Usability/UX V 2022.1 Pi

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1 Usability and User Experience

***Vorwort**: Dieses Skript stellt eine Zusammenfassung von Inhalten in englischer Sprache dar um deren Bedeutung in der Kommunikation im technischen Umfeld gerecht zu werden CLIL (Content an language integrated learning).*

1.1 What is Usability?

Usability refers to the quality of a **user's experience (UX)** when interacting with products or systems, including websites, software, devices, or applications. Usability is about **effectiveness, efficiency** and the overall **satisfaction** of the user.

Usability is a combination of factors including:

- **Intuitive design**: a nearly effortless understanding of the architecture and navigation of the site
- **Ease of learning**: how fast a user who has never seen the user interface before can accomplish basic tasks
- **Efficiency of use**: How fast an experienced user can accomplish tasks
- **Memorability**: after visiting the site, if a user can remember enough to use it effectively in future visits
- **Error frequency and severity**: how often users make errors while using the system, how serious the errors are, and how users recover from the errors
- **Subjective satisfaction**: If the user likes using the system

1.1.1 Basics of UX-Design

User experience (UX) focuses on having a deep understanding of users, what they need, what they value, their abilities, and also their limitations. It also takes into account the business goals and objectives of the group managing the project.

Figure: Factors that Influence UX

At the core UX is ensuring that users **find value in what you are providing to them**.

Information must be:

- **Useful**: Your content should be original and fulfill a need
- **Usable**: Site must be easy to use
- **Desirable**: Image, identity, brand, and other design elements are used to evoke emotion and appreciation
- **Findable**: Content needs to be navigable and locatable onsite and offsite
- **Accessible**: Content needs to be accessible to people with disabilities
- **Credible**: Users must trust and believe what you tell them

1.2 Areas Related to Building the User Experience

UX is a growing field that is very much still being defined. Creating a successful user-centered design encompasses the principles of **human-computer interaction (HCI)** and goes further to include the following disciplines:

- **Project Management** focuses on planning and organizing a project and its resources.

- **User Research** focuses on understanding user behaviors, needs, and motivations through observation techniques, task analysis, and other feedback methodologies.
- **Usability Evaluation** focuses on how well users can learn and use a product to achieve their goals. It also refers to how satisfied users are with that process.
- **Information Architecture (IA)** focuses on how information is organized, structured, and presented to users.
- **User Interface Design** focuses on anticipating what users might need to do and ensuring that the interface has elements that are easy to access, understand, and use to facilitate those actions.
- **Interaction Design (IxD)** focuses on creating engaging interactive systems with well thought out behaviors.
- **Visual Design** focuses on ensuring an aesthetically pleasing interface that is in line with brand goals.
- **Content Strategy** focuses on writing and curating useful content by planning the creation, delivery and governance behind it.
- **Accessibility** focuses on how a disabled individual accesses or benefits from a site, system or application.
- **Web Analytics** focuses on the collection, reporting, and analysis of website data.

1.2.1 User Research

User research focuses on **understanding user behaviors, needs, and motivations** through observation techniques, task analysis, and other feedback methodologies. The types of user research you can or should perform will depend on the type of site, system or app you are developing, your timeline, and your environment.

- **Card Sorting** - Allows users to group your site's information. This helps ensure that the site structure matches the way users think.
- **First Click Testing** - A testing method focused on navigation, which can be performed on a functioning website, a prototype, or a wireframe.
- **Focus Groups** - Moderated discussion with a group of users, allow you to learn about user attitudes, ideas, and desires.

- **Personas** - The creation of a representative user based on available data and user interviews. Though the personal details of the persona may be fiction, the information used to create the user type is not.
- **Parallel Design** - A design methodology that involves several designers pursuing the same effort simultaneously, but independently, with the intention to combine the best aspects of each for the ultimate solution.
- **Prototyping** - Allows the design team to explore ideas before implementing them by creating a mock-up of the site. A prototype can range from a paper mock-up to interactive html pages.
- **Surveys** - A series of questions asked to multiple users of your website.
- **Usability Testing** - Identifies user frustrations and problems with your site through one-on-one sessions where a "real-life" user performs tasks on your site, help you learn about the people who visit your site.

