

WEB APPLICATIONS DEVELOPMENT

Module 03: Usability

Making the Web Work for Humans

Prepared by Cyber.SoHo

01

What Is Usability?

What Is Usability? (1/2)

THE FORMAL DEFINITION

ISO 9241-11:

"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."

IN PLAIN ENGLISH

Can real people use this thing to do what they came to do — quickly, correctly, and without frustration?

CRITICAL DISTINCTION

Beautiful + Unusable = Usability FAILURE (gorgeous layout, users can't check out)

Plain + Usable = Usability SUCCESS (simple layout, every task done in 30 seconds)

What Is Usability? (2/2)

THE BUSINESS CASE

\$1 → \$10–\$100

Every dollar invested in UX (User Experience)
returns 10 to 100 dollars

WHY USABILITY MATTERS

- Reduces development costs (fix problems early)
- Increases customer retention and loyalty
- Decreases support tickets and training needs
- Directly increases conversion and revenue

Source: Nielsen Norman Group (nngroup.com)

KEY TAKEAWAY

Usability is a measurable quality, not an opinion. It is defined by international standards (ISO 9241-11), backed by decades of research, and directly tied to revenue.

02

The Five Pillars of Usability

Nielsen's Five Components

Defined by Jakob Nielsen, co-founder of the Nielsen Norman Group

1

Learnability

Can a first-time user figure it out?

2

Efficiency

Can a returning user do it fast?

3

Memorability

Can a lapsed user pick it up again?

4

Errors

How bad are mistakes & can users recover?

5

Satisfaction

Does it feel good to use?

KEY TAKEAWAY

Every interface can be audited against these five pillars. If any pillar scores low, user retention drops. Think of them as a health checkup for your website.

Pillar 1: Learnability

How easy is it to accomplish basic tasks on the first visit?

DESIGN LEVERS

Familiar icons & conventions — magnifying glass = search, cart = checkout

Visual hierarchy — biggest element = primary action, guides the eye

Progressive disclosure — show basics first, details on demand

No jargon — "Order Now" not "Initiate Beverage Procurement"

KEY TAKEAWAY

Learnability gets users through the door. A first-time visitor should complete the primary task without a tutorial.

Pillar 2: Efficiency

How quickly can a returning user perform tasks?

DESIGN LEVERS

- Autocomplete & predictive text
- Keyboard shortcuts for power users
- Saved preferences & recent items
- Batch actions (select all → delete)

EFFICIENCY FORMULA

$$\text{Gain} = (1 - \text{keystrokes_with} / \text{keystrokes_without}) \times 100\%$$

Example: "Intro" with autocomplete vs typing
"Introduction to Computer Science"
5 vs 38 keystrokes → 87% reduction

KEY TAKEAWAY

Efficiency keeps returning users coming back. Design shortcuts for experts alongside simple defaults for beginners.

Pillar 3: Memorability

When users return after a gap, how easily can they re-establish proficiency?

Consistent layout — same header, same icon positions on every page

Predictable navigation patterns — links don't rearrange between pages

Standard icon meanings — gear = settings, house = home, cart = checkout

Rule of thumb: If your navigation rearranges between pages, your memorability score is zero.




KEY TAKEAWAY

Memorability depends on consistency. Users should never have to re-learn where things are when they return to your site.

Pillar 4: Errors

Frequency, severity, and recoverability of user mistakes

THREE LAYERS OF GOOD ERROR HANDLING

-  **1. PREVENT** Disable 'Submit' until all fields are valid
-  **2. REDUCE SEVERITY** Allow 'Undo' instead of permanent deletion
-  **3. GUIDE RECOVERY** Show which requirement fails, not just 'Error: Invalid'

KEY TAKEAWAY

Good error handling means: prevent the mistake, minimize the damage, and tell the user exactly how to fix it.

