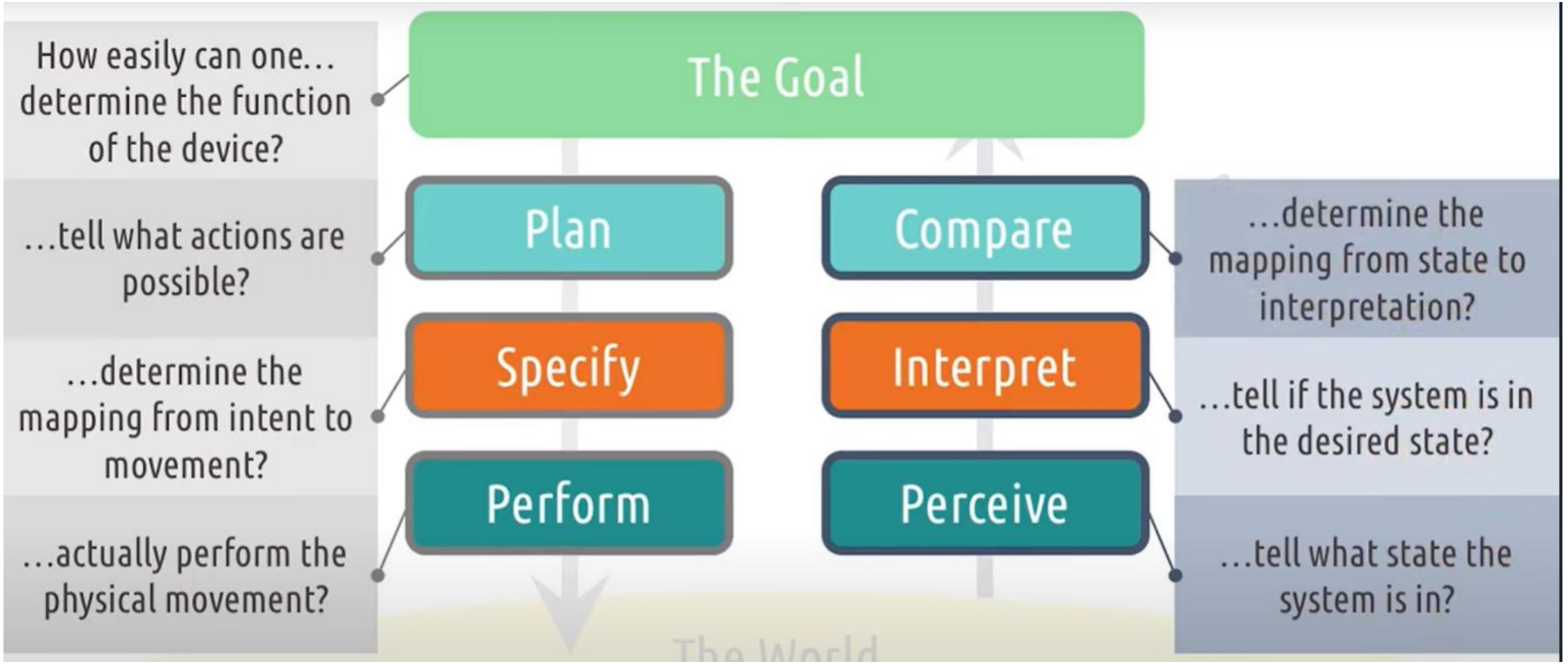
Donald Norman's feedback cycle



From user point of view



Design goals in context of feedback cycle



Tips

Execution

- Make functions discoverable
- Let user mess around
- Be consistent with other tools
- Know your user
- Feedforward

https://www.youtube.com/watch?v=WZxL7cTqw1w&t=101s

Evaluation

- Give feedback constantly
- Give feedback immediately
- Match the feedback to the action
- Vary your feedback
- Leverage direct manipulation

https://www.youtube.com/watch?v=ZFNmVDPtiDE&t=10s

ID principles, guidelines, standards

Norman's 7 Principles

1. Use both knowledge in the world and knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible: bridge the gulfs of Execution and Evaluation.
4. Get the mappings right.
5. Exploit the power of constraints, both natural and artificial.
6. Design for error.
7. When all else fails, standardize.

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

Standards

Standards

- Standards are just limited tools for encouraging certain changes in practice
- They represent consensus about good practice
- They are part of a large and systematic usability engineering approach to design
- For more general applicability there is a tendency to make standards based on usability and performance issues instead of product characteristics
- Standards vary in terms of
  - Level
  - Purpose and use
  - Content
  - Approach: there is a shift on emphasis from product design features to user performance required from the equipment (not how it is achieved)

Levels of HCI standards

- In-house standards ensure consistency across different parts of a system
- Commercial style guide
  - Apple human interface guidelines: the Apple Desktop Interface
  - IBM Systems Application Architecture: Common User Access Guide to User Interface Design
- National standards: developed by national bodies
  - British Standards Institution (BSI)
  - Deutshes Institut fur Normung (DIN): published standards which addressed ergonomics problems of VDUs and their workplace
- International standards: developed by the International Organisation Standardisation (ISO)
  - Major manufacturers are international, best and most effective solutions need to be international
  - ISO 9241: ergonomics requirements to work with Visual Display Terminals (VDT), both software and hardware

ISO 9241

- ISO 9241 is a multi-part standard covering ergonomics of human-computer interaction.
- 1996. ISO 9241 was originally titled *Ergonomic requirements for office work with visual display terminals* (VDTs)
- 2006. extended version, additional series under title *Ergonomics of Human System Interaction.*

https://www.iso.org/obp/ui/#iso:std:iso:tr:9241:-100:ed-1:v1:en

ISO 9241

Part 1: General introduction

Part 2: Guidance on task requirements

Part 4: Keyboard requirements

Part 5: Workstation layout and postural requirements

Part 6: Guidance on the work environment

Part 9: Requirements for non-keyboard input devices

Part 11: Guidance on usability

Part 12: Presentation of information

Part 13: User guidance

Part 14: Menu dialogues

Part 15: Command dialogues

Part 16: Direct manipulation dialogues

Part 17: Form filling dialogues

100 series: Software ergonomics

Part 100: Introduction to standards related to software ergonomics

Part 110: Dialogue principles

Part 112: Principles for the presentation of information

Part 125: Guidance on visual presentation of information

Part 129: Guidance on software individualization

Part 143: Forms

Part 151: Guidance on World Wide Web user interfaces

Part 154: Interactive voice response (IVR) applications

Part 161: Guidance on visual user interface elements

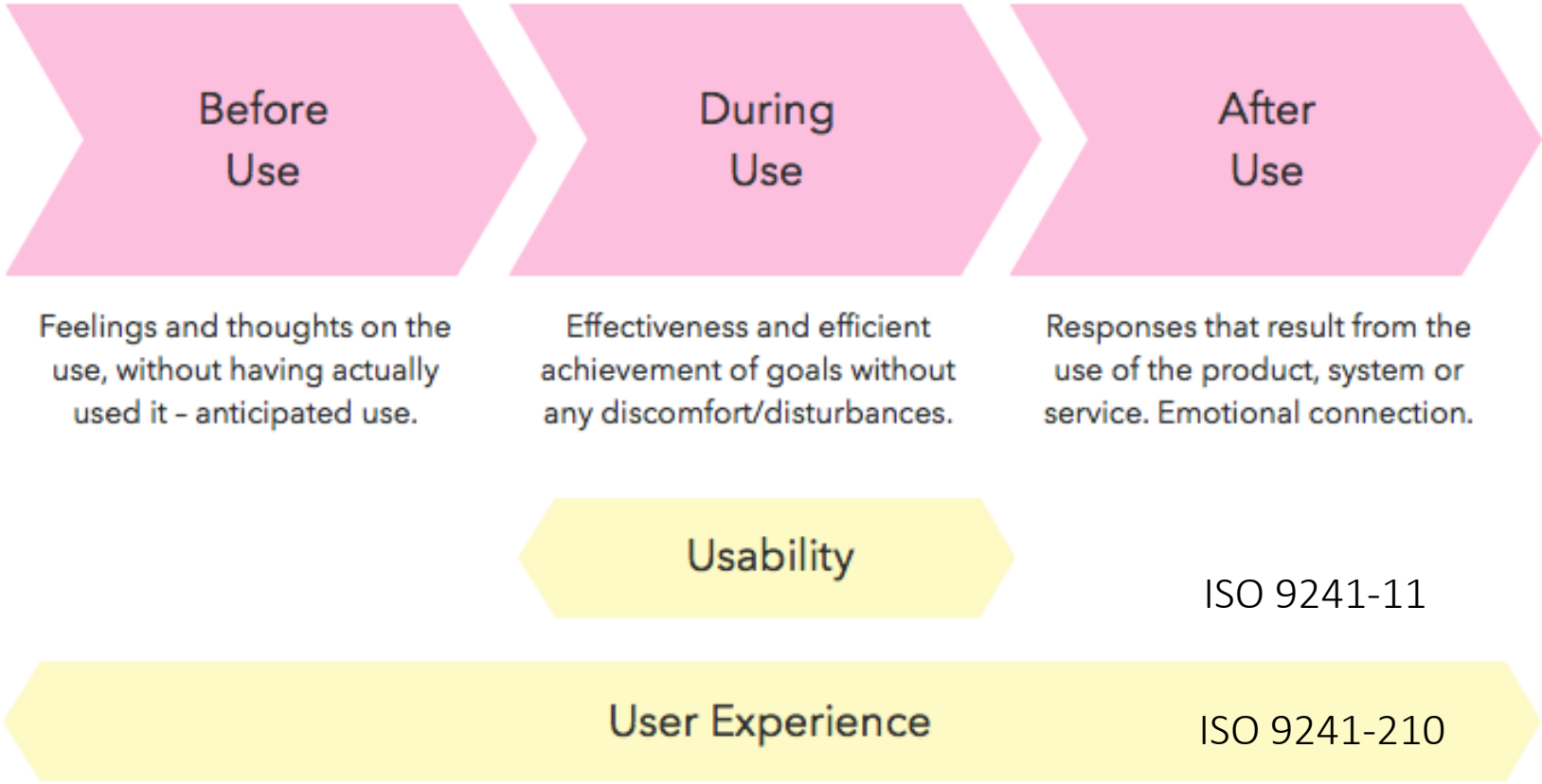
Part 171: Guidance on software accessibility