1.2.2 Information Architecture

Information architecture (IA) focuses on **organizing, structuring, and labeling content in an effective and sustainable** way. The goal is to help users find information and complete tasks. To do this, you need to understand how the pieces fit together to create the larger picture, how items relate to each other within the system.

The main components of IA are:

- **Organization Schemes and Structures**: How you categorize and structure information
- **Labeling Systems**: How you represent information
- **Navigation Systems**: How users browse or move through information
- **Search Systems**: How users look for information

1.2.3 User Interface Design

User Interface (UI) Design focuses on **anticipating what users might need to do** and ensuring that the interface has elements that are easy to access, understand, and use to

facilitate those actions. UI **brings together concepts from interaction design, visual design, and information architecture**.

1.2.3.1 CHOOSING INTERFACE ELEMENTS

Users have **become familiar with interface elements** acting in a certain way, so try to be consistent and predictable in your choices and their layout. Doing so will help with task completion, efficiency, and satisfaction.

Interface elements include but are not limited to:

- **Input Controls**: buttons, text fields, checkboxes, radio buttons, dropdown lists, list boxes, toggles, date field
- **Navigational Components**: breadcrumb, slider, search field, pagination, slider, tags, icons
- **Informational Components**: tooltips, icons, progress bar, notifications, message boxes, modal windows
- **Containers**: accordion

Everything stems from knowing your users, including understanding their goals, skills, preferences, and tendencies. Once you know about your user, make sure to consider the following when **designing your interface**:

- **Keep the interface simple**. The best interfaces are almost invisible to the user. They avoid unnecessary elements and are clear in the language they use on labels and in messaging.
- **Create consistency and use common UI elements**. By using common elements in your UI, users feel more comfortable and are able to get things done more quickly. It is also important to create patterns in language, layout and design throughout the site to help facilitate efficiency. Once a user learns how to do something, they should be able to transfer that skill to other parts of the site.
- **Be purposeful in page layout**. Consider the spatial relationships between items on the page and structure the page based on importance. Careful placement of items can help draw attention to the most important pieces of information and can aid scanning and readability.

- **Strategically use color and texture**. You can direct attention toward or redirect attention away from items using color, light, contrast, and texture to your advantage.
- **Use typography to create hierarchy and clarity**. Carefully consider how you use typeface. Different sizes, fonts, and arrangement of the text to help increase scanability, legibility and readability.
- **Make sure that the system communicates what's happening**. Always inform your users of location, actions, changes in state, or errors. The use of various UI elements to communicate status and, if necessary, next steps can reduce frustration for your user.
- **Think about the defaults**. By carefully thinking about and anticipating the goals people bring to your site, you can create defaults that reduce the burden on the user. This becomes particularly important when it comes to form design where you might have an opportunity to have some fields pre-chosen or filled out.

1.2.4 Visual Design

Visual design focuses on the **aesthetics of a site** and its related materials by strategically implementing images, colors, fonts, and other elements. A successful visual design does not take away from the content on the page or function. Instead, it enhances it by engaging users and helping to build trust and interest in the brand.

1.2.4.1 Basic Elements of Visual Design

The **basic elements** that combine to create visual designs include the following:

- **Lines** connect two points and can be used to help define shapes, make divisions, and create textures. All lines, if they're straight, have a length, width, and direction.
- **Shapes are self-contained areas**. To define the area, the graphic artist uses lines, differences in value, color, and/or texture. Every object is composed of shapes.
- **Color palette** choices and combinations are used to differentiate items, create depth, add emphasis, and/or help organize information. Color theory examines how various choices psychologically impact users.