Pillar 5: Satisfaction

The subjective, emotional response to using the product

DESIGN LEVERS

Visual polish — consistent branding, clean typography, professional look

Fast load times — under 3 seconds or users leave

Microinteractions — button animations, progress celebrations, subtle feedback

Friendly tone — human, warm copy in UI elements and messages

WITHOUT DELIGHT

Click heart → turns red. That's it.

WITH DELIGHT

Click heart → bounces, particles fly, color sweeps in!

KEY TAKEAWAY

Satisfaction is invisible when done right and painfully obvious when done wrong. Small moments of delight drive retention and loyalty.

03

Nielsen's 10 Usability Heuristics

The 10 Heuristics (1/2)

Published 1994 by Jakob Nielsen — still the most cited usability framework worldwide

- #1 Visibility of system status** — Always show users what is happening right now
- #2 Match system & real world** — Use language and concepts users already know
- #3 User control & freedom** — Always provide "Undo," "Back," and "Exit"
- #4 Consistency & standards** — Follow platform conventions, don't reinvent the wheel
- #5 Error prevention** — Stop mistakes before they happen (confirmations, constraints)

KEY TAKEAWAY

These heuristics are your pre-launch checklist. Walk through each one before shipping any web application.

The 10 Heuristics (2/2)

- #6 **Recognition over recall** — Show options visually; don't force memorization
- #7 **Flexibility & efficiency** — Serve beginners AND experts (shortcuts + simple defaults)
- #8 **Aesthetic & minimalist design** — Every element must earn its place; remove the rest
- #9 **Help users recover from errors** — Error messages must explain AND suggest a fix
- #10 **Help & documentation** — If needed, make it searchable and task-focused

KEY TAKEAWAY

If your app violates any of these 10 heuristics, fix it before users find it. Source: nngroup.com/articles/ten-usability-heuristics/

Heuristics in Practice (1/2)

Heuristic #1 — Visibility

Bad: Click 'Upload' → nothing for 30 seconds

Good: Progress bar: '36/50 MB, ~8s remaining'

Heuristic #3 — User Control

Bad: Deleted file → gone forever

Good: 'Undo' button appears for 10 seconds

KEY TAKEAWAY

Heuristics map directly to daily design decisions. Use the 10-point table as a literal checklist during development.

Heuristics in Practice (2/2)

Heuristic #5 — Error Prevention

Bad: User types invalid date → error after submission

Good: Date picker only allows valid dates → error impossible

Heuristic #8 — Minimalist Design

Bad: Homepage: 47 links, 3 banners, auto-playing video

Good: Homepage: one headline, one CTA, one image

KEY TAKEAWAY

Every heuristic violation is a potential lost user. Prevention is always cheaper than recovery.

04

User-Centered Design (UCD)

User-Centered Design (UCD) (1/3)

Defined in ISO 9241-210 by the International Organization for Standardization

Core Principle: You are not your user.

What makes sense to the developer almost never makes sense to the user on the first try.

THE UCD CYCLE — 4 REPEATING STEPS

1 UNDERSTAND

Who are the users?
What are they trying to do?



2 SPECIFY

What do users
actually need?



3 DESIGN

Create prototypes,
wireframes, mockups



4 EVALUATE

Test with real users.
Did it work?

KEY TAKEAWAY

UCD is a cycle, not a one-time event. Understand → Specify → Design → Evaluate → Repeat.

UCD Technique: Personas (2/3)

A persona is a fictional, data-informed character representing a real user segment.

STANDARD PERSONA DATA POINTS

Name, age, role — who they are

Primary device — phone, laptop, tablet

Tech comfort level — novice to expert

Goals — what they want to accomplish

Frustrations — what blocks them today

Key quote — one sentence, their core need

EXAMPLE PERSONA

Alex Chen, 18, First-year CS student

Device: iPhone (primary)

Goal: Register for courses quickly on phone

Frustration: Academic jargon, no undo

Quote: "I just want to register without messing something up."