200 series: Human system interaction processes

Part 210: Human-centred design for interactive systems

300 - 900 series

Usability and User experience

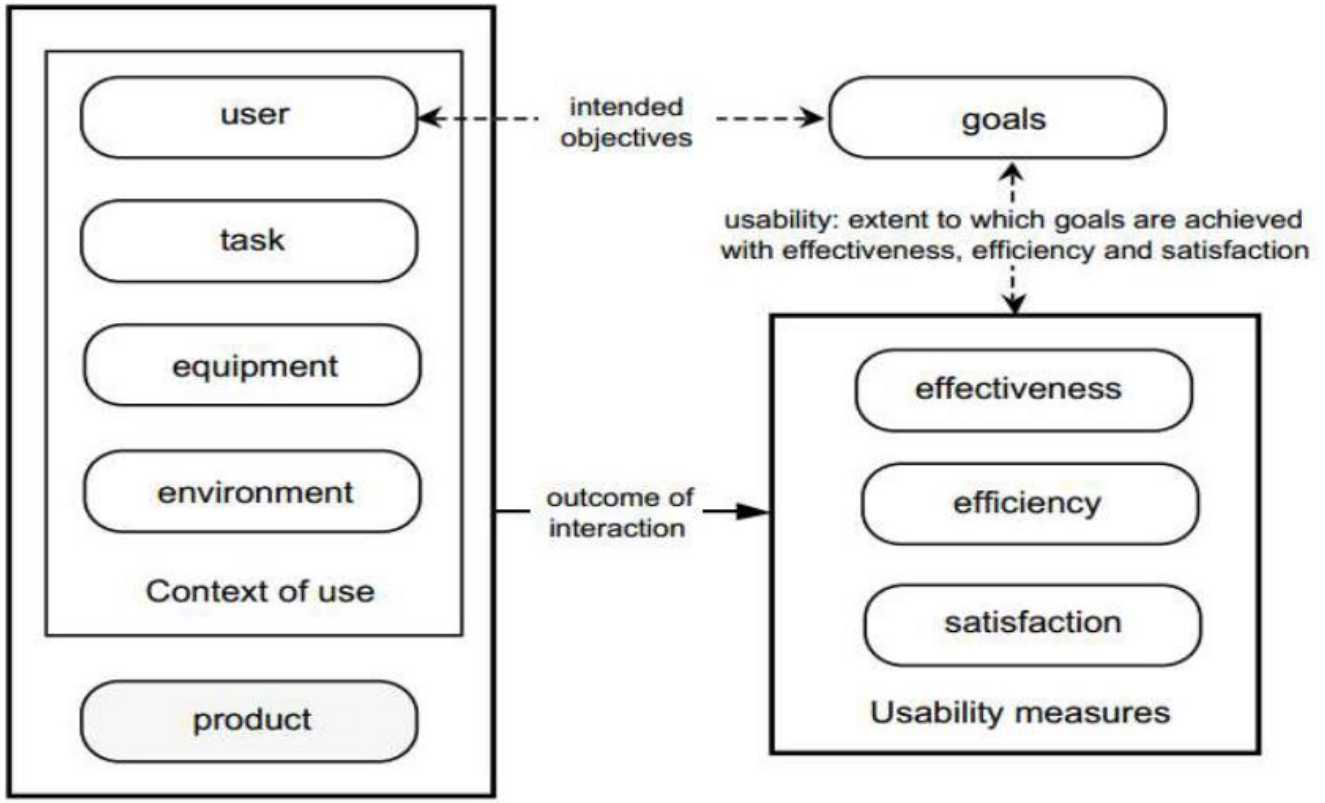


ISO 9241-11

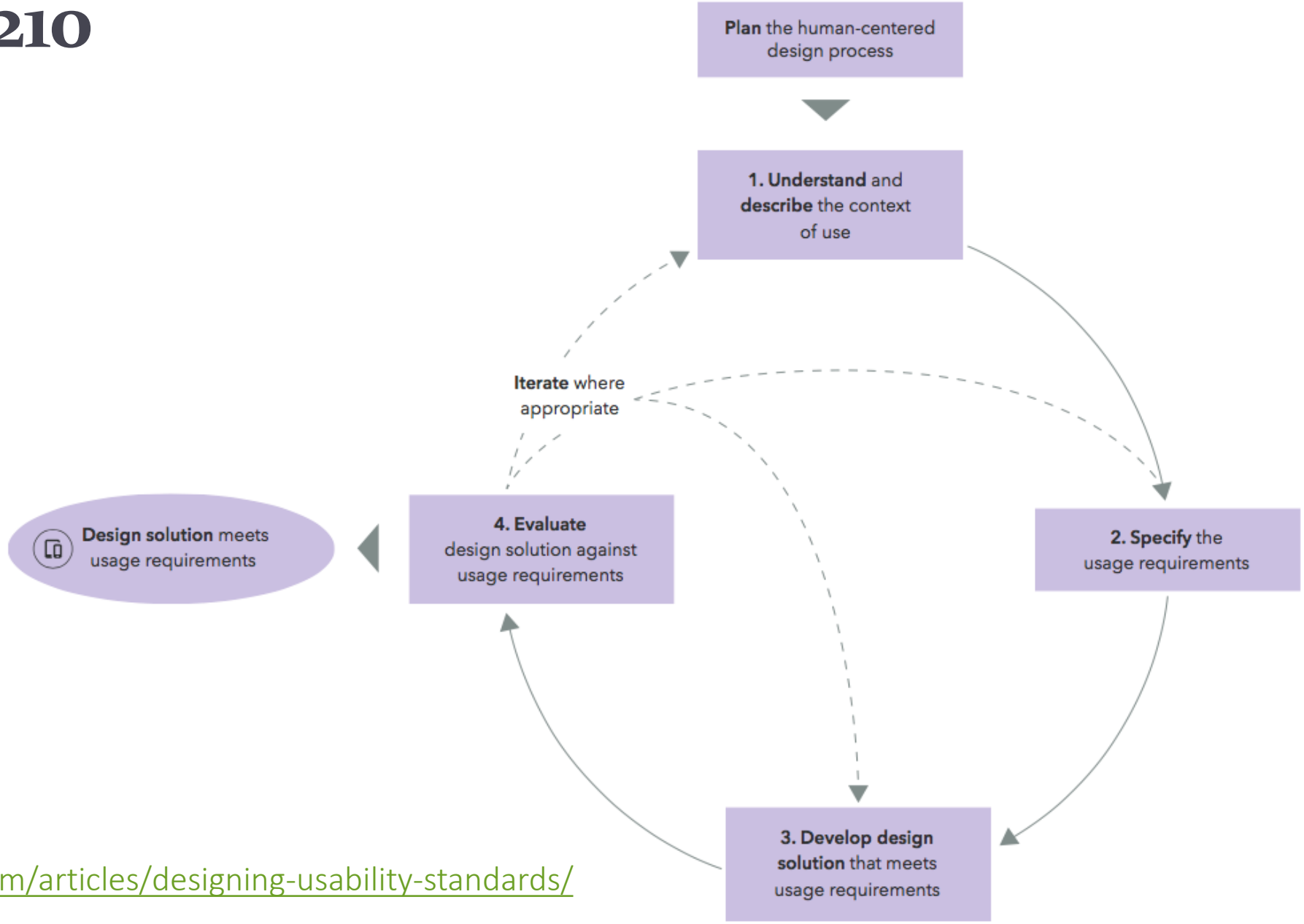
- ISO 9241-11 explains how usability can be specified and evaluated in terms of user performance and satisfaction.
- Usability: The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use
  - Effectiveness : The accuracy and completeness with which users achieve specified goals.
  - Efficiency: The resources expended in relation to the accuracy and completeness with which users achieve goals.
  - Satisfaction : The comfort and acceptability of use
- The standard describes how it can be applied to:
  - specify and measure the usability of products
  - specify and evaluate usability during design
  - specify and measure a work system in use.

ISO 9241-11

- ISO 9241-11 also emphasises that usability is dependent on the context of use.
- The context of use consists of the users, tasks, equipment (hardware, software and materials), and the physical and organisational environments which may all influence the usability of a product.



ISO 9241-210



https://www.uxbooth.com/articles/designing-usability-standards/

HCI design patterns

HCI design patterns

- capture design practice not theory
- capture the essential common properties of good examples of design
- represent design knowledge at varying levels: social, organisational, conceptual, detailed

Book on patterns

Jenifer Tidwell, Charles Brewer, and Aynne Valencia, *Designing Interfaces*, 2020

- Cognition and Behavior Related to Interface Design
- Information Architecture and Application Structure
- Navigation, Signposts, and Wayfinding
- Layout of Screen Elements
- Visual Style and Aesthetics
- Mobile Interfaces
- Lists of Things
- Actions and Commands
- Showing Complex Data
- Forms and Controls

The Patterns: Cognition and Behavior Related

- Safe Exploration - “Let me explore without getting lost or getting into trouble.” (e.q. Undo)
- Instant Gratification - “I want to accomplish something now, not later.” (firt step must be easy)
- Satisfying and sufficing - “This is good enough. I don’t want to spend more time learning to do it better.”

  “call to action”, labels quick to read, layout communicating meaning, “escape hatches”
- Changes in Midstream - “I changed my mind about what I was doing.” (support reentrance)
- Deferred Choices - “I don’t want to answer that now; just let me finish!”
  - Don’t accost the user with too many upfront choices in the first place.
  - Clearly indicate required versus optional field
  - Use Good Defaults
- Incremental Construction - “Let me change this.”
  - Builder-style interfaces, fast preview
- Habituation - “That gesture works everywhere else; why doesn’t it work here, too?” (e.g. Ctrl-X)
- Microbreaks - “I’m waiting for the train. Let me do something useful for two minutes.”

Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

The Patterns: Cognition and Behavior Related

- Spatial Memory - “I swear that button was here a minute ago. Where did it go?”
- Prospective Memory - “I’m putting this here to remind myself to deal with it later.”
- Streamlined Repetition - “I have to repeat this how many times?” (Format painter, Find/Replace)
- Keyboard Only - “Please don’t make me use the mouse.”
  - define keyboard shortcuts, Selection from lists, even multiple selection, is usually possible using arrow keys
  - in combination with modifiers (such as the Shift key), Tab key typically moves the keyboard focus, default button on dialog boxes
- Social Media, Social Proof, and Collaboration - “What did everyone else say about this?”
  - social functionalities: User-generated reviews and comments, Everything is a social object (sharing, rateing), Collaboration

Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Navigation, Signposts, and Wayfinding

General

- Separate the Navigation Design from the Visual Design
- Keep Distances Short
  - Broad global navigation
  - Put frequently accessed items directly in the global navigation
  - Bring steps together

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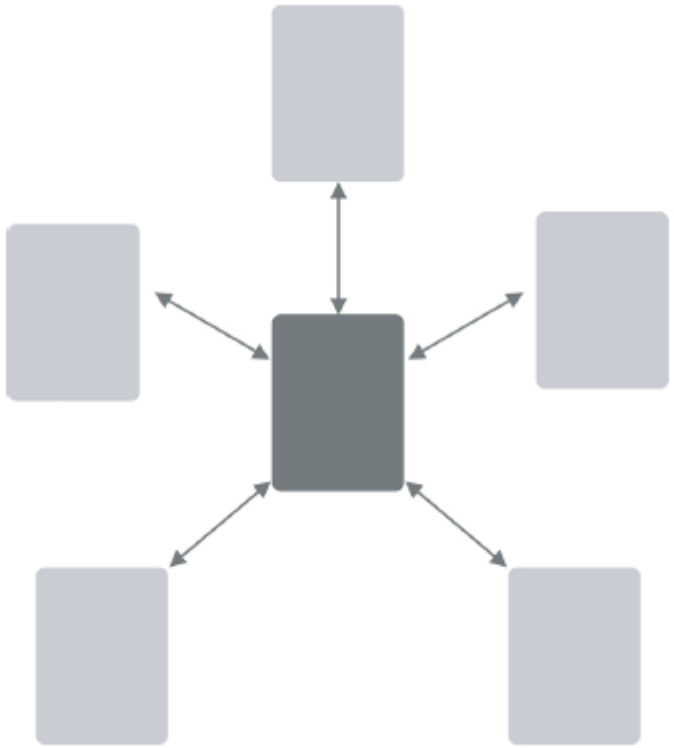
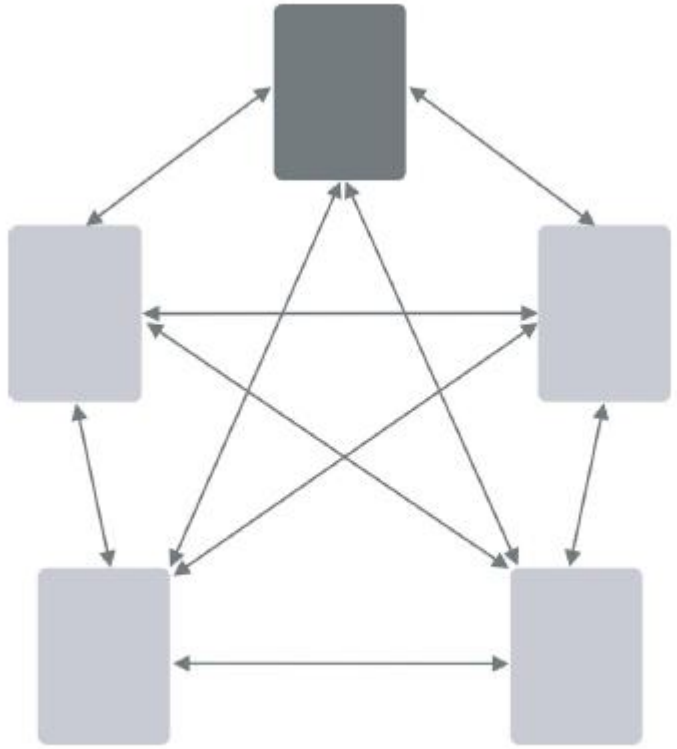
Navigational models



