



IS-104: DIGITAL INTERACTION DESIGN

LECTURE 5: DESIGN FOR USABILITY AND ACCESSIBILITY

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September 25, 2019

GOALS FOR TODAY

A. Learn to use references

B. Learn about design for usability and accessibility
(Chapter 5)

- Definitions, distinctions, examples
- Accessibility guidelines
- Usability principles
- Ethical considerations
- Legal considerations



RECAP FROM LAST LECTURE

- Experience
- Experience design
- Engagement
- Gamification
- Designing for pleasure
- Aesthetics
- Lifestyle



A. USING REFERENCES

USING REFERENCES



- www.Kildekompasset.no
- APA6th
- **In text:**
 - This is a statement (Repstad, 2014).
 - According to Repstad (2014), this is a statement.
 - “This is the exact statement from the source” (Repstad, 2014, p. 53)
 - Repstad (2014) expressed this “exact statement from the source” (p. 53)
 - This is a statement from two sources (Repstad, 2014; Folketrygdløven, 1997)
 - This is a statement from one source with two authors (Nielsen & Thon, 2008)
 - This is the first statement from one source with more than two authors (Fasting, Doksheim & Vatnøy, 2011)
 - This is another statement from the same source with more than two authors (Fasting et al., 2011)

- **In literature list (in alphabetical order)**

Fasting, M., Doksheim, M. & Vatnøy, E. (2011). Den norske velferden. Oslo: Civita.

Folketrygdloven. (1997). Lov om folketrygd (LOV-1997-02-28-19). Hentet fra <https://lovdata.no/lov/1997-02-28-19>

Nielsen, M.-B. O. & Thon, J. (2008). *Wergelandenes Kristiansand: Byguide*. Kristiansand: Wergelandselskapet.

Repstad, P. (2014). *Sosiologiske perspektiver for helse- og sosialarbeidere* (3. utg.). Oslo: Universitetsforlaget.

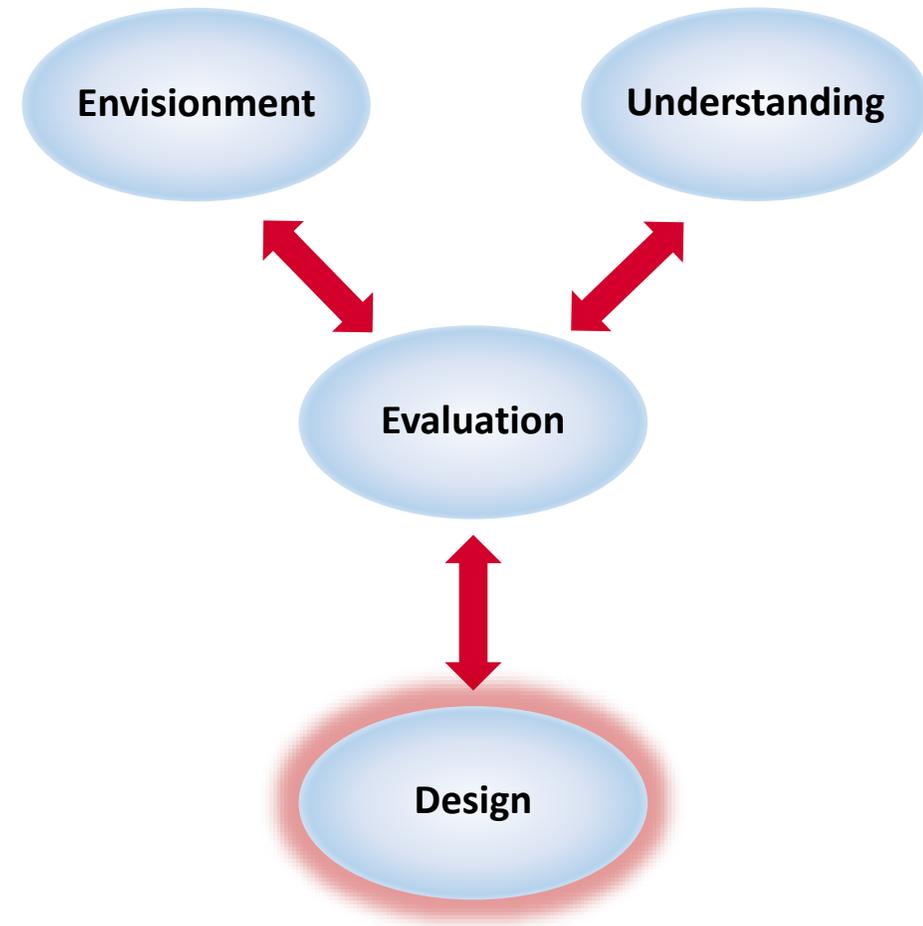


B. DESIGN FOR USABILITY AND ACCESSIBILITY

DESIGN: ONE OF THE FOUR KEY ACTIVITIES

Design for:

- User experience
- Usability
- Accessibility



DESIGN FOR UX

- Focus on all the qualities of the interactive experience that make it **memorable, satisfying, enjoyable, and rewarding**
- Experience design is concerned with all the issues related to providing a good experience for people in both short and longer term
- This includes aesthetics, pleasure, and emotional engagement



UX – USABILITY – ACCESSIBILITY - ACCEPTABILITY

UX	Key aim: pleasant to use
Usability	Key aim: easy to use
Accessibility	Key aim: possible to use
Acceptability	Key aim: actual use

We can aim for all these in parallel or start from UX (work on a great concept) and continue with usability and accessibility for specific users and contexts. Over time we can gradually expand accessibility to more user groups.