KEY TAKEAWAY

Personas turn abstract 'users' into concrete people. 'Would Alex find this button?' is far more useful than 'Would someone find this button?'

UCD: Why It Works (3/3)

THE UCD ADVANTAGE

Catches usability problems BEFORE launch (cheaper to fix early)

Keeps the team focused on real user needs, not developer assumptions

Creates a shared understanding across designers, developers, and stakeholders

Produces measurable improvements through iterative testing

Reduces post-launch support costs and negative user feedback

KEY TAKEAWAY

User-Centered Design is not a luxury — it is the most cost-effective way to build products that people actually want to use.

05

Accessibility (a11y)

Accessibility: The POUR Framework (1/2)

WCAG 2.2 — Web Content Accessibility Guidelines, published by the W3C



PERCEIVABLE

Users can see or hear the content

Alt-text on images, captions on video, 4.5:1 contrast



OPERABLE

Users can navigate and interact

Full keyboard navigation, no seizure-inducing flashes



UNDERSTANDABLE

Users comprehend content

Plain language, predictable nav, visible labels



ROBUST

Works across technologies

Valid HTML, ARIA labels, semantic elements

KEY TAKEAWAY

Remember POUR: Perceivable, Operable, Understandable, Robust. These four principles cover all aspects of web accessibility.

Accessibility: Standards & Law (2/2)

WCAG COMPLIANCE LEVELS

Level A	3:1 contrast	Bare minimum
Level AA	4.5:1 contrast	Industry standard (most laws)
Level AAA	7:1 contrast	Highest — aspirational

CONTRAST FORMULA

$$\text{Ratio} = (L_{\text{lighter}} + 0.05) / (L_{\text{darker}} + 0.05)$$

LEGAL LANDSCAPE

USA: ADA (Americans with Disabilities Act)
applied to websites by courts

EU: European Accessibility Act (EAA)
requires digital product accessibility

Global: WCAG 2.2 referenced by
legislation worldwide

KEY TAKEAWAY

Aim for WCAG AA (4.5:1 contrast minimum). Accessibility is not a feature — it is a legal and ethical requirement.

06

Usability Testing

Usability Testing (1/3)

Watch real people try to use your product. Observe where they struggle. Fix. Repeat.

TWO TYPES OF TESTING

MODERATED

Facilitator sits with user, gives tasks, asks follow-up questions

Tools: In-person, Zoom, Teams

UNMODERATED

User completes tasks alone; session is recorded

Tools: Hotjar, UserTesting

KEY TAKEAWAY

Both moderated and unmoderated testing have their place. Moderated gives deeper insight; unmoderated scales better.

The Five-User Rule (2/3)

5 users → 85%

of usability problems found
(Jakob Nielsen, 2000)

WHAT THIS MEANS

After 5 users, each additional tester mostly finds duplicate problems

Better to test 5 users three times than 15 users once

No massive budget required — 5 people, one afternoon, a notepad

DIMINISHING RETURNS CURVE

Users:	1	2	3	4	5	6	7	8	9	10
Found:	30%	50%	70%	80%	85%	88%	90%	91%	92%	93%

— / — diminishing returns after 5 —

KEY TAKEAWAY

You don't need 500 participants. Five users, one afternoon, a notepad — that finds the majority of usability problems in any project.

Usability Test Report (3/3)

REPORT STRUCTURE

1. **Task completion rates** — what % of users finished each task?
2. **Findings ranked by severity** — $\text{Severity} = \text{Frequency} \times \text{Impact}$
3. **Actionable recommendations** — each finding gets a specific fix
4. **Overall assessment** — Pass / Needs Work (based on critical count)

SEVERITY SCORING FORMULA

Severity = Frequency (0.0–1.0) × Impact (1–3)

0.0 – 0.9	→	MINOR
1.0 – 1.9	→	MAJOR
2.0 – 3.0	→	CRITICAL

KEY TAKEAWAY

Every finding needs a severity score AND a specific recommendation. A report that just lists problems without solutions is incomplete.