. *Hub and spoke architecture*



. *The fully connected model*

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Navigational models

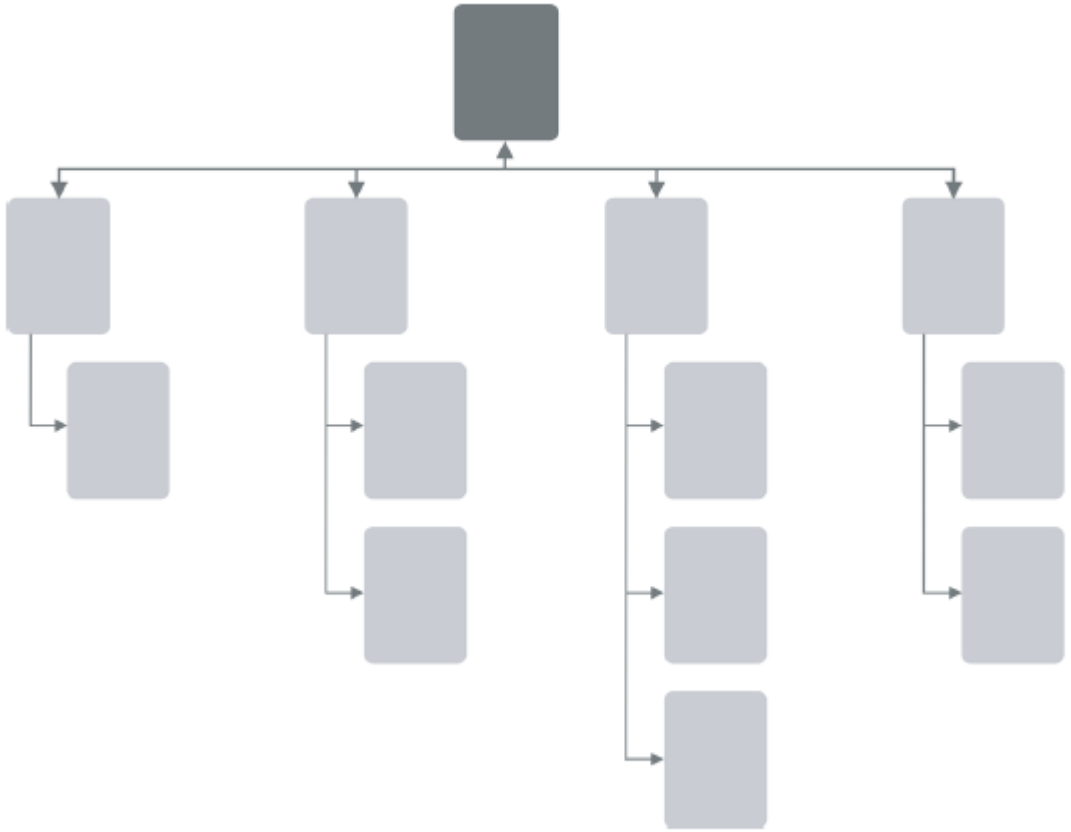

Figure 3-3. *Multilevel navigation*

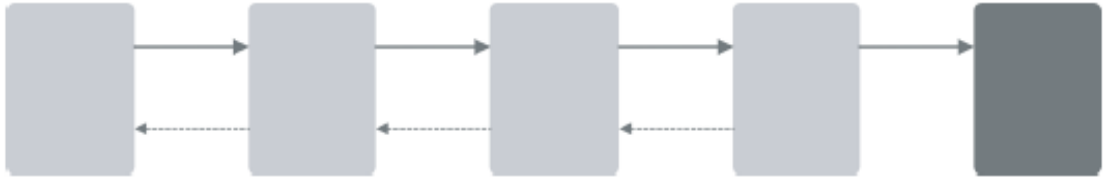

Figure 3-4. *Step-by-step flows*

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Navigational models

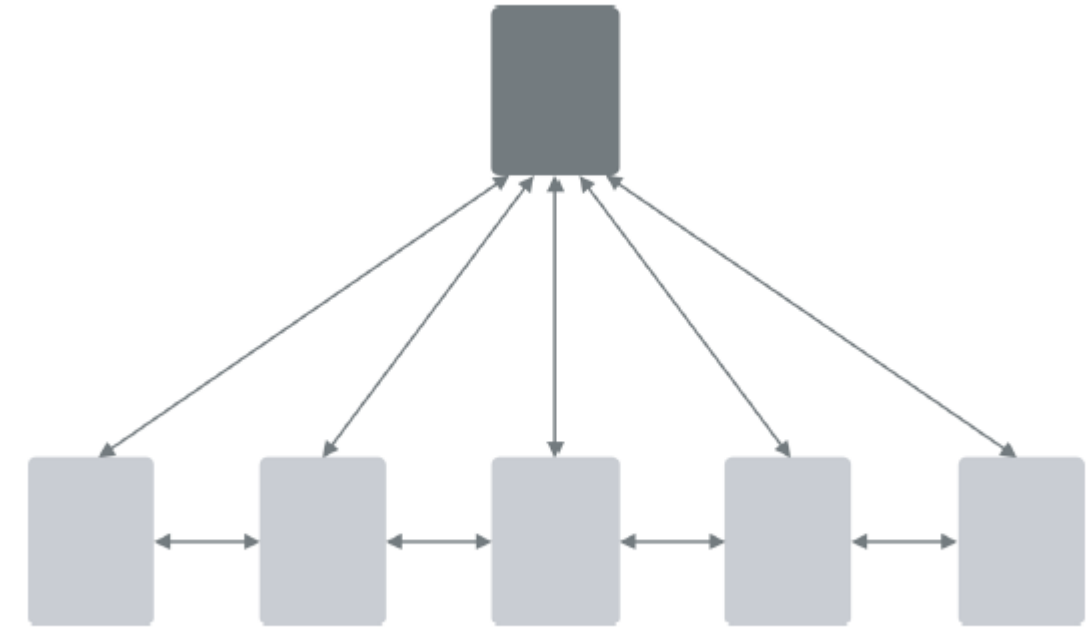

Figure 3-5. *Pyramid*

Flat Navigation

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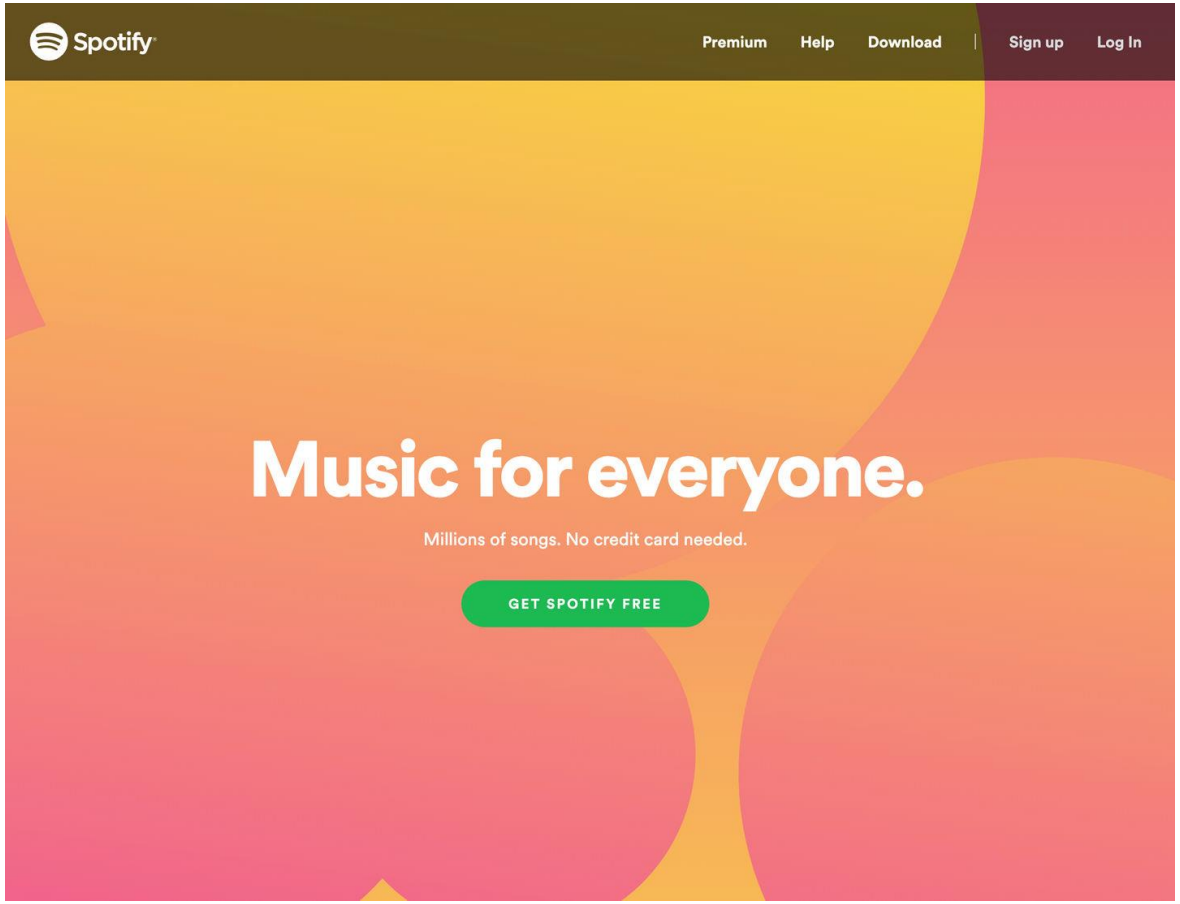
Patterns

Clear Entry Points

- Present only a few main entry points into the interface so that the user knows where to start.
- site or application that has a lot of first-time or infrequent users



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Patterns

Pyramid

Link together a sequence of pages with Back/Next links.

slideshow, a wizard, chapters in a book, or a set of products

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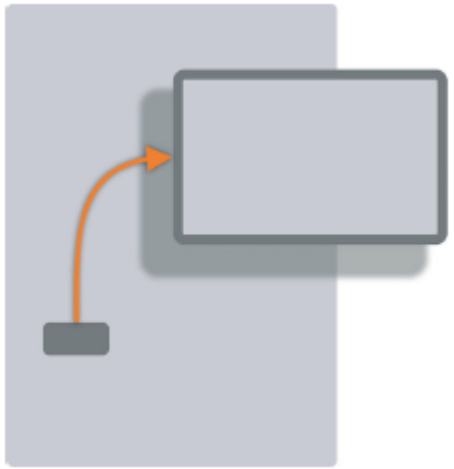
Patterns

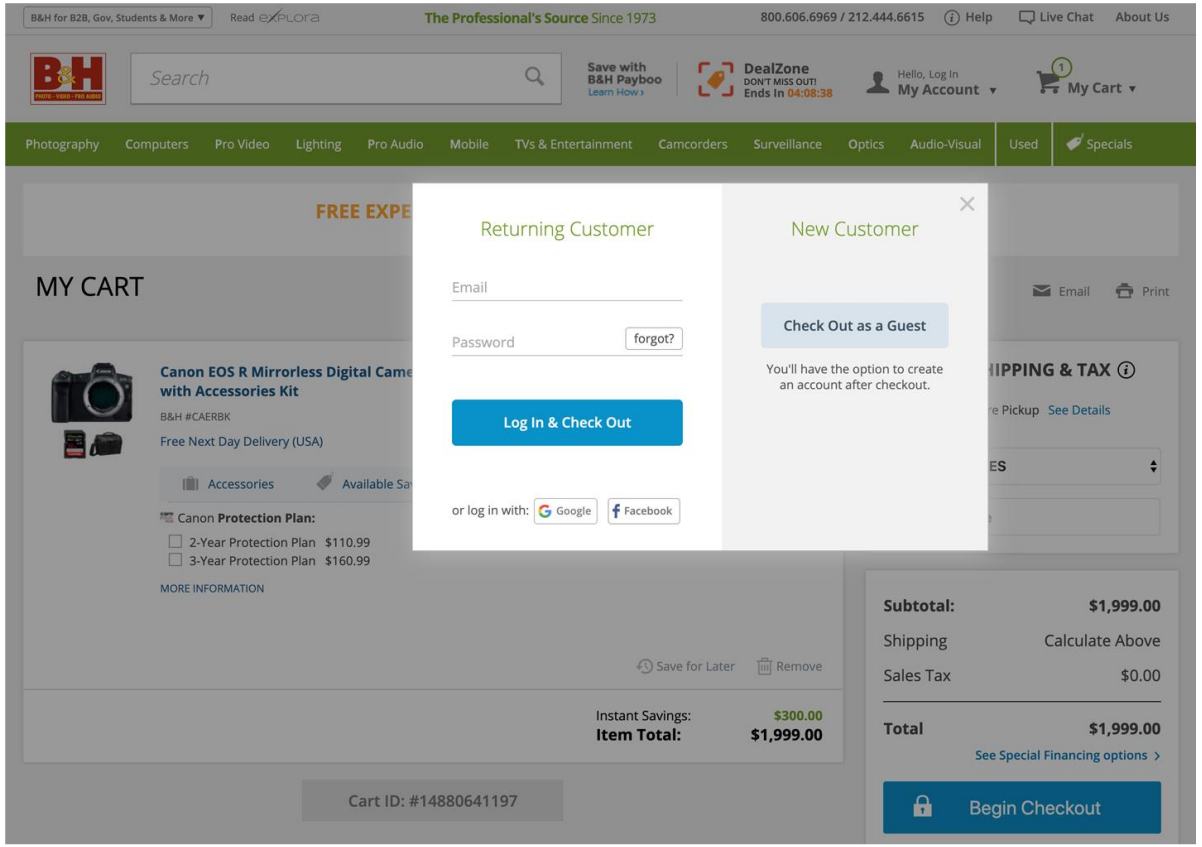
Modal Panel

cuts off all other navigation options from the user

focusing on a single action or process

not losing context while carrying out a quick subtask





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Patterns

Deep links

Deep Links gives the user a way to jump directly to a desired point and application state, thus saving time and work