- **Texture** refers to how a surface feels or is perceived to feel. By repeating an element, a texture will be created and a pattern formed. Depending on how a texture is applied, it may be used strategically to attract or deter attention.
- **Typography** refers to which fonts are chosen, their size, alignment, color, and spacing.

1.2.4.2 Principles for Creating a Visual Design

A successful visual design applies the following principles to elements noted above and effectively brings them together in a way that makes sense. When trying to figure out how to use the basic elements consider:

- **Unity** has to do with all elements on a page visually or conceptually appearing to belong together. Visual design must strike a balance between unity and variety to avoid a dull or overwhelming design.
- **Gestalt**, in visual design, helps users perceive the overall design as opposed to individual elements. If the design elements are arranged properly, the Gestalt of the overall design will be very clear.
- **Space** is "defined when something is placed in it", according to Alex White in his book, The Elements of Graphic Design. Incorporating space into a design helps reduce noise, increase readability, and/or create illusion. White space is an important part of your layout strategy.
- **Hierarchy** shows the difference in significance between items. Designers often create hierarchies through different font sizes, colors, and placement on the page. Usually, items at the top are perceived as most important.
- **Balance** creates the perception that there is equal distribution. This does not always imply that there is symmetry.
- **Contrast** focuses on making items stand out by emphasizing differences in size, color, direction, and other characteristics.
- **Scale** identifies a range of sizes; it creates interest and depth by demonstrating how each item relates to each other based on size.
- **Dominance** focuses on having one element as the focal point and others being subordinate. This is often done through scaling and contrasting based on size, color, position, shape, etc.

- **Similarity** refers to creating continuity throughout a design without direct duplication. Similarity is used to make pieces work together over an interface and help users learn the interface quicker.

Below is an example homepage that features some of the principles in action:

- *Color contrast was applied to the logo making the word "stop" stand out*
- *Text spacing and size creates a visual hierarchy*
- *Featured image in the carousel dominates over the smaller images below it to create a focal point*
- *White space is used around text and between sections to allow the page to breath*
- *Textured background to helps the elements on the page stand out on top of it*
- *Map showing scale*
- *Lines to divide sections*
- *Shapes to create buttons*

2 UI/UX Rules, Guidelines and Tools

2.1 The eight golden UI Rules

These rules were obtained from the text Designing the User Interface by Ben Shneiderman. Shneiderman proposed this collection of principles that are derived heuristically from experience and applicable in most interactive systems after being properly refined, extended, and interpreted.

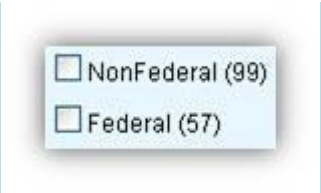
- **Strive for consistency**. Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens; and consistent commands should be employed throughout.
- **Enable frequent users to use shortcuts**. As the frequency of use increases, so do the user's desires to reduce the number of interactions and to increase the pace of interaction. Abbreviations, function keys, hidden commands, and macro facilities are very helpful to an expert user.
- **Offer informative feedback**. For every operator action, there should be some system feedback. For frequent and minor actions, the response can be modest, while for infrequent and major actions, the response should be more substantial.
- **Design dialog to yield closure**. Sequences of actions should be organized into groups with a beginning, middle, and end. The informative feedback at the completion of a group of actions gives the operators the satisfaction of accomplishment, a sense of relief, the signal to drop contingency plans and options from their minds, and an indication that the way is clear to prepare for the next group of actions.
- **Offer simple error handling**. As much as possible, design the system so the user cannot make a serious error. If an error is made, the system should be able to detect the error and offer simple, comprehensible mechanisms for handling the error.
- **Permit easy reversal of actions**. This feature relieves anxiety, since the user knows that errors can be undone; it thus encourages exploration of unfamiliar