DESIGN FOR ACCESSIBILITY

ACCESSIBILITY

Reasons why people can be excluded from accessing interactive systems:

- Physically
- Conceptually
- Economically
- Culturally
- Socially



14.01	Nyttårs □
28.01	Arbm. Rapport Nevnder ≡ Regnskap/budsjett
11.02	= +
18.02	Info.m.
25.02	Arbm.
11,03	≡ + Galla
08.04	- +
19.04	Sildeaften (fredag)
22.04	= + ≡ 1 g. N
13.05	O + Galla
17.05	Åpent hus i Falckenbergsgt. 7 (fredag)
27.05	Arbm. ≡ 2 g. N V
10.06	Sommeravslutning
26.08	Ei Galla



ACCESSIBILITY

- Accessibility is about removing barriers that can exclude people from using the system
- Two main approaches to designing for accessibility:

- **Design for all** (also known as universal design) aims to accommodate the needs of all types of users
- **Inclusive design** is a more pragmatic approach that takes into account reasons (e.g., technical or financial) that make total inclusion unattainable



Equality



Equity



Accessibility

PRINCIPLES OF UNIVERSAL DESIGN

Powered door with sensors is convenient for all shoppers, especially if hands are full.

1 Equitable Use
The design is useful and marketable to people with diverse abilities.

2 Flexibility in Use
The design accommodates a wide range of individual preferences and abilities.

Larger grips accommodate use with either hand and allow alternation between the two in highly repetitive tasks.

A secondary trigger on a small gun requires the user to (1) activate the safety before (2) pulling the trigger, minimizing accidents that occur when a user accidentally hits an object or person while pulling the trigger.

5 Tolerance for Error
The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Door lever does not require grip strength to operate, and can even be operated by a closed fist or elbow.

6 Low Physical Effort
The design can be used efficiently and comfortably and with a minimum of fatigue.

Public emergency stations utilize recognized emergency colors and a simple design to convey convey function to passersby.

3 Simple and Intuitive Use
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or education level.

4 Perceptible Information
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Small bumps on a cell phone helped the user where important keys are without requiring the user to look at the keys.

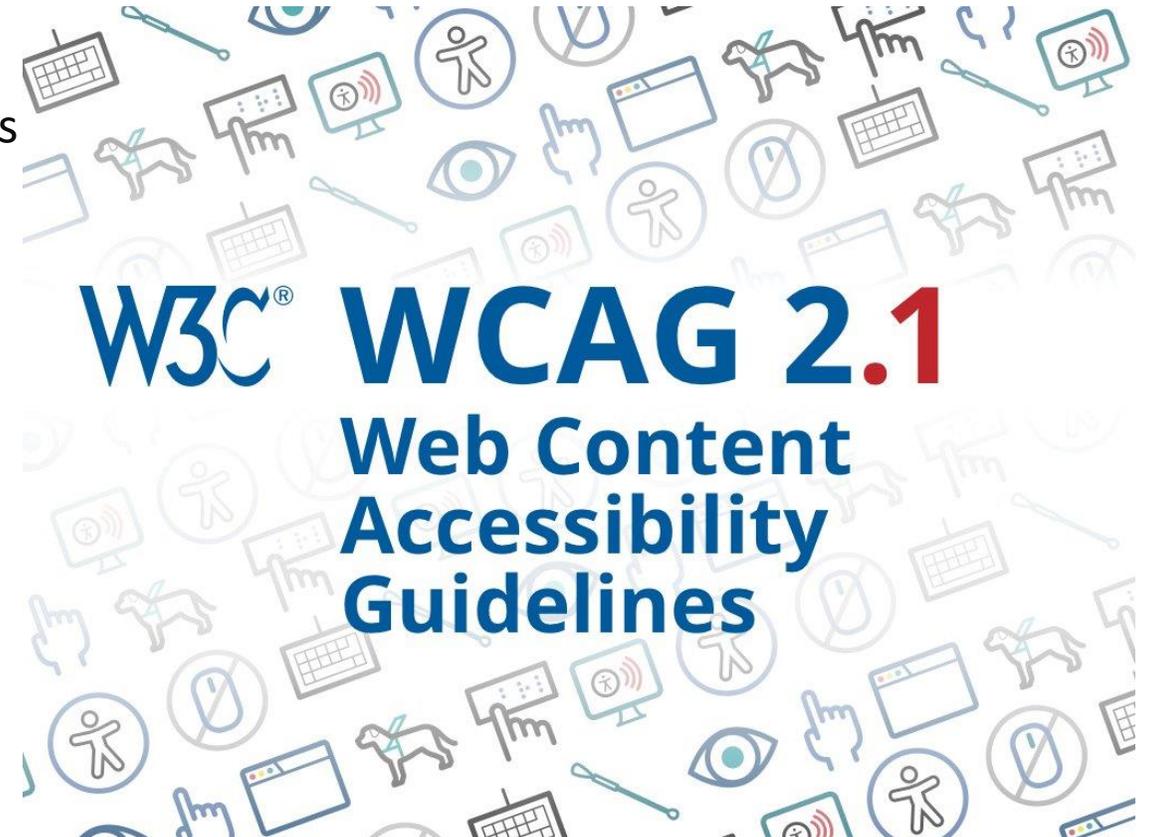
Wide gates at subway stations accommodate wheelchair users as well as commuters with packages or luggage.