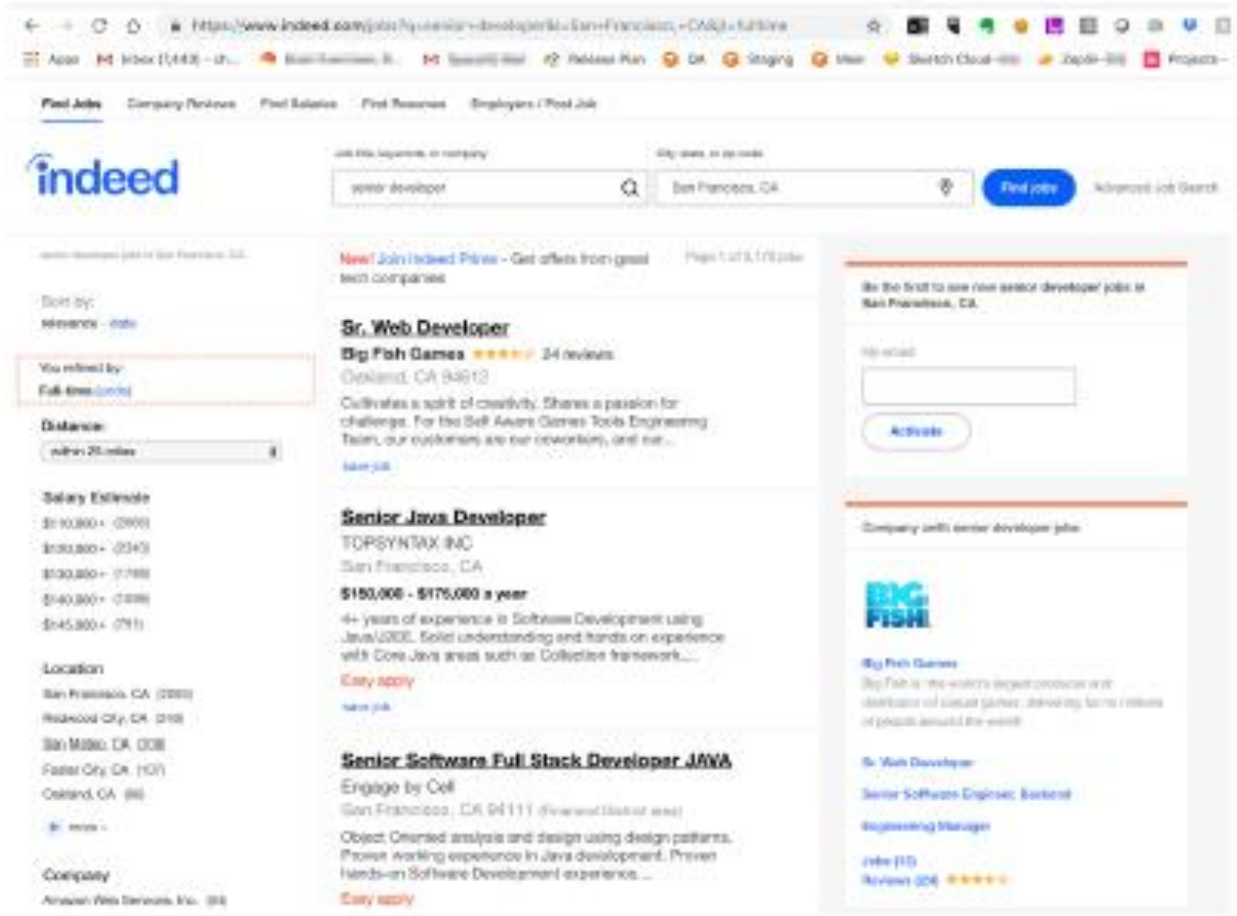

Figure 3-31. *Indeed job search; parameters are written in the URL so that this search can be shared or saved*

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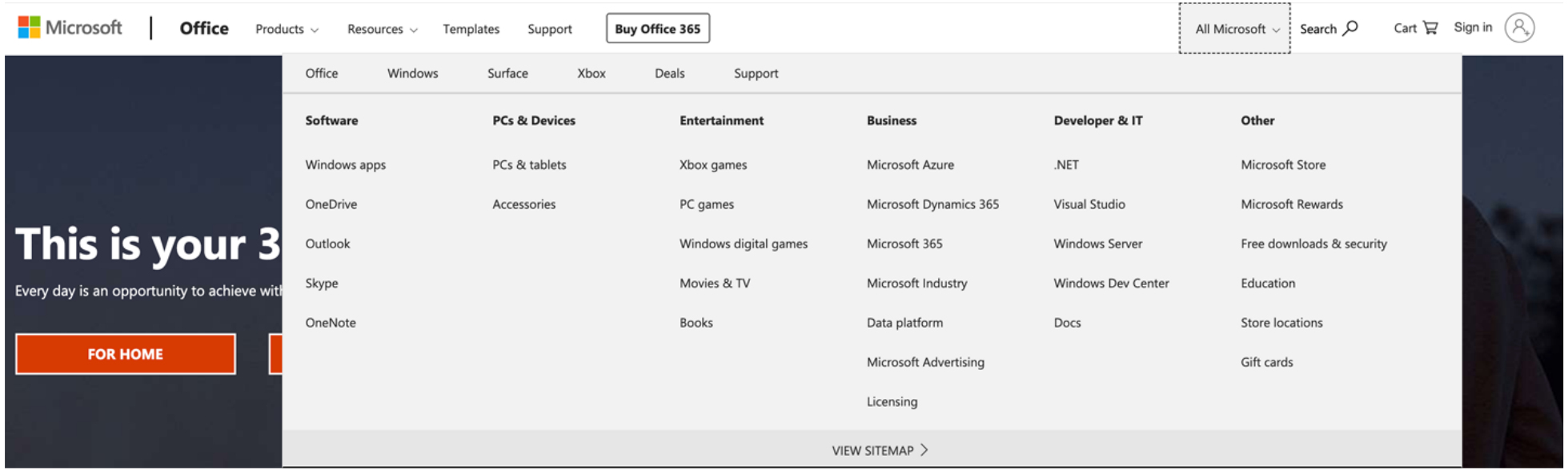
Patterns

Fat Manues

show all of the subpages in site sections

- The site or app has many pages in many categories, possibly in a hierarchy with three
- or more levels. You want to expose most of these pages to people casually exploring
- the site, so they can see what's available.



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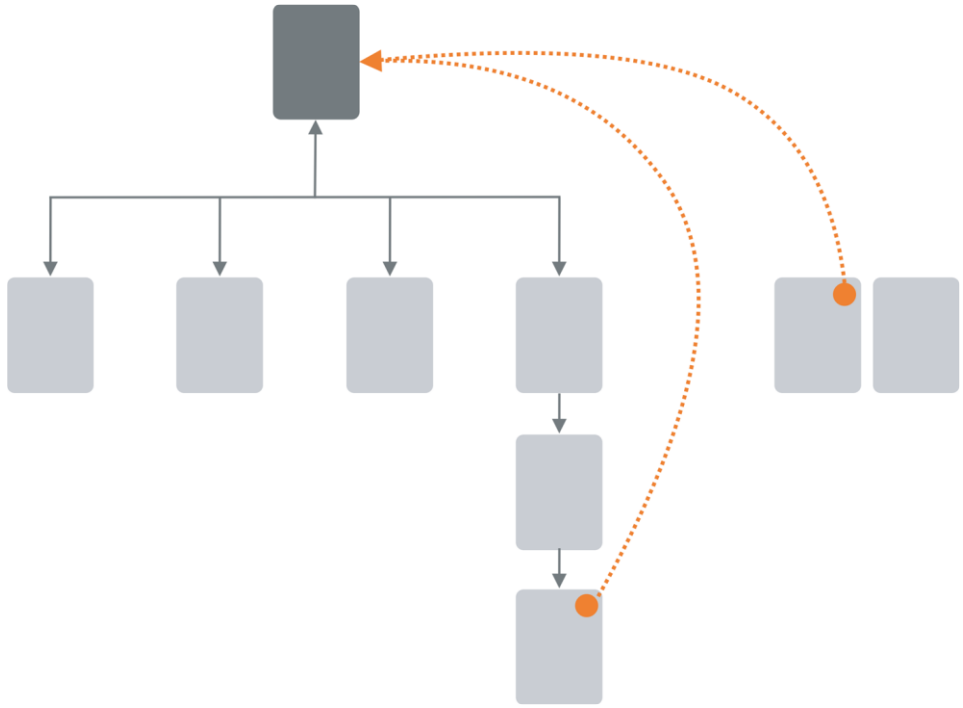
Patterns

Escape Hatch

You have pages that constitute some sort of serial process, such as a wizard, or any

pages that lock the user into a limited navigation situation, such as a Modal Panel.

Limited navigation is one thing, but having no way out is quite another



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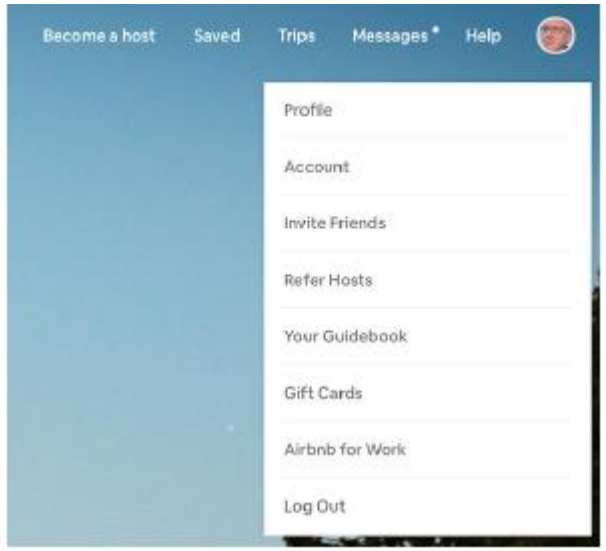
Patterns

Sign-in tools

Place utility navigation related to a signed-in user's site experience in the upper-right corner. This pattern is purely convention

Cluster together tools such as the following:

- Sign-out button or link (this is important, so make sure it's here)
- Account settings
- Profile settings
- Site help
- Customer service
- Shopping cart
- Personal messages or other notifications
- A link to personal collections of items (e.g., image sets, favorites, or wish lists)
- Home



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Patterns

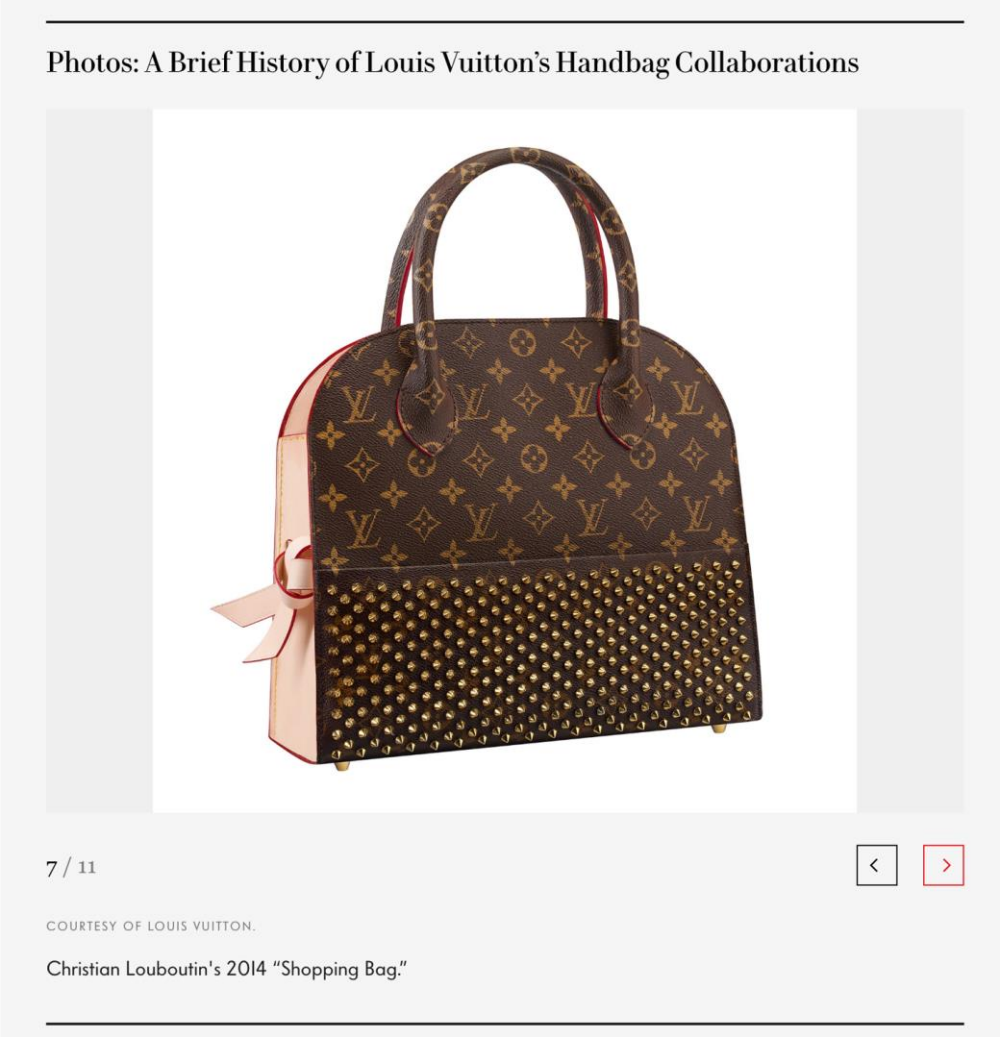
Progress Indicator

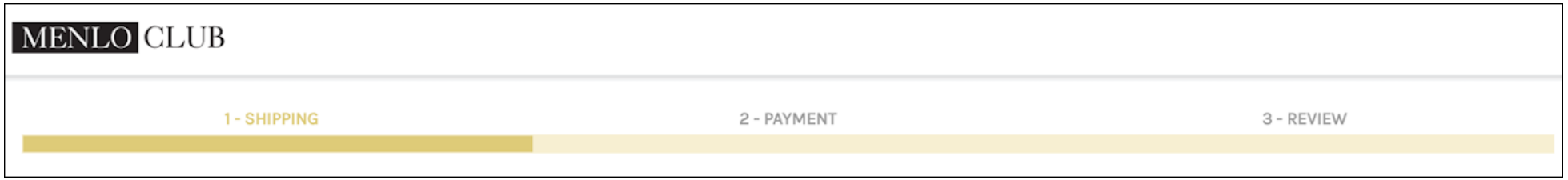
On each page in a sequence, show a map of all the pages in order to show steps in a

process, including a “You are here” indicator

If the navigation topology is large and hierarchical (as opposed to linear) you might