07

Dark Patterns

Dark Patterns: Know the Enemy (1/2)

A UI design that deliberately tricks users into unintended actions. Term coined by Harry Brignull (deceptive.design).

Confirmshaming	"No thanks, I hate saving money"
Roach Motel	One-click signup, 12-step cancellation
Hidden Costs	\$0 shipping! → \$14.99 at payment
Forced Continuity	Free trial silently converts to paid
Misdirection	Giant 'Accept All' vs tiny gray 'Reject'
Trick Questions	"Uncheck to not unsubscribe"

KEY TAKEAWAY

The same usability knowledge that builds great products can be weaponized. Know dark patterns so you can recognize and avoid them.

Dark Patterns: Ethics & Law (2/2)

ETHICAL ALTERNATIVES

Giant 'Accept All' + invisible 'Reject' → Equal size Accept & Reject buttons

Auto-checked 'Subscribe to newsletter' → Unchecked by default, user opts in

15-step account deletion in settings → Clear 'Delete Account' in profile

REGULATORY CRACKDOWN

FTC (Federal Trade Commission) — enforcement guidelines targeting dark patterns (2022)

GDPR (General Data Protection Regulation) — manipulated consent is invalid

Global trend — growing legislation banning deceptive design

KEY TAKEAWAY

Dark patterns are not just unethical — they are increasingly illegal. Design with honesty and transparency.

08

Final Summary

Five Things to Remember

1

Usability is measurable

Five pillars: learnability, efficiency, memorability, errors, satisfaction

2

10 Heuristics = your checklist

Walk through all 10 before every launch

3

You are not your user

UCD cycle: understand → specify → design → evaluate → repeat

4

Accessibility is required

POUR principles, WCAG AA minimum, legal obligations

5

Dark patterns are unethical

Design with honesty and transparency; they're increasingly illegal

KEY TAKEAWAY

Usability is not a phase of development — it is a lens through which every design decision should be made.

Homework Assignment

Go to your five most-used websites and for each one:

Evaluate against Nielsen's 10 Heuristics (use the table from slides 13-14)

Write down 3 usability wins — things the site does well

Write down 3 usability failures — things that frustrate you

Suggest one specific fix for the worst failure you found

KEY TAKEAWAY

Start applying these concepts today. You will be surprised at what you find — even on websites you use every day.

Resources & Further Reading

Nielsen Norman Group

nngroup.com

10 Usability Heuristics

nngroup.com/articles/ten-usability-heuristics/

WCAG 2.2

[w3.org/WAI/standards-guidelines/wcag/](https://www.w3.org/WAI/standards-guidelines/wcag/)

ISO Standards

[iso.org](https://www.iso.org)

Deceptive Design (Dark Patterns)

deceptive.design

ADA (Americans with Disabilities Act)

[ada.gov](https://www.ada.gov)

GDPR Info

gdpr.eu

WebAIM Contrast Checker

webaim.org/resources/contrastchecker/

WAVE Accessibility Tool

wave.webaim.org

Hotjar (Heatmaps)

hotjar.com

VirusTotal (Link Scanner)

[virustotal.com/gui/home/url](https://www.virustotal.com/gui/home/url)

Disclaimer

Intellectual Property —

This material is the original work and intellectual property of Cyber.SoHo. All rights reserved.

Copyright & Non-Affiliation —

Cyber.SoHo is not affiliated with, endorsed by, or sponsored by any organization mentioned herein. All trademarks are property of their respective owners.

External Links —

Links are for reference only. Verify all URLs with VirusTotal ([virustotal.com/gui/home/url](https://www.virustotal.com/gui/home/url)) before visiting.

Liability & Ethics —

Material is provided 'as is' for educational purposes. Discussion of dark patterns is for recognition and avoidance only — never for implementation.