7 Size and Space for Approach and Use
Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.



ACCESSIBILITY GUIDELINES

- The United Nations and the World Wide Web Consortium (W3C) have declarations and guidelines on ensuring that everyone can get access to information that is delivered through software technologies
- Web Content Accessibility Guidelines (WCAG) is a collection of guidelines on **how to make web content accessible**. Since 2012 has the status of international standard: ISO/IEC 40500.
- WCAG covers:
 - Color
 - Contrast
 - Text size
 - More than one way to navigate
 - Visible focus
 - Error identification and explanation and more...



EXAMPLES FROM WCAG

- **Contrast:** The visual presentation of text needs a contrast ratio of at least 4.5:1
- **Color:** Colors can be good carriers of meaning. But, color should not be used as a sole information carrier, people have different abilities to perceive color
- **Images:** All images should have textual descriptions (text alternatives for visually impaired users)
- **Video/audio:** Subtitles need to be included for video/audio (for users that are hearing impaired)
- You can read the full WCAG 2.0 guidelines here:
 - <https://www.w3.org/TR/WCAG20/>
 - <https://wcag.difi.no/wcag-20.html>



WEB CONTENT ACCESSIBILITY GUIDELINES (WCAG)

[Login](#) [Register](#)

Web Accessibility Checker

Web Accessibility Checker

Check Accessibility By:

Web Page URL HTML File Upload Paste HTML Markup

Address:

Options

Spill som en Founder. kr 1 299

STADIA Forhåndsbestill

Mer informasjon

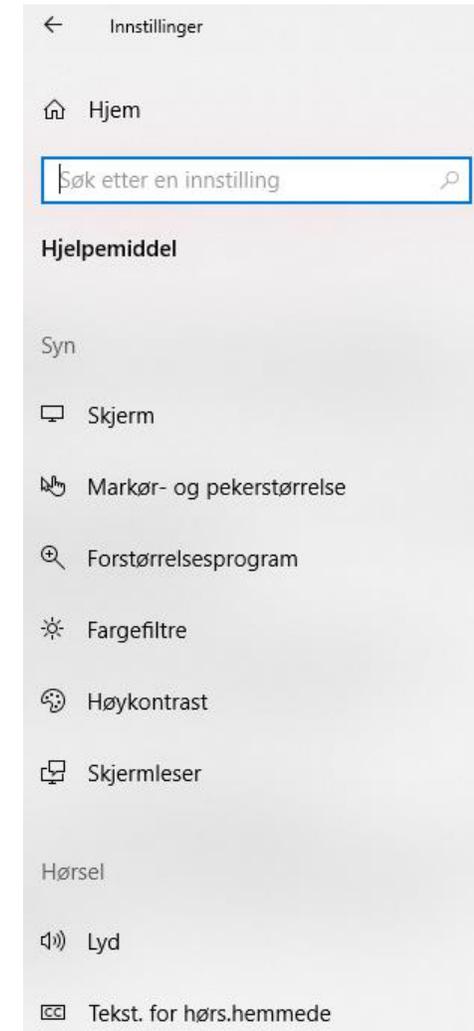
Welcome to AChecker. This tool checks single HTML pages for conformance with accessibility standards to ensure the content can be accessed by everyone. See the Handbook link to the upper right for more about the Web Accessibility Checker.

Translate to **English** | [German](#) | [Italiano](#)

Web site engine's code is copyright © 2011

ASSISTIVE TECHNOLOGIES FOR ACCESSIBILITY

- Web browsers that read web pages, and screen enlargers that allow people to focus
- Voice input used instead of text entry but also as a substitute for mouse/keyboard control
- Keyboard filters can compensate for tremor, erratic motion and slow response time
- Obviously, when designing for accessibility you need to include people with special needs in requirements analysis and testing



Skjerm

Gjør skjermen lettere å se.