want to consider using Breadcrumbs instead





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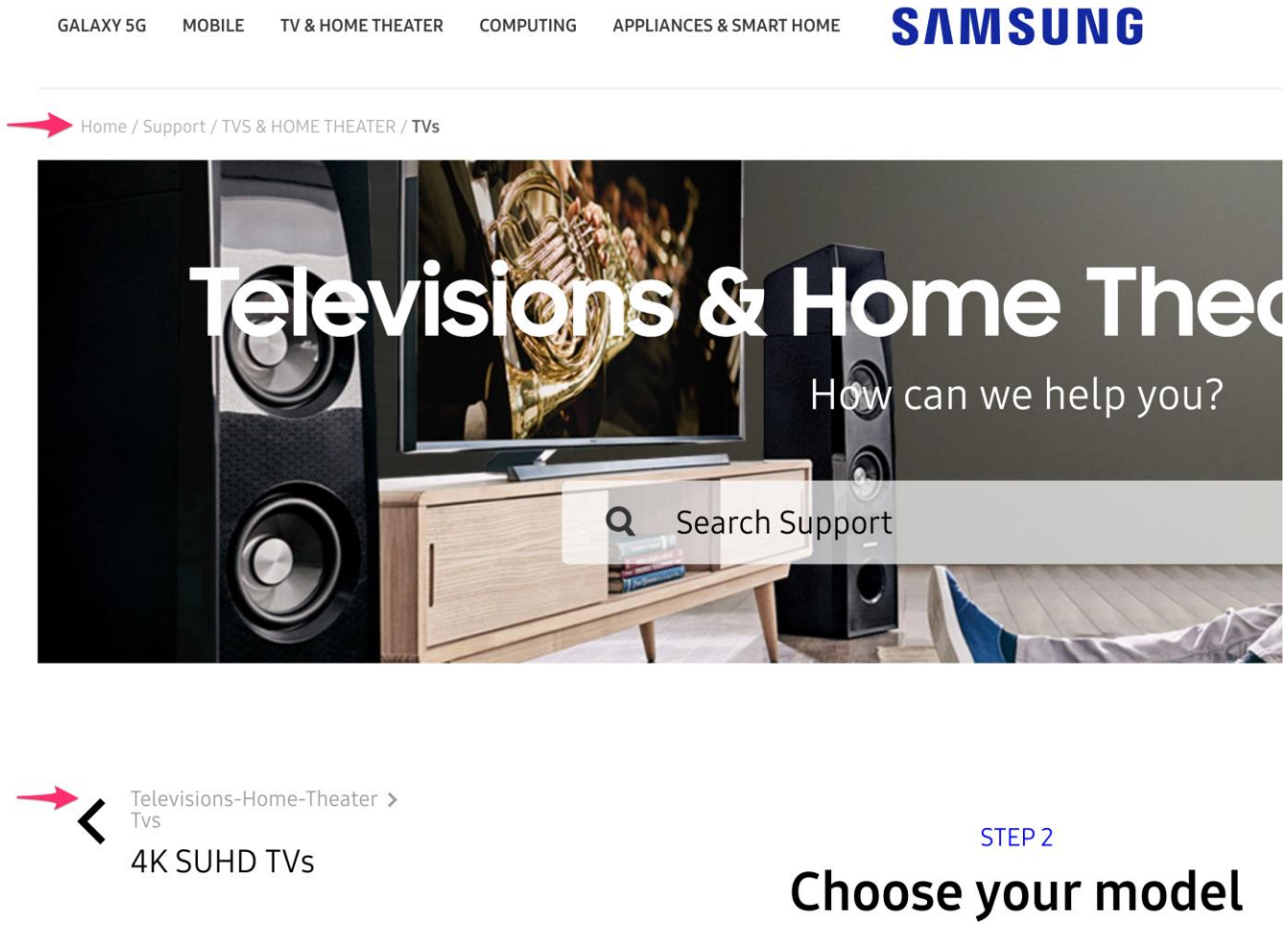
Patterns

Breadcrumbs

shows the path from the starting screen

Your application or site has a hierarchical structure with two or more levels.



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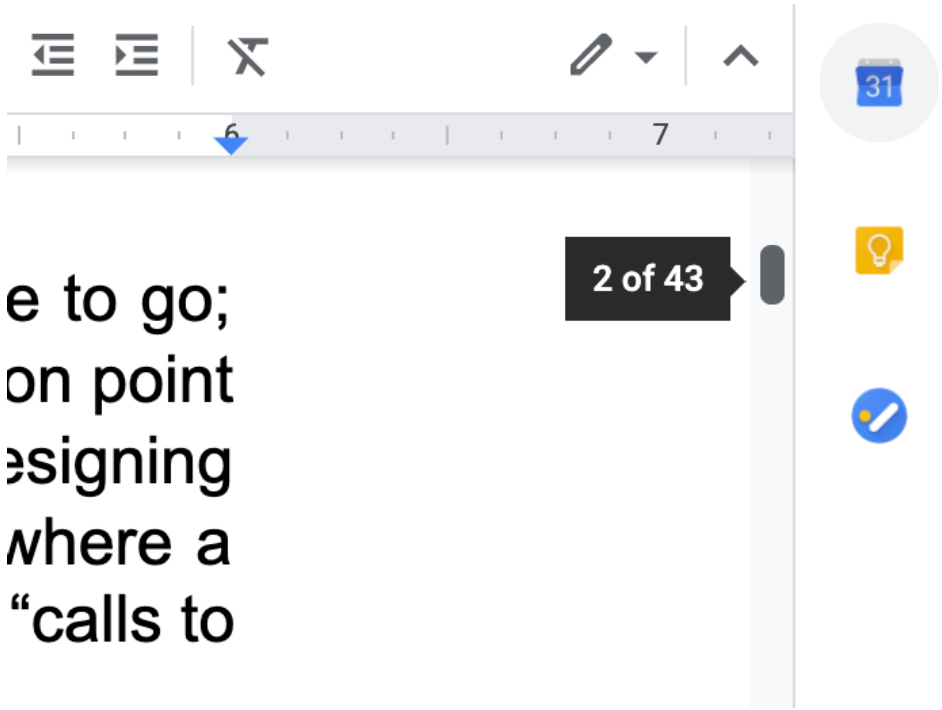
Patterns

Annotated Scroll Bar

document- or data-centric application



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Actions and Commands

Actions and Commands

- methods for initiating action or activating commands
- how to make it clear that an item can be acted on with affordances
- common ways actions are available to the user:
  - Tap, Swipe, and Pinch
  - Rotate and Shake
  - Buttons
  - Menu Bars
  - Pop-Up/Context Menus
  - Toolbars
  - Links
  - Keyboard Actions
  - Drag-and-Drop

Affordance

how to indicate that UI component “affords” performing that action

affordances for actions could include the following:

- Icons, objects, or shapes that are different from the rest of the interface
- Text that is styled differently from regular reading copy
- Something that reacts when the mouse pointer rolls over it
- Something that reacts when tapped or swiped
- A highlighted or high-contrast visual design treatment
- Some object that looks manipulable: drop shadows, ridges or texture, highlights
- An object or component that just looks different, or is separated with whitespace, from everything else on the screen

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Forms and Controls

The Basics of Form Design

- Respect the user's time and attention
- Make sure the user understands the purpose of the form
- Minimize the number of form inputs
- Minimize visual clutter
- Group and title the form elements into sections where possible
- Consider dynamic, show/hide sections for long, complicated forms
- Use alignment for clear vertical flow
- Indicate what are required and what are optional fields
- Labels, instructions, examples, and help

  Use descriptive form labels, input examples, and help text with individual form fields. Labels are still a best practice for ensuring accessibility by differently abled people. Avoid lots of placeholder text in fields because it can confuse users into thinking they filled them out already. Use vocabulary that is appropriate for the audience and task domain. Don't be afraid to put instructions into your form if necessary (and you always have the option of putting instructions in a user triggered pop-up or modal window).

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The Basics of Form Design

- Use the width of the input fields to preview the length of the input
- Accept variations in input formatting
- Error prevention and validation as quickly as possible
- Consider top-aligned labels for mobile and web-responsive designs
- Consider internationalization
- Message success
- Test usability
  - For some reason, when input forms are involved, it's particularly easy for designers and users to make radically different assumptions about terminology, possible answers, intrusiveness, and other context-of-use issues. Do some usability testing, even if you're reasonably sure your design is good.

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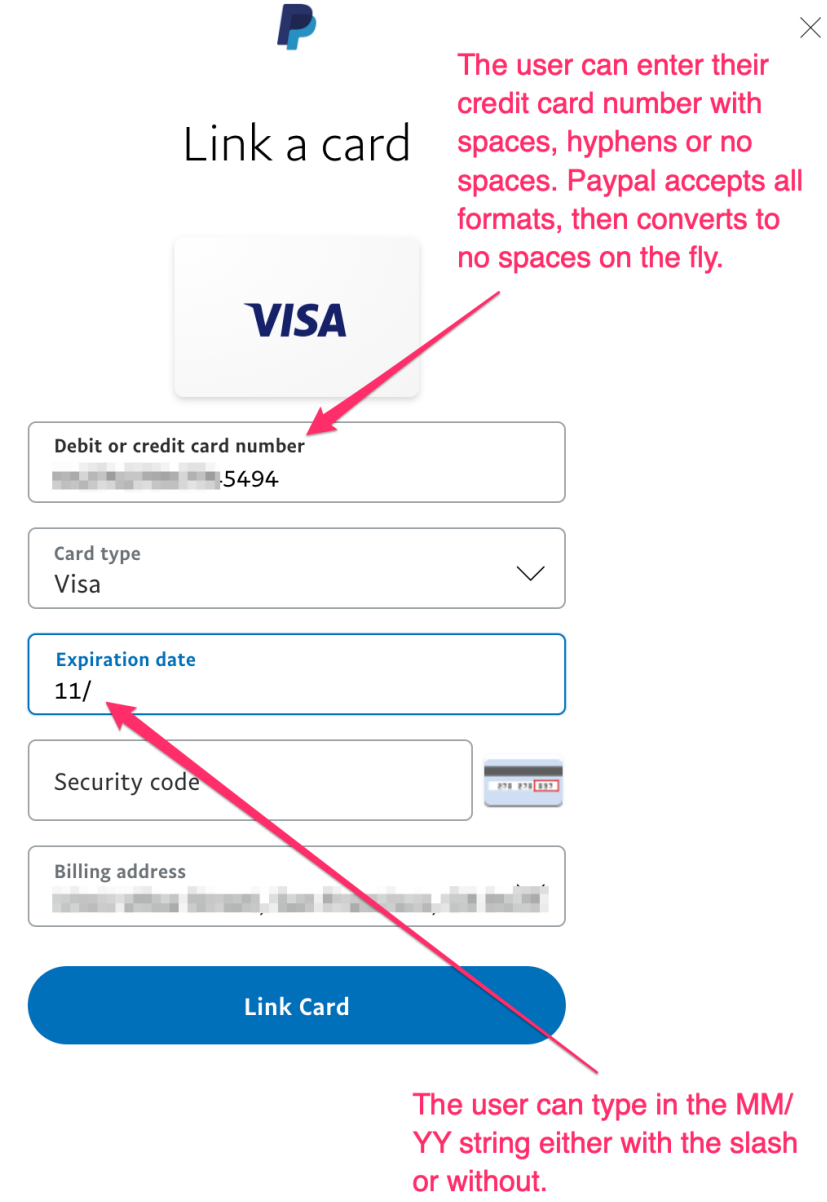
Paterns

Forgiving Format

Permit users to enter inputs in a variety of choices, formats, and syntax, and make the application interpret it intelligently