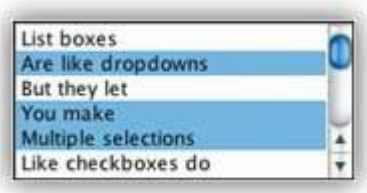
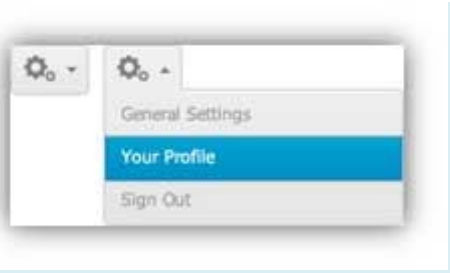
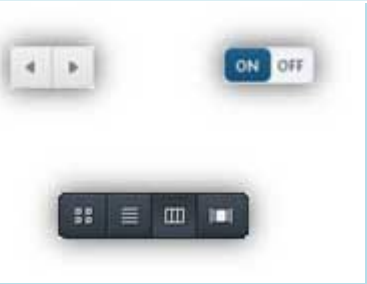
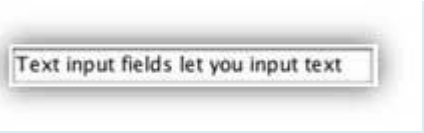
options. The units of reversibility may be a single action, a data entry, or a complete group of actions.

- **Support internal locus of control**. Experienced operators strongly desire the sense that they are in charge of the system and that the system responds to their actions. Design the system to make users the initiators of actions rather than the responders.
- **Reduce short-term memory load**. The limitation of human information processing in short-term memory requires that displays be kept simple, multiple page displays be consolidated, window-motion frequency be reduced, and sufficient training time be allotted for codes, mnemonics, and sequences of actions.

2.2 User Interface Elements

2.2.1 Input Controls

Element	Description	Examples
Checkboxes	Checkboxes allow the user to select one or more options from a set. It is usually best to present checkboxes in a vertical list. More than one column is acceptable as well if the list is long enough that it might require scrolling or if comparison of terms might be necessary.	
Radio buttons	Radio buttons are used to allow users to select one item at a time.	
Dropdown lists	Dropdown lists allow users to select one item at a time, similarly to radio buttons, but are more compact allowing you to save space. Consider adding text to the field, such as 'Select one' to help the user recognize the necessary action.	

List boxes	List boxes, like checkboxes, allow users to select a multiple items at a time,but are more compact and can support a longer list of options if needed.	
Buttons	A button indicates an action upon touch and is typically labeled using text, an icon, or both.	
Dropdown Button	The dropdown button consists of a button that when clicked displays a drop-down list of mutually exclusive items.	
Toggles	A toggle button allows the user to change a setting between two states. They are most effective when the on/off states are visually distinct.	
Text fields	Text fields allow users to enter text. It can allow either a single line or multiple lines of text.	

Date and time	A date picker allows users to select a date and/or time. By using the picker, the information is consistently formatted and input into the system.	

2.2.2 NAVIGATIONAL COMPONENTS

Element	Description	Examples
Search Field	A search box allows users to enter a keyword or phrase (query) and submit it to search the index with the intention of getting back the most relevant results. Typically search fields are single-line text boxes and are often accompanied by a search button.	
Breadcrumb	Breadcrumbs allow users to identify their current location within the system by providing a clickable trail of proceeding pages to navigate by.	