Gjør alt større

Endre størrelsen på apper og tekst på hovedskjermen

100 %

[Endre størrelsen på apper og tekst på andre skjermer](#)

[Endre størrelsen og fargen på markøren og musepekeren](#)

Gjør alt lysere

Endre lysstyrken på den innebygde skjermen

90 %

[Endre lysstyrke automatisk eller bruk kveldsmodus](#)

Forenkle og tilpasse Windows

Vis animasjoner i Windows

På

Vis gjennomsiktighet i Windows

På

In Norway, we want a society where everyone can participate. Therefore, universal design of ICT is a legal requirement for the web sites that address the general public.

Such people are exposed to the "Digital Exclusion" which means no or limited ability to use modern forms of communication, for example, websites.



DIFI

- The Agency for Public Management and eGovernment (Difi) aims to strengthen the renewal of the Norwegian public sector
- Difi works to ensure that government administration in Norway is characterized by values of excellence, efficiency, user-orientation, transparency and democracy
- Difi tasks include inspecting public and private organizations to ensure that their web-based solutions fulfill universal design requirements
- Difi is supervised by the Ministry of Local Government and Modernization (KMD)



Difi

Direktoratet for
forvaltning og ikt



Difi

Direktoratet for
forvaltning og ikt

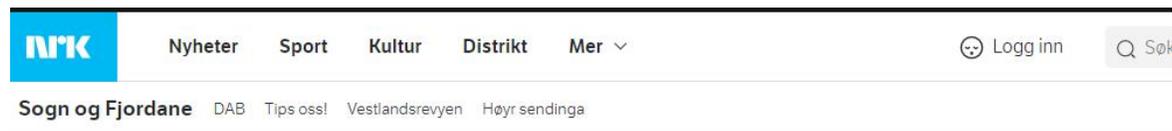
<https://www.youtube.com/embed/oNpPOnji5Gs>



Geir I. Hausvik, 2019

DIFI

Difi
Direktoratet for
forvaltning og ikt



SAS kan få dagbøter på 150.000 kroner

Difi har mista tolmodet med SAS Norge AS og gir dei no ti dagar på å rette opp feil på nettsidene sine. Om ikkje må dei betale 150.000 kroner i dagbøter.



MÅ ORDNE NETTSIDER INNAN TI DAGAR: Difi meiner SAS sine nettsider ikkje er tilgjengelege nok for alle.
FOTO: HELGE CARLSEN / NRK

Anna Gytri
Journalist

Amanda Strand Askeland
Journalist

Thomas Brakstad
Journalist

Publisert 16. aug. 2018 kl. 10:32
Oppdatert 17. aug. 2018 kl. 12:04

<https://www.nrk.no/sognogfjordane/sas-kan-fa-dagboter-pa-150.000-kroner-1.14168232>



Direktoratet for forvaltning og IKT (Difi) har sendt varsel om tvangsmulkt fordi dei meiner flyselskapet bryt med likestillings- og diskrimineringslova. Ifølgje Difi har SAS Norge AS ikkje gjort det moaleq for alle å bruke nettsidene.

Geir I. Hausvik, 2019



HINDRER SAMFUNNSDELTAELSE: Hjemmesidene til SAS følger ikke i dag regelverket for universell utforming. Det gjør at mange med nedsatt syn vil ha problemer med å gjennomføre billettinnstillingene uten hjelp. (Illustrasjonsfoto: Pixabay)

SAS kan få dagbøter

Difi mener at hjemmesidene til flygiganten bryter med likestillings- og diskrimineringsloven. Nå har SAS kun dager igjen på å rette opp feilene.

STINE MARIE HAGEN

stine.marie.hagen@cw.no

Publisert: torsdag 23. august 2018, kl. 10:13 • Endret: 24. august 2018, kl. 12:38

Tilsynet i Difi (Direktoratet for forvaltning og ikt) gir SAS Norge tvangsmulkt for ikke å ha utbedret nettsidene sine etter en kontroll i fjor høst. Feilene er knyttet til billettbestilling. Fremdriften i arbeidet med rettingen har vært for dårlig. Det melder Difi på sine sider.

<https://www.cw.no/artikkel/siste-nyheter/sas-kan-fa-dagboter>

Mange norske nettstader bryt lova

Tilsyn for universell utforming av ikt i Difi har i 2018 målt status for universell utforming på 278 norske nettstader. Resultata er for dårlege både i offentleg og privat sektor.

Publisert: 13. des 2018, Sist endret: 01. Feb 2019

Hovudfunn

Det er gjennomført 26 818 enkelttestar på 278 nettstader. Samla sett oppnår verksemdene 60 prosent av totalt oppnåeleg resultat i målinga. Men det er stor variasjon i resultata frå verksemd til verksemd, med resultat som varierer frå 34 prosent til 92 prosent.