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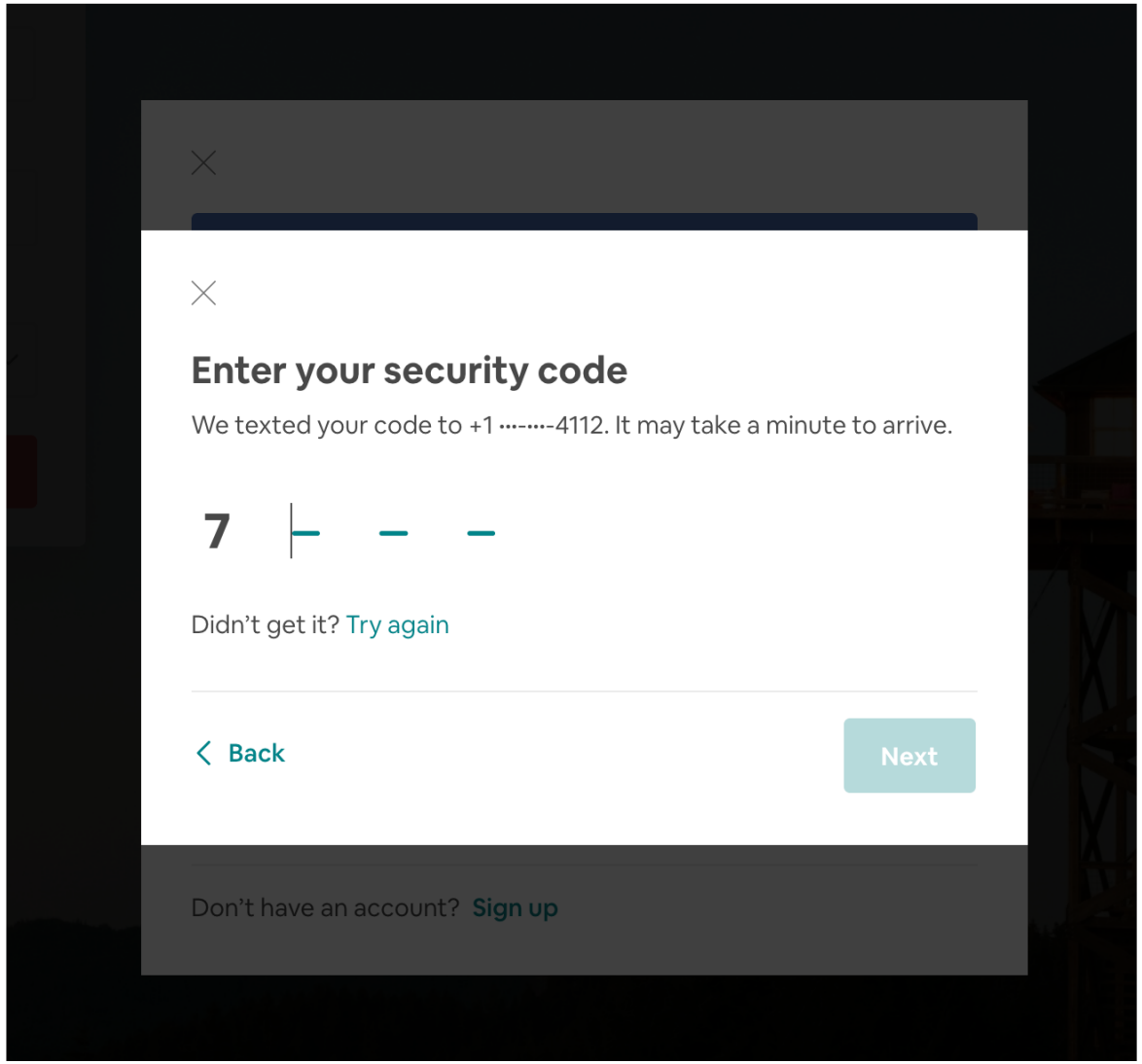
Paterns

Structured Format



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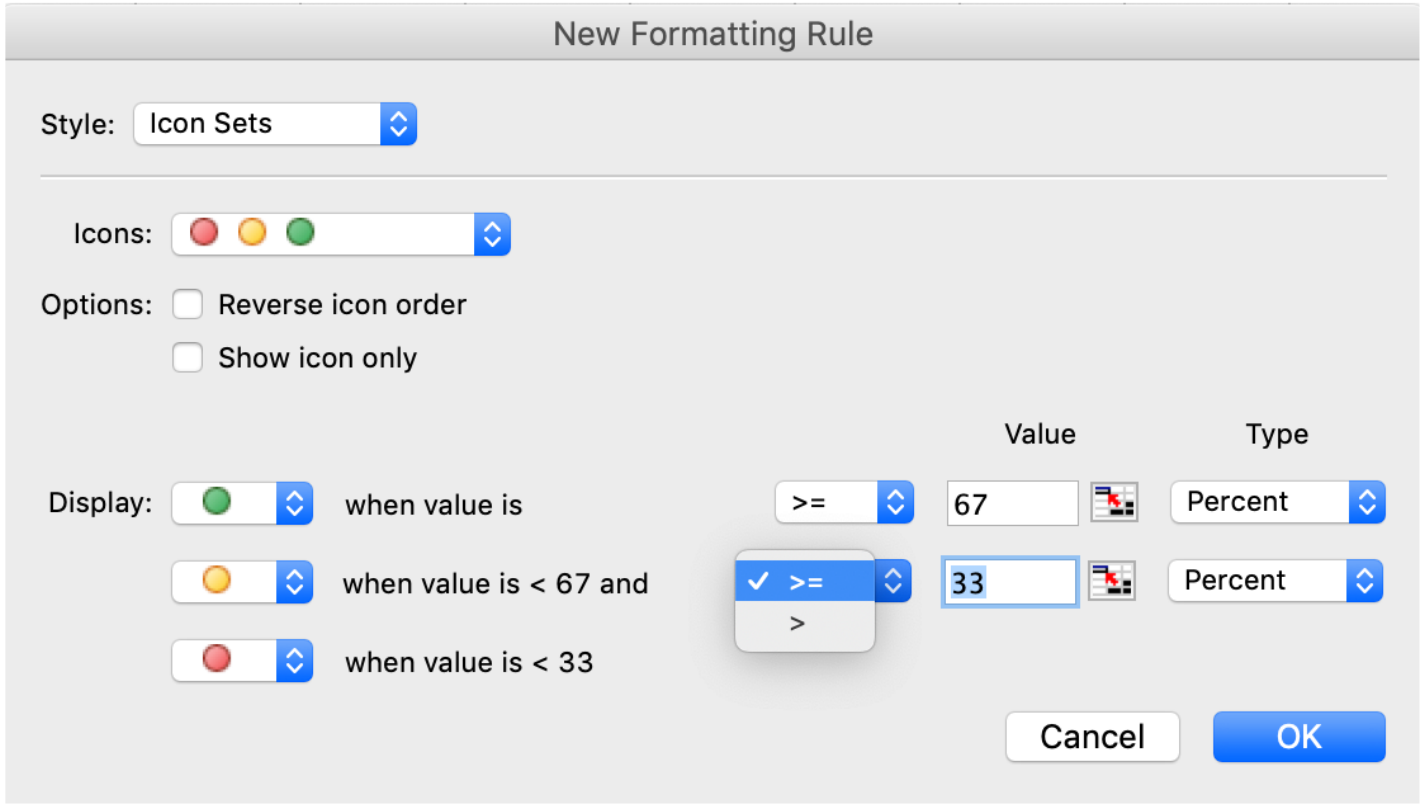
Paterns

Fill-in-the-Blanks

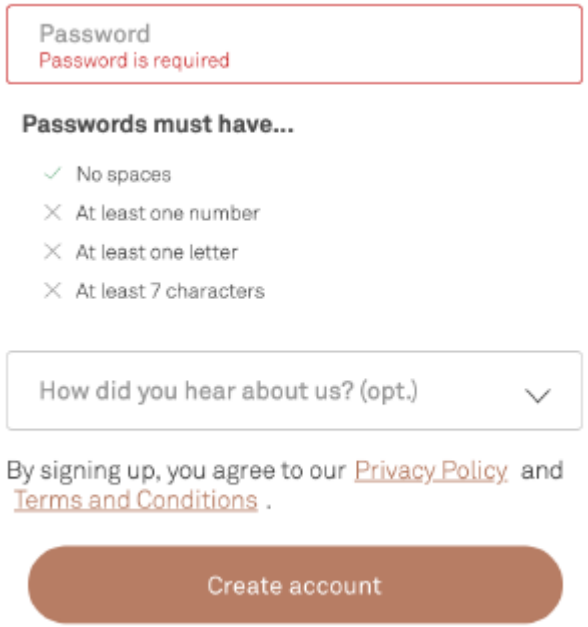
make the interface self-explanatory



Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Paterns

Input Hints

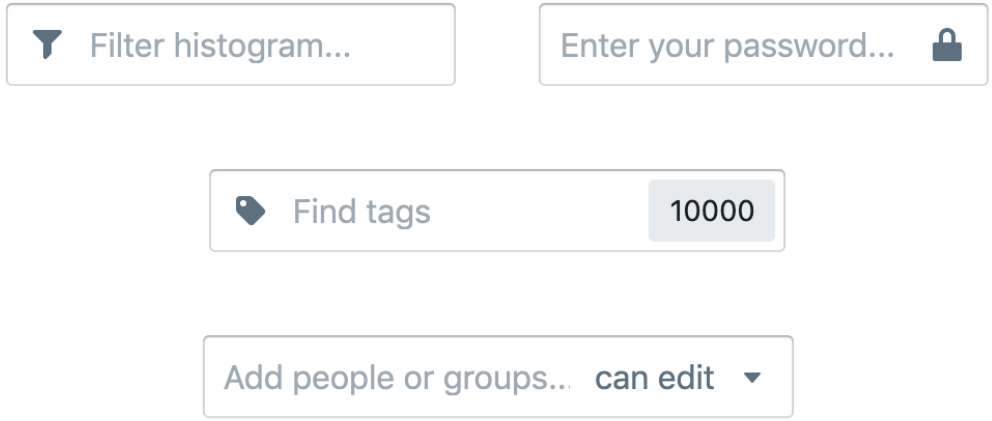


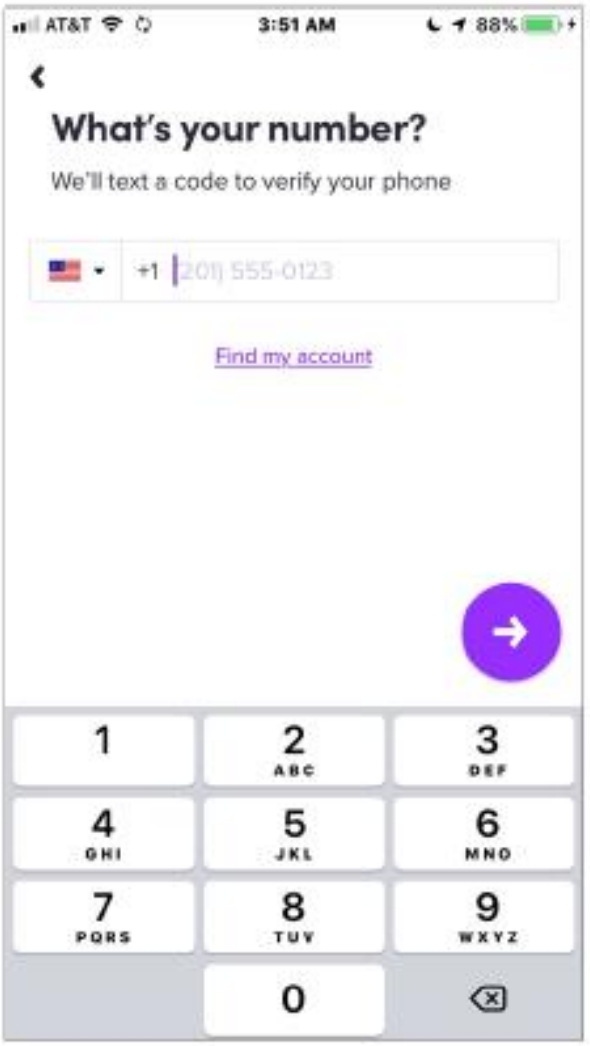
Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Paterns

Input Prompt

Prefill a text field with an example input or instructional text that helps the user with what to do or type.