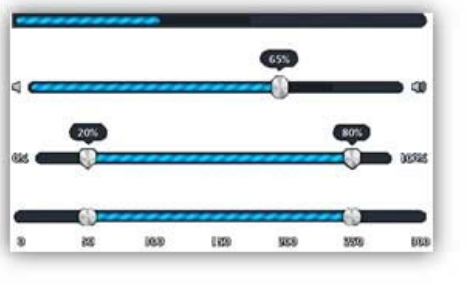
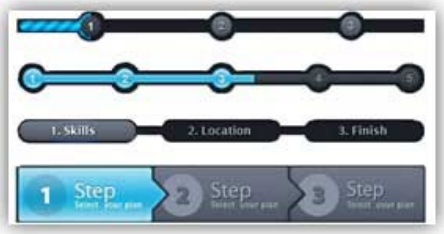
Pagination	Pagination divides content up between pages, and allows users to skip between pages or go in order through the content.	
Tags	Tags allow users to find content in the same category. Some tagging systems also allow users to apply their own tags to content by entering them into the system.	
Sliders	A slider, also known as a track bar, allows users to set or adjust a value. When the user changes the value, it does not change the format of the interface or other info on the screen.	
Icons	An icon is a simplified image serving as an intuitive symbol that is used to help users to navigate the system. Typically, icons are hyperlinked.	

Image Carousel	Image carousels allow users to browse through a set of items and make a selection of one if they so choose. Typically, the images are hyperlinked.	

2.2.3 INFORMATION COMPONENTS

Element	Description	Examples
Notifications	A notification is an update message that announces something new for the user to see. Notifications are typically used to indicate items such as, the successful completion of a task, or an error or warning message.	
Progress Bars	A progress bar indicates where a user is as they advance through a series of steps in a process. Typically, progress bars are not clickable.	
Tool Tips	A tooltip allows a user to see hints when they hover over an item indicating the name or purpose of the item.	

Message Boxes	A message box is a small window that provides information to users and requires them to take an action before they can move forward.	
Pop-Up Window	A modal window requires users to interact with it in some way before they can return to the system.	

2.2.4 CONTAINERS

Element	Description	Examples
Accordion	An accordion is a vertically stacked list of items that utilizes show/ hide functionality. When a label is clicked, it expands the section showing the content within. There can have one or more items showing at a time and may have default states that reveal one or more sections without the user clicking	

2.3 WIREFRAMES

A wireframe is a **two-dimensional illustration of a page's interface** that specifically focuses on space allocation and prioritization of content, functionalities available, and intended behaviors. For these reasons, wireframes typically do not include any styling,

color, or graphics. Wireframes also help establish relationships between a website's various templates.

2.3.1 Creating Wireframes

It's important to keep in mind that wireframes are guides to where the major navigation and content elements of your site are going to appear on the page. Since the goal of the illustrations is not to depict visual design, keep it simple.

- **Do not use colors**. If you would typically use color to distinguish items, instead rely on various gray tones to communicate the differences.
- **Do not use images**. Images distract from the task at hand. To indicate where you intend to place an image and its size, you can instead use a rectangular box sized to dimension with an "x" through it.
- **Use only one generic font**. Typography should not be a part of the wireframing discussion. Within the wireframes, however, you may still resize the font to indicate various headers and changes in the hierarchy of the text information on the page.

Since wireframes are two-dimensional, it's important to remember that they don't do well with showing interactive features of the interface like drop-downs, hover states, accordions that implement show-hide functionality, or auto-rotating carousels.

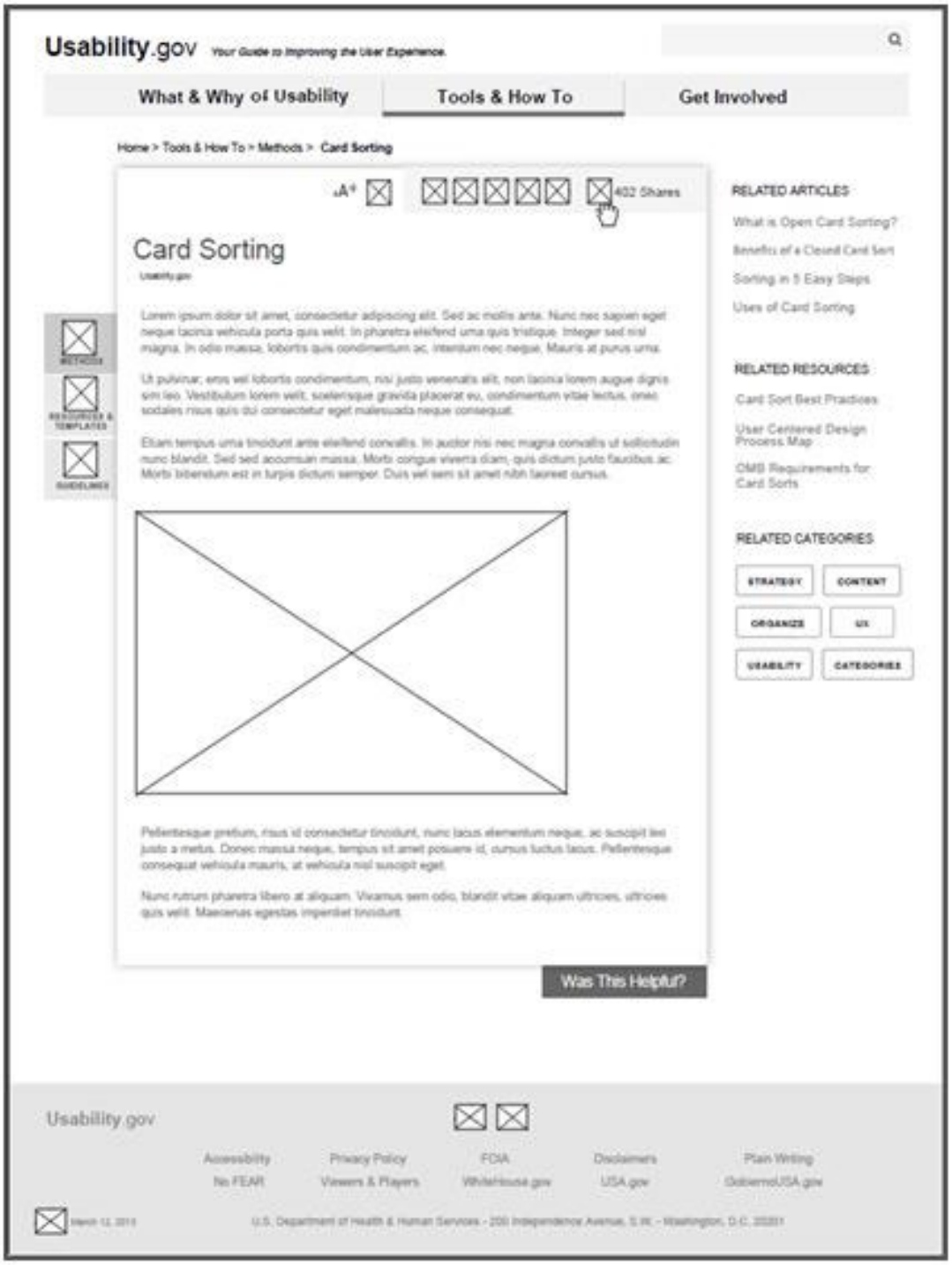


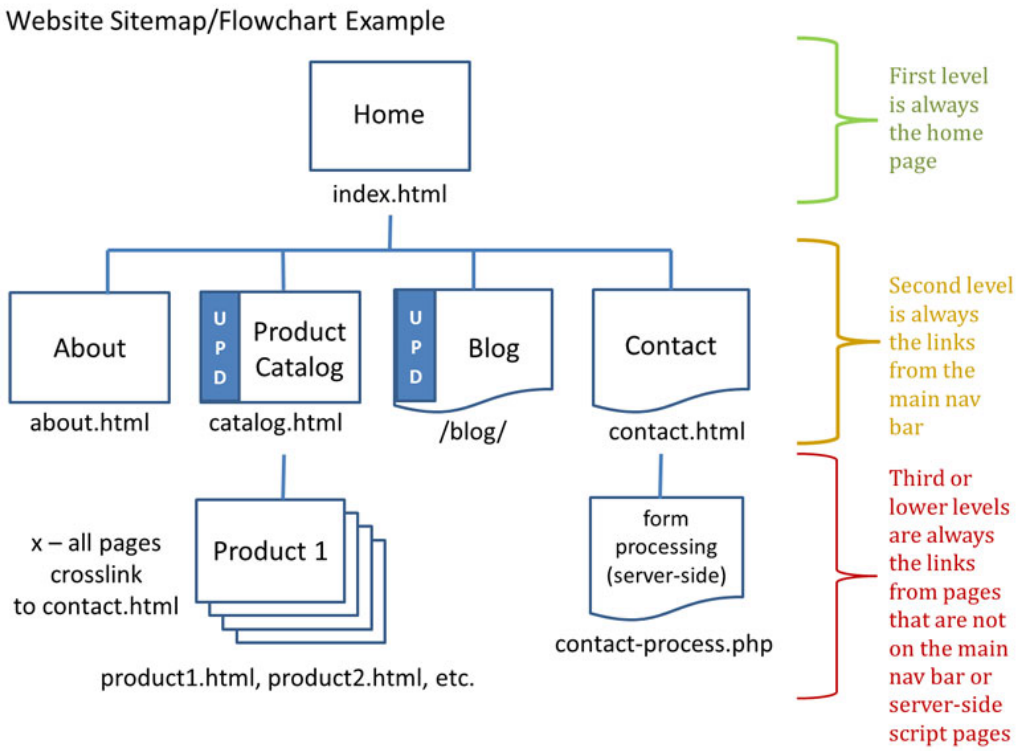
Figure: Example of a wireframe of Usability.gov

Although wireframes differ from site to site, the following elements often are included as **standard elements** on wireframes:

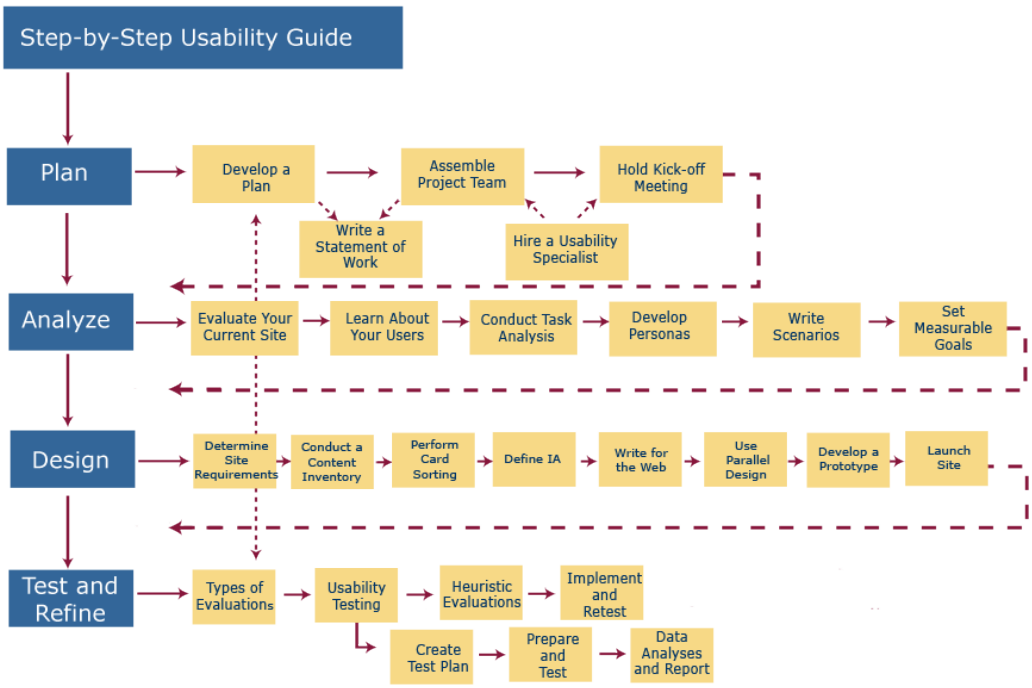
- Logo
- Search field
- Breadcrumb
- Headers, including page title as the H1 and subheads H2-Hx
- Navigation systems, including global navigation and local navigation
- Body content
- Share buttons
- Contact information
- Footer

2.4 THE FLOWCHART

A flowchart/sitemap visualizes the structure and navigation of the website.

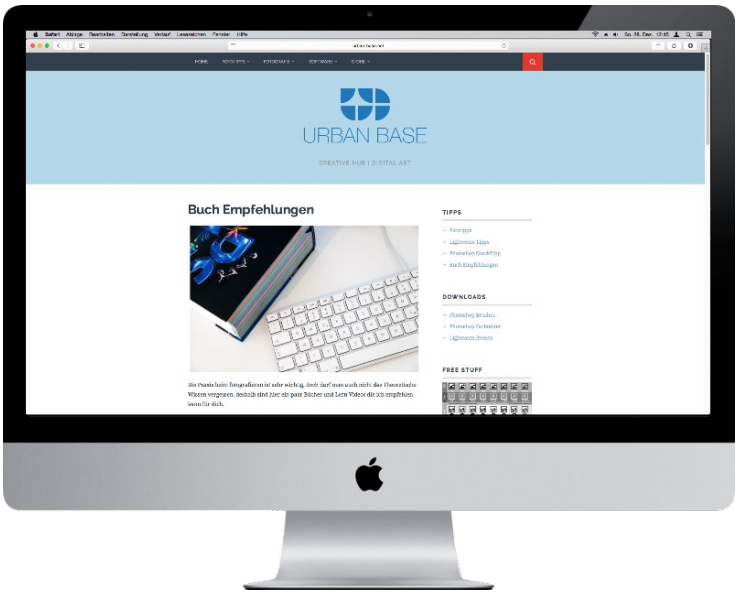


2.5 Step by Step Usability Guide



2.6 The Mockup

The mock-up is a high-fidelity **final layer of UI-Design** and reflect the design choices for color schemes, layouts, typography, iconography, the visuals of navigation, and the overall atmosphere of the product.



2.7 Austrian accessibility guidelines

The "Bundes-Behindertengesetz" governs private website accessibility in Austria and can be found here:

https://www.wko.at/branchen/information-consulting/werbung-marktkommunikation/Barrierefreie-Websites.html

Summary of the Austrian **accessibility guidelines**:

- Insufficient color contrast
- Lack of responsiveness
- Lack of alternative text (e.g. alt-attribute in the img-Tag)
- Complex sentence structure
- Too short timeouts
- No keyboard-navigation

2.8 Software for Prototyping and Wireframes

The software and web services mentioned below are free to use or are limited to 1 project free of charge.

2.8.1 Pencil Project (win, linux, mac, firefox extension)

Pencil is built for the purpose of providing a free and open-source GUI prototyping tool that people can easily install and use to create mockups in popular desktop platforms. http://pencil.evolus.vn/

2.8.2 FluidUI

Online-Tool for prototyping and presenting. https://www.fluidui.com/

2.8.3 InVision

Get high-fidelity in under 5 minutes. Upload your design files and add animations, gestures, and transitions to transform your static screens into clickable, interactive prototypes. https://www.invisionapp.com/

2.8.4 InDesign, Adobe XD, MS Visio

Use **InDesign** for prototyping by importing graphics and designing layout elements in ID or Illustrator. In ID you can place hyperlinks, video elements and relative layouts to create a prototype of your app or webpage.

Adobe XD is a software specifically for experience design.

Use **Visio** to visualize the look and feel of your website or app by creating flowcharts.