Nettstader som er tekne i bruk etter innføringa av regelverket verkar å vere meir tilgjengelege enn eldre løysingar.

Andre funn er:

- Dei største nettavisene og nyheitsformidlarane er med i målinga. Mange av desse er langt frå å oppfylle krava til universell utforming
- Mange store nettbutikkar er lite tilgjengelege for store grupper av befolkninga
- Mange store bankar oppnår gode resultat i målinga, men har framleis utfordringar knytt til digitale skjema
- Privat sektor har større utfordringar enn offentleg

Kva er dei vanlegaste feila?

Dei vanlegaste feila vi finn gjeld

- dårleg kontrast mellom tekst og bakgrunn
- mangelfull teksting av videoar
- feilmeldingar i skjema
- moglegheit for å forstørre innhald
- utfordringar med tastaturbetjening

<https://uu.difi.no/nyhet/2018/12/mange-norske-nettstader-bryt-lova>

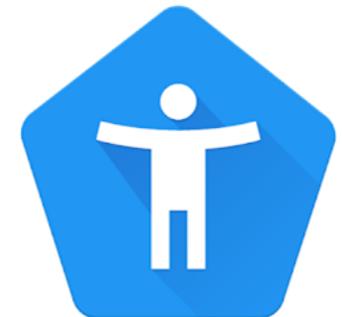
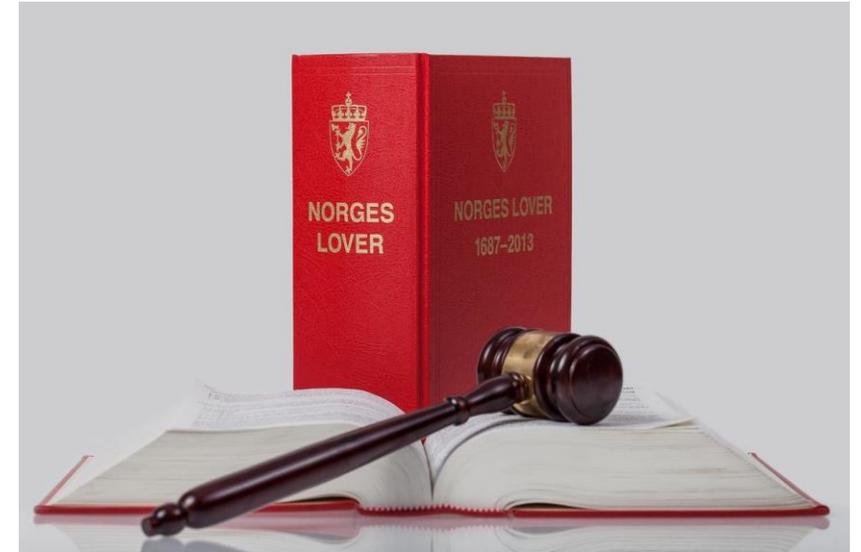
ACCESSIBILITY STANDARDS

De jure standards for design

- Forskrift om universelt design:
<https://lovdata.no/dokument/SF/forskrift/2013-06-21-732>

De facto standards for design:

- Apple
- Google
- And many more..



USABILITY

USABILITY

- Original definition of usability: “systems that are easy to use, easy to learn, flexible, and engender a good attitude in people” (Shackel, 1990)
- Usability refers to the quality of the interaction in terms of parameters such as time taken to perform tasks, number of errors made, and the time to become a competent user

USABILITY DEFINED

From ISO 9241 on ergonomics of human-system interaction:

Usability is the effectiveness, efficiency and satisfaction with which specified *users* achieve specified *goals* in particular *environments*.

http://www.usabilitynet.org/tools/r_international.htm

- **Effectiveness:** the accuracy and completeness with which users can achieve specified goals in particular environments
- **Efficiency:** the resourced expended in relation to the accuracy and completeness of goals achieved
- **Satisfaction:** the comfort and acceptability of the work system to its users and other people affected by its use

USABILITY

Benyon's principles of usability.

12 principles (grouped in 3 broader categories) that can be used as criteria for evaluation

Learnability

1. Visibility
2. Consistency
3. Familiarity
4. Affordance

Effectiveness

5. Navigation
6. Control
7. Feedback
8. Recovery
9. Constraints

Accommodation

10. Flexibility
11. Style
12. Conviviality

USABILITY

Learnability:

“Helping people access, learn, and remember the system”

- Visibility (“What is going on?”)
- Consistency (“I’ve seen that before”)
- Familiarity (“Oh, I know that!”)
- Affordance (“I know what that does”)