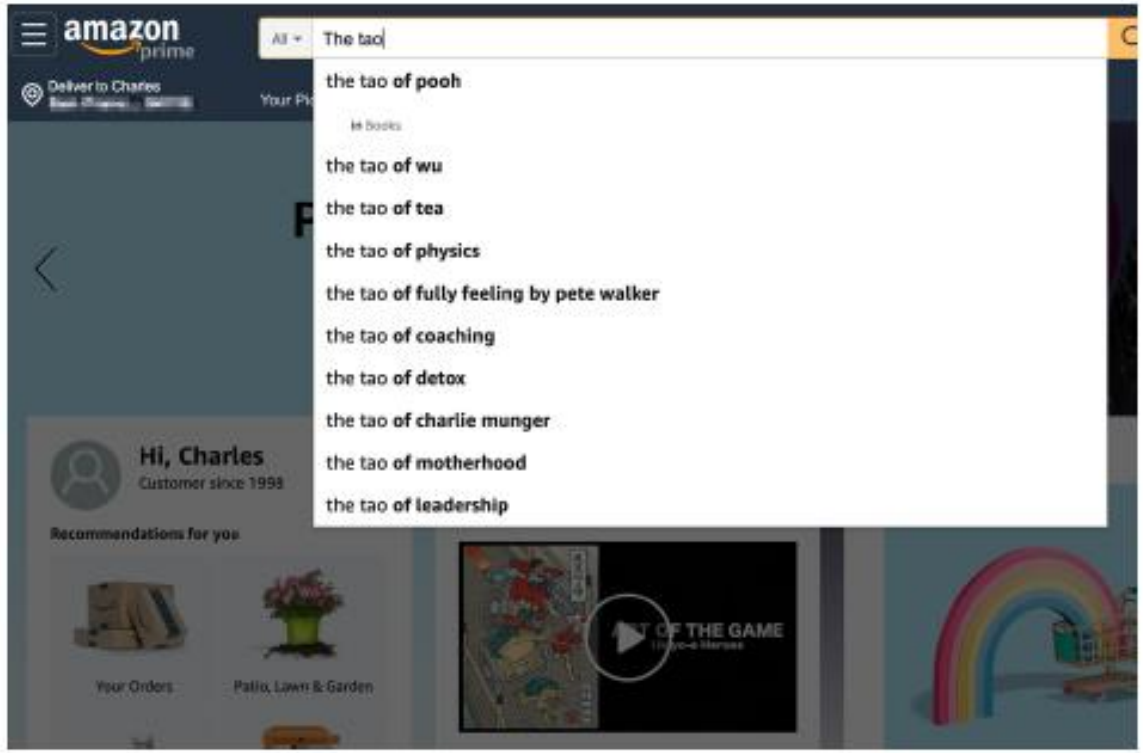


Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Paterns

Autocompletion

offer the most likely match based on the available string of characters

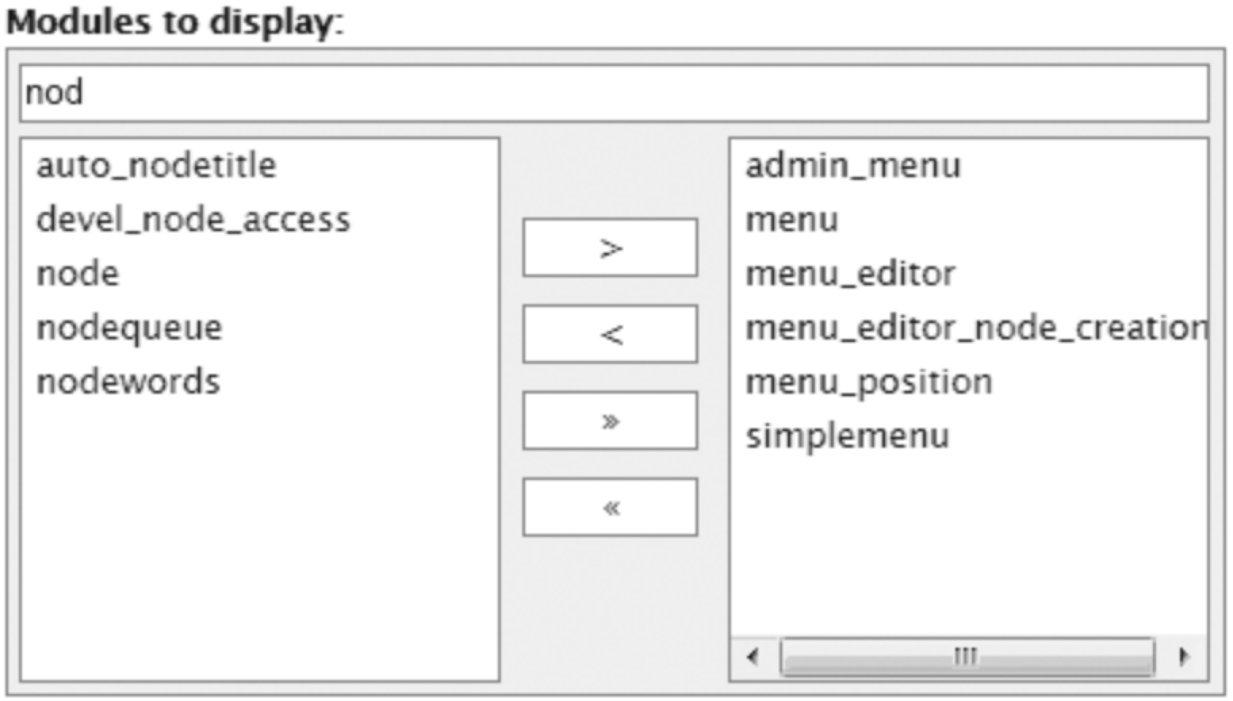


Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Paterns

List builder

creating a complicated selection set from a larger source set of objects



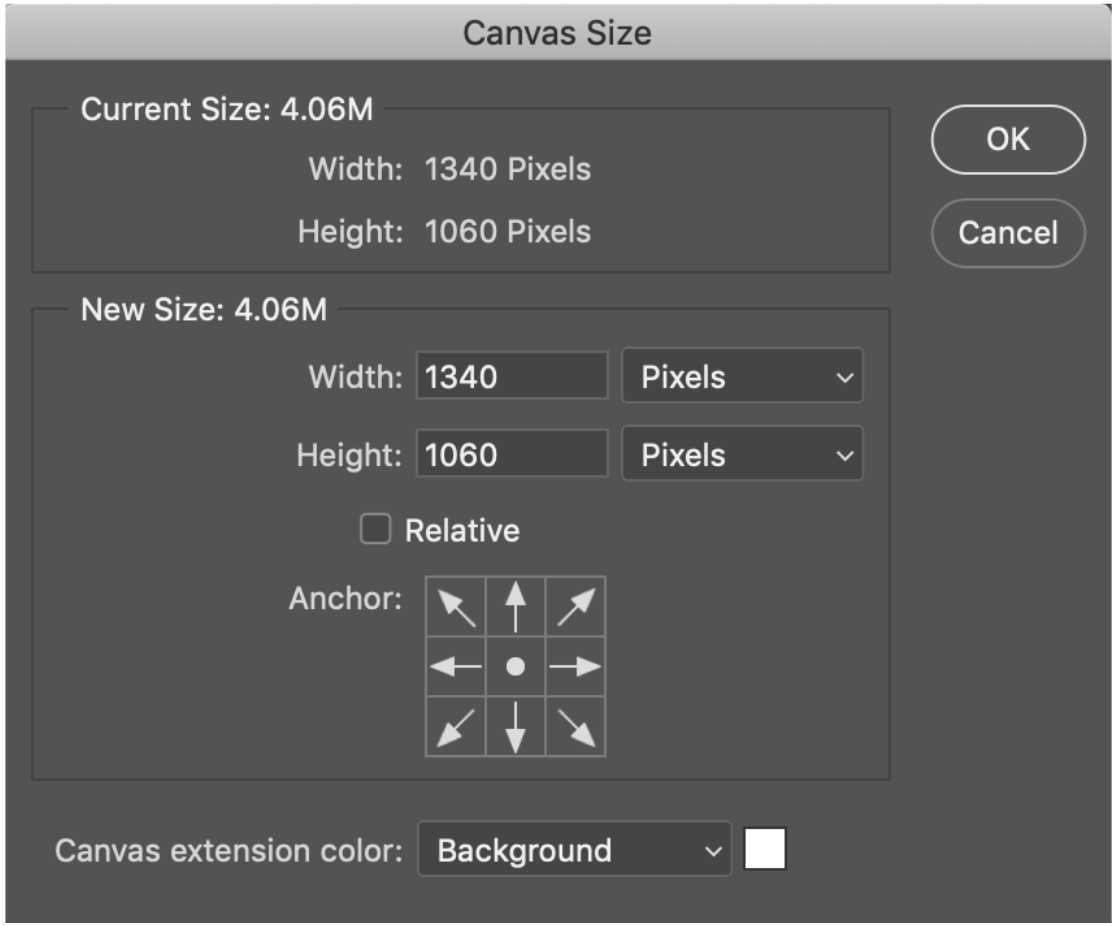
Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Paterns

Good Defaults and Smart Prefills

Good defaults draw from:

- previously entered data from the session,
- information from the user's account,
- current location,
- current data and time, and
- other values that the designer can identify as having a high probability of making it easier and quicker for the user to complete a form.



Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Paterns

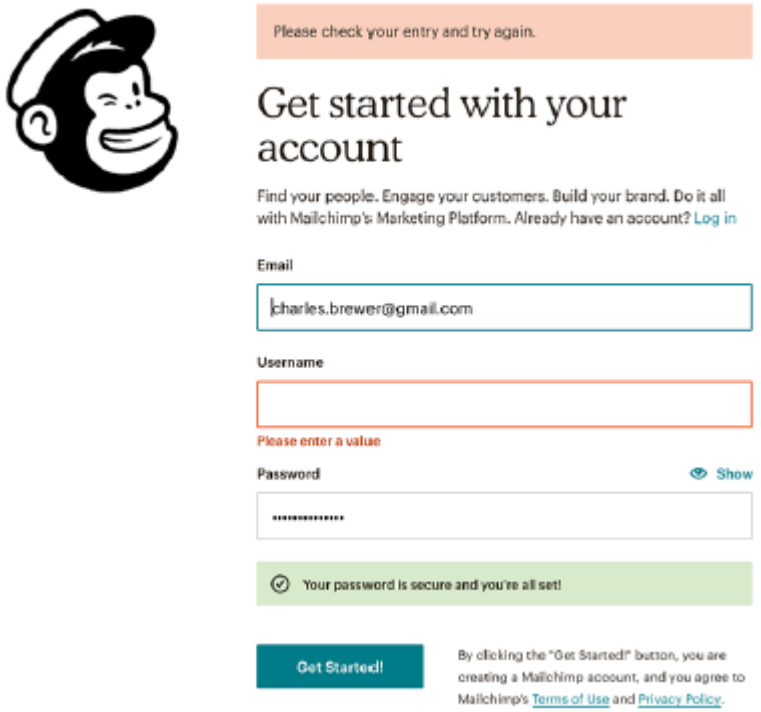
Error Messages

You want to encourage user to try again.

The universal standard is to mark the form fields that caused the errors. You should display element-specific messages next to each affected control

Error-message writing:

- Make them short, but detailed enough to explain both which field it is and what went wrong: “You haven’t given us your address” versus “Not enough information.”
- Use ordinary language, not computerese: “Is that a letter in your zip code?” versus “Numeric validation error.”
- Be polite: “Sorry, but something went wrong! Please click ‘Go’ again” versus “JavaScript Error 693” or “This form contains no data.”



Jenifer Tidwell, Charles Brewer, and Aynne Valencia, **Designing Interfaces, 2020**

Another source

http://ui-patterns.com/patterns

User Interface Design Patterns

Getting input

Forms
WYSIWYG
Password Strength Meter
Calendar Picker
Structured Format
Input Feedback
Fill in the Blanks
Forgiving Format
Morphing Controls
Keyboard Shortcuts
Captcha
Autosave
Rule Builder
Inplace Editor
Drag and drop
Settings
Expandable Input
Preview
Undo
Good Defaults
Input Prompt

Explaining the process
Wizard
Steps Left
Completeness meter
Inline Help Box

Community driven
Vote To Promote
Flagging & Reporting
Pay To Promote
Rate Content
Wiki

Navigation

Tabs
Navigation Tabs
Module Tabs

Jumping in hierarchy
Notifications
Breadcrumbs
Shortcut Dropdown
Modal
Home Link
Fat Footer

Menus
Vertical Dropdown Menu
Accordion Menu
Horizontal Dropdown Menu

Content
Carousel
Cards
Event Calendar
Adaptable View
Progressive Disclosure
Categorization
Article List
Pagination
Continuous Scrolling
Tagging
Archive
Favorites
Tag Cloud
Thumbnail

Gestures
Pull to refresh

Dealing with data

Tables
Table Filter
Alternating Row Colors
Sort By Column

Formatting data
Dashboard
Frequently Asked Questions (FAQ)
Copy Box

Images
Slideshow
Gallery
Image Zoom

Search
Autocomplete
Search Filters

Onboarding

Guidance
Blank Slate
Walkthrough
Coachmarks
Playthrough

Social

Reputation
Collectible Achievements
Leaderboard
Testimonials

Social interactions
Activity Stream
Auto-sharing Mini
Friend list Mini
Friend
Chat
Reaction
Invite friends
Follow

Miscellaneous

Shopping
Product page
Pricing table
Coupon
Shopping Cart

Increasing frequency
Tip A Friend

Persuasive Design Patterns

Cognition

Loss Aversion
Loss Aversion
Status-Quo Bias
Optimism Bias Mini
Endowment Effect
Framing Mini
Negativity bias

Other cognitive biases
Illusion of control
Need for closure
Peak-end rule
Curiosity Mini
Set Completion Mini
Value attribution Mini

Scarcity
Scarcity
Limited duration
Limited choice Mini

Game mechanics

Gameplay design
Appropriate challenge
Levels Mini
Self-Monitoring Mini
Storytelling Mini
Intentional gaps Mini
Periodic Events Mini

Fundamentals of rewards
Fixed rewards
Variable rewards

Gameplay rewards
Completion
Prolonged play
Powers
Praise
Unlock features
Delighters Mini
Achievements Mini

Perception and memory

Attention
Reduction
Tunnelling
Isolation Effect

Comprehension
Chunking
Recognition over recall
Sequencing Mini
Pattern recognition Mini
Conceptual metaphor Mini
Anchoring
Serial Positioning Effect

Feedback

Timing
Kairos
Feedback loops Mini
Tailoring Mini
Trigger Mini
Simulation Mini

Social

Social biases
Authority
Liking
Commitment & consistency
Role playing Mini
Self-Expression Mini
Social proof
Reciprocation
Revenge Mini
Status Mini
Positive mimicry Mini
Nostalgia Effect Mini
Reputation Mini
Competition Mini

Encouraging engagement

User engagement

Marketers can understand user engagement as the junction between getting a person's attention and inspiring them to take action. The more engaged a user is, the more likely they are to return to the site and then to become ambassadors for brand.

User engagement can be measured by a variety or combination of activities such as downloads, clicks, shares, and more.(https://www.codefuel.com/blog/what-is-user-engagement/)

https://www.business2community.com/strategy/difference-user-engagement-user-experience-01552193

https://mixpanel.com/topics/what-is-user-engagement/

Encouraging engagement

- Help users achieve their goals.
- Create content and user interfaces that fit the device and the platform.
- Create content and ads that are relevant and personalized.
- Find out your product's strengths and weaknesses, then improve on your strengths and fix what needs fixing.
- Develop content that is visually rich and interactive. Two additional patterns:
  - Microinteractions
  - Call-to-action

Microinteractions

Microinteractions

Micro-interactions are events which have one main task — a single purpose.
Their purpose is to delight the user, to create a moment that is engaging, welcoming.