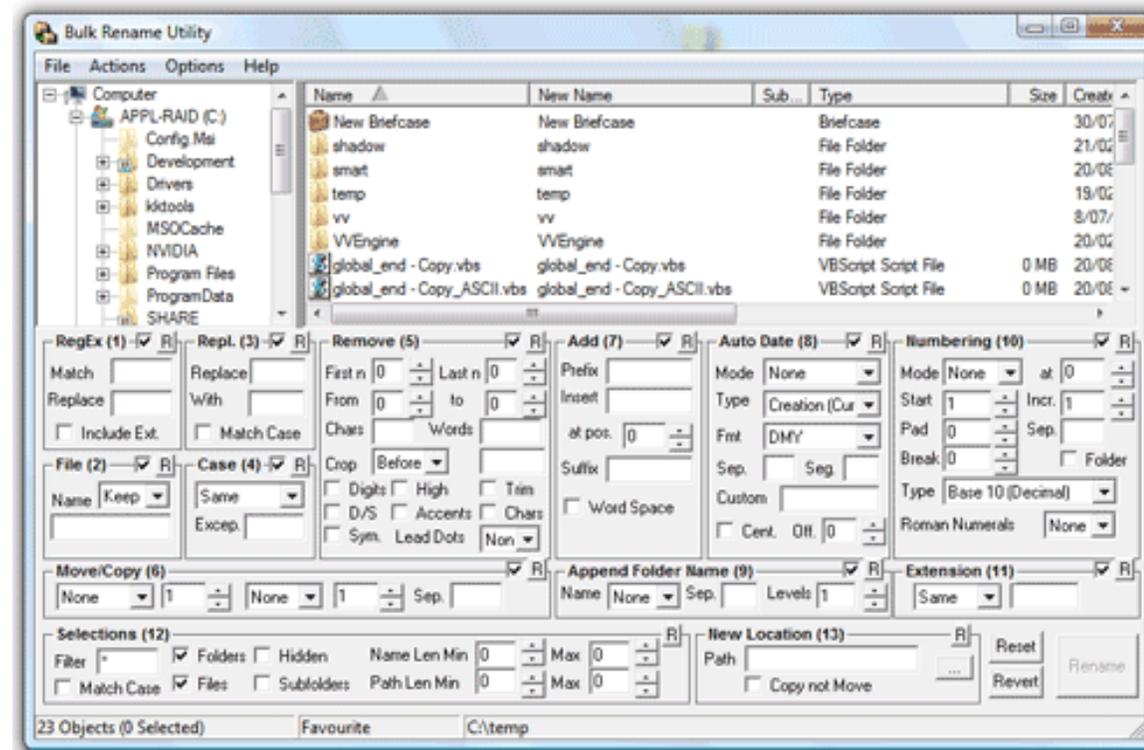


USABILITY

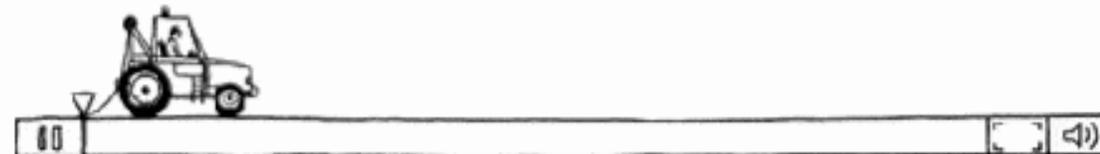
Effectiveness (ease of use):

“Giving users the sense of being in control, knowing what to do and how to do it”

- Navigation (“I know where to find it”)
- Control (“I’m on top of this!”)
- Feedback (“So that’s what’s happening”)



System loading... Please wait...



USABILITY

Effectiveness (safety):

“Where users can access the system safely and securely”

- Recovery (“Phew.. Thanks for helping me!”)
- Constraints (“Phew.. Thanks for stopping me!”)



WARNING!

Are you sure you want to alert the entire citizenry of Hawaii of an incoming ballistic missile?

This action CANNOT BE UNDONE.

Cancel

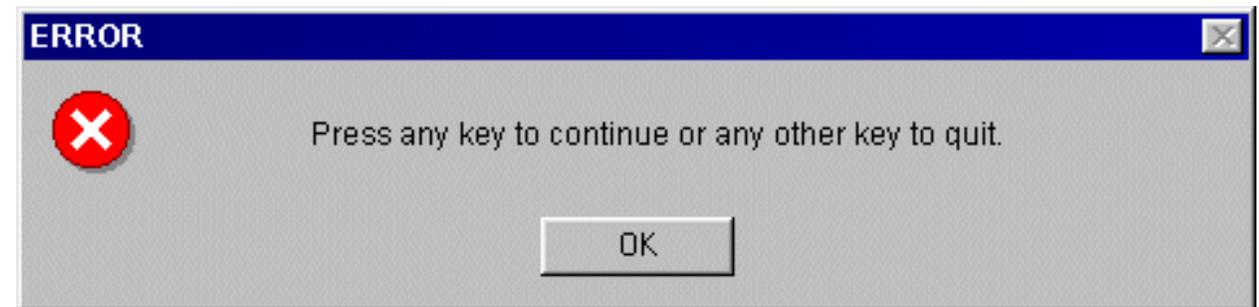
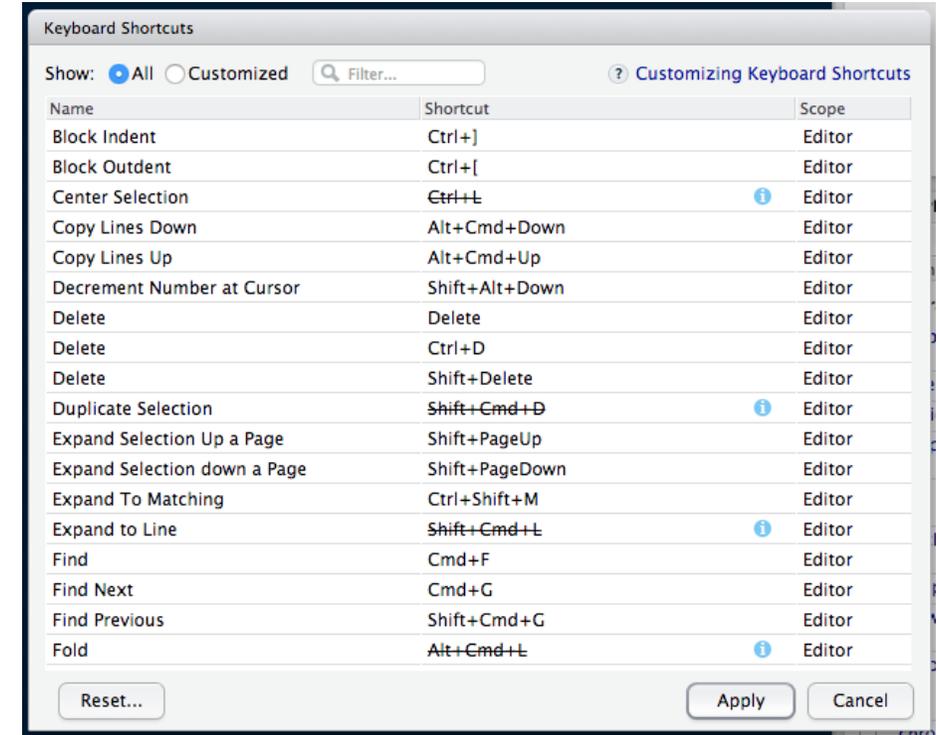
Proceed

USABILITY

Accommodation:

“Accessing the system in a way that suits the users”

- Flexibility (“This was a smarter way to do it!”)
- Style (“This looks nice!”)
- Conviviality (“The system is polite and pleasant”)



USABILITY

Nielsen's 10 principles of usability.

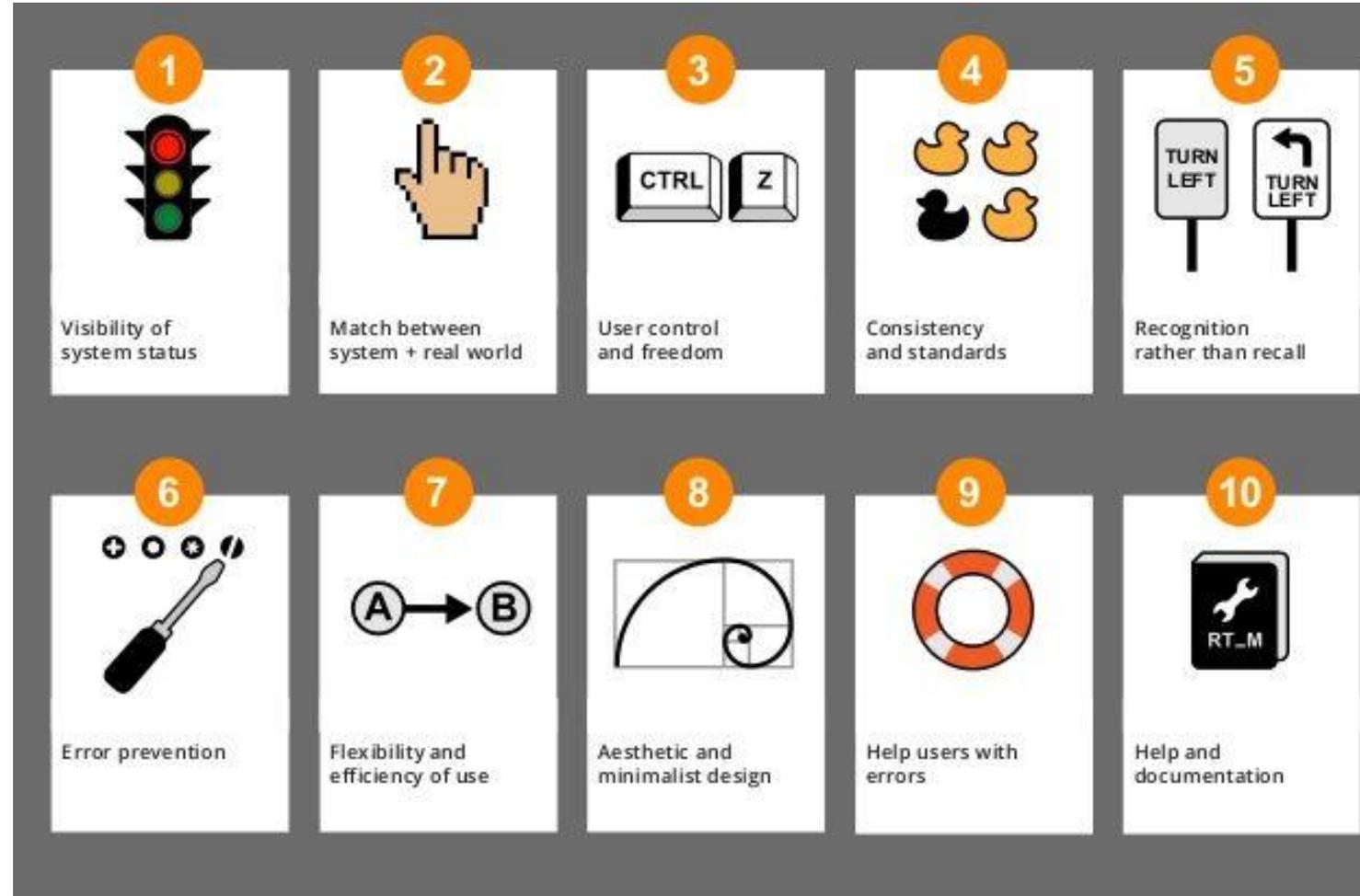
One of the most influential usability experts globally.

Classic books:

Usability Engineering (1993)

Designing Web Usability (1999)

<https://www.youtube.com/embed/hWc0Fd2AS3s>



USABILITY

- People avoid using difficult systems when they have the option
- People that have to use a difficult system waste a lot of time
- People that have to use a difficult system need more support



(Source: blog.uxeria.com)

USABILITY

<https://digitalsynopsis.com/design/important-good-web-design-impact-people-profits/>

How Web Design Impacts People and Profits



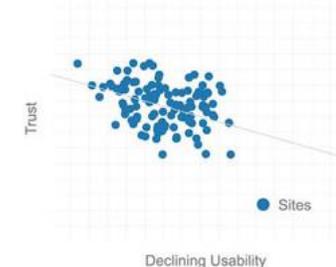
3^{1/2} out of 10 people fail to complete simple tasks on the average site.



Impact of Stumbling Blocks on Conversion



Trust Decreases as Usability Declines



How long the average person will try before giving up.

:60

Give Up Times by Tech Profile

:61 **:65** **:28**
Wired Pragmatist Minimizer

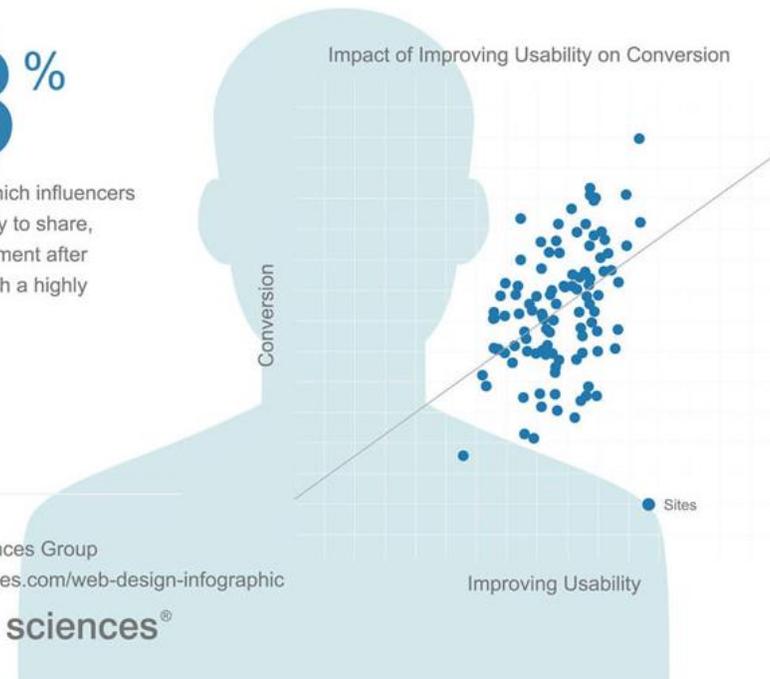
Success Rates by Selected Industries



18%

Percent by which influencers are more likely to share, follow or comment after interacting with a highly usable site.

Impact of Improving Usability on Conversion



Source

Change Sciences Group
changesciences.com/web-design-infographic

change sciences®

USABILITY