Functions:

- Communicating status and providing feedback
- Enhancing the sense of direct manipulation
- Helping people to see the results of their actions

https://uxdesign.cc/micro-interactions-why-when-and-how-to-use-them-to-boost-the-ux-17094b3baaa0

Dan Saffer, Microinteractions, 2013

Structure of Microinteractions

- **Triggers** initiate a microinteraction. Triggers can be user-initiated or system initiated.
  - In a user-initiated trigger, the user has to initiate an action.
  - In a system-initiated trigger, software detects certain qualifications are being met and initiates an action.
- **Rules** determine what happens once a microinteraction is triggered.
- **Feedback** lets people know what's happening. Anything a user sees, hears, or feels while a microinteraction is happening is feedback.
- **Loops and Modes** determine the meta-rules of the microinteraction.

Microinteractios Examples

Microinteractions encompass a substantial number of digital elements, but not every element is part of a microinteraction. Static elements that are always present on the screen are not microinteractions because they do not have a distinct trigger

Digital element	Is it a microinteraction?	Reason
Scrollbar	Yes	User triggered; visual feedback to user changing location within a page
Digital alarm	Yes	System triggered; auditory (and visual) feedback to time condition being met
Button	It depends	If there is no feedback when a user clicks the button, there is no microinteraction
Pull-to-refresh animation	Yes	User triggered; visual feedback to a user action
GIFs	No	Not triggered by the system or a user
Swipe animation	Yes	User triggered; visual feedback that a user has swiped an element
Email notification	Yes	System triggered; provides user with feedback that a new message has arrived
Video player	No	Feature, not a microinteraction; volume control within the video player would be a microinteraction

https://www.nngroup.com/articles/microinteractions/

Creating Microinteractios in Figma

https://thegymnasium.com/courses/take5/animating-microinteractions-with-figma

Call to action

Calls to action

Call to action is a set of marketing tactics consistently implemented in the interface design.

The button itself does not encourage anyone, no matter how well optimized it is. Designers with no knowledge of fundamental CTA creation principles expend plenty of effort polishing buttons and worrying whether they should be rounded and at what degree.

Users don’t access webpages for the buttons. They are attracted by the offer, as long as it is presented well: easy to understand, appropriate, good-looking, emotional, and logical.

https://medium.com/outcrowd/call-to-action-the-foundations-of-efficiency-f8218fa8e344

What affects CTA efficiency?

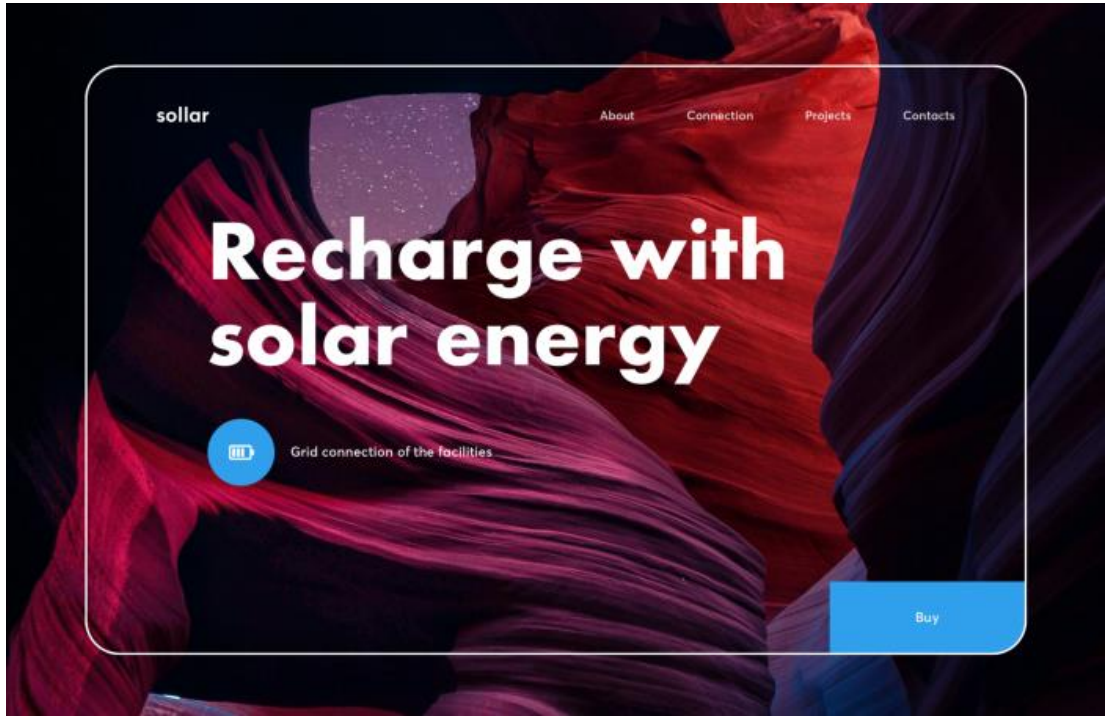
Good UX

The user's way from the entry point should be as simple, intuitive, and logical as possible. When it's immediately clear what is being offered and what needs to be done, it's much more likely to encourage a positive response.

- simple and understandable navigation
- no obstacles
- predictability

Good UI

This is about the momentary impression made by glancing at the page. A cluttered page with too much content confuses and frustrates users. Plenty of CTAs on one page is a good way to scare away users. Ideally, there should be one effective CTA per offer.



https://medium.com/outcrowd/call-to-action-the-foundations-of-efficiency-f8218fa8e344

What affects CTA efficiency?

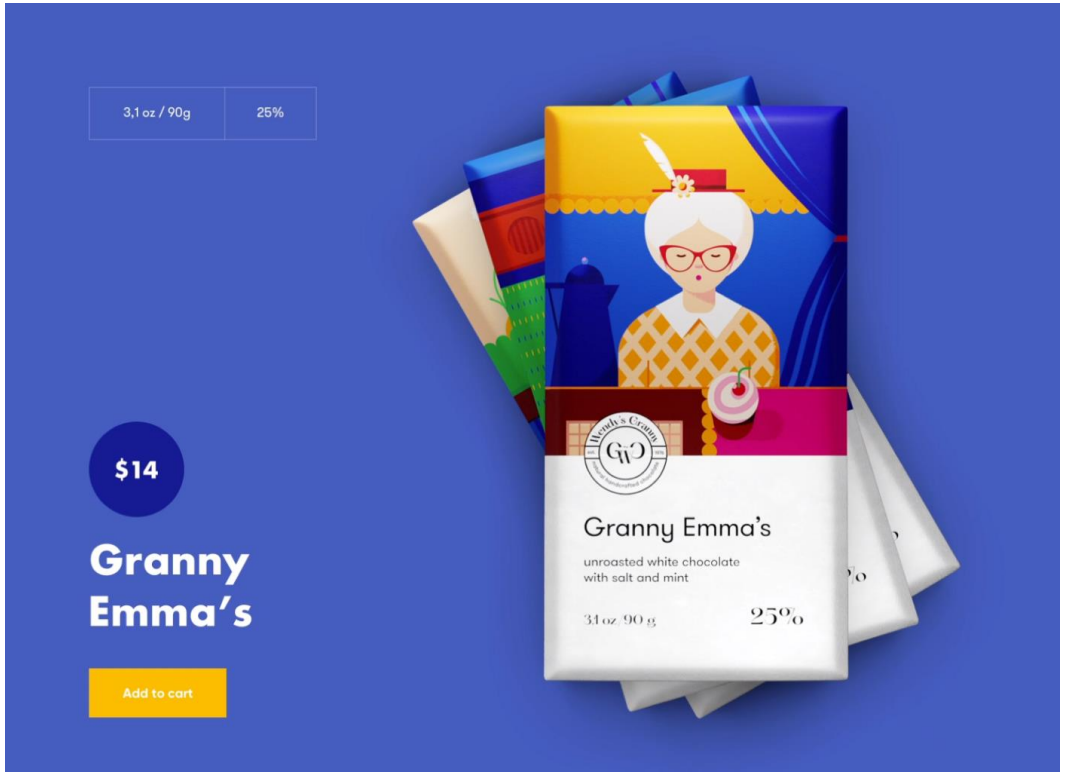
Content and CTA placement
Webpage content must work toward the main goal, showcasing its advantages and guiding the user to the CTA block.

https://medium.com/outcrowd/call-to-action-the-foundations-of-efficiency-f8218fa8e344

What affects CTA efficiency?

Highlighting the goal

The user's goal and top priority is whatever makes him perform the target action. When he subscribes to a course, he's thinking of improving his education. When he clicks the "Buy" button, he's thinking of the product. The picture that reinforces the necessary mental image should be placed near the CTA button.



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What affects CTA efficiency?

Convising text

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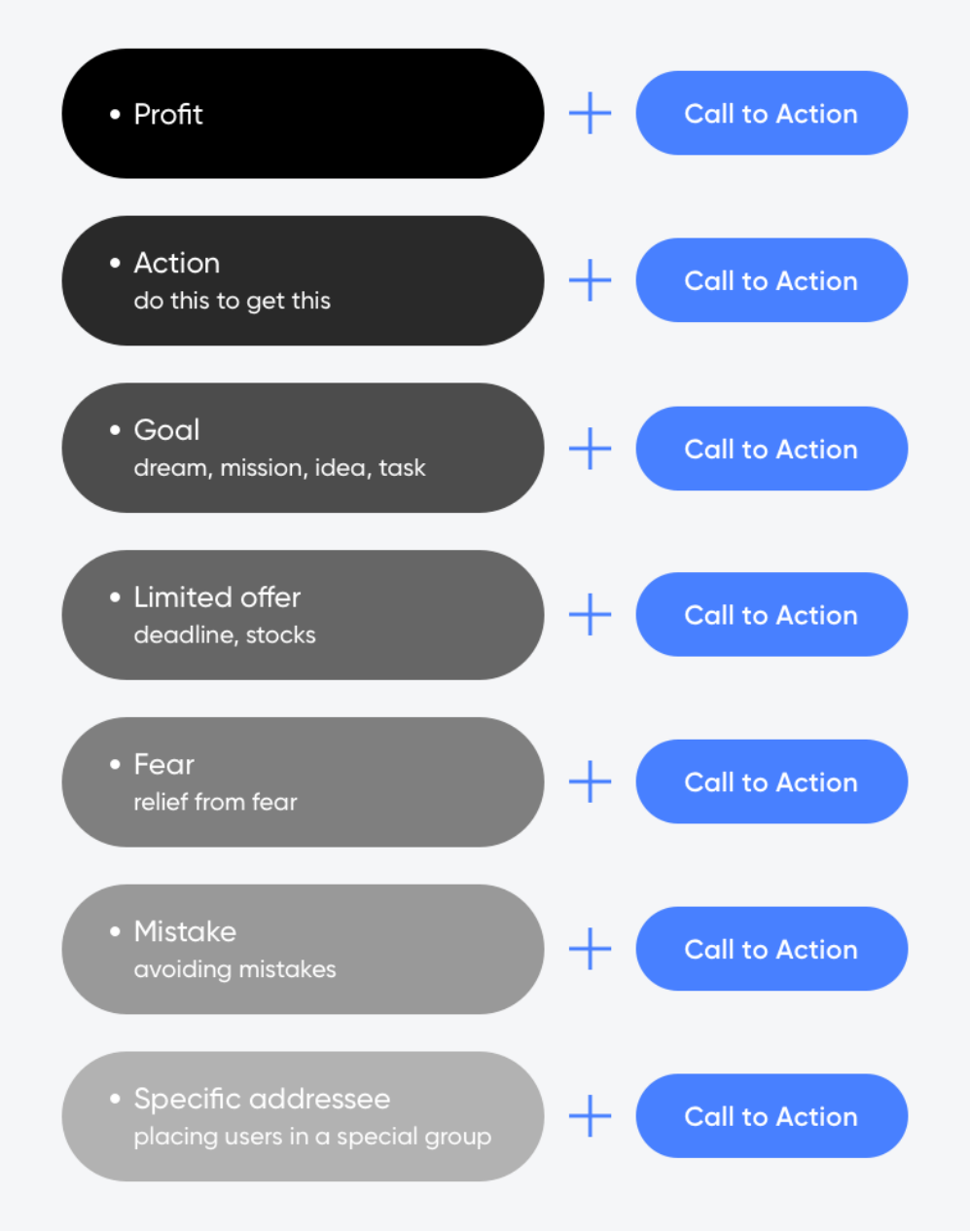

https://medium.com/outcrowd/call-to-action-the-foundations-of-efficiency-f8218fa8e344

Microinteractions and CTA

- Microinteractions essentially nudges the user to interact with an application or website. Call to action instills a feeling of achievement and also empathy factor in user behavior and the best way to make your user interact with CTA is to make it engaging to entice interest of user.

- “Call to Action” micro-interactions may assist in persuading an individual to make an action, such as register, click for more information, or share with others.

Mobile and web design

Sources

- Jenifer Tidwell, Charles Brewer, and Aynne Valencia, ***Designing Interfaces: Patterns for Effective Interaction Design***, 2020
- Alan Cooper at all, ***About Face: The Essentials of Interaction Design***, 2014
  - CH 19: Designing for Mobile and Other Devices
  - CH 20: Designing for the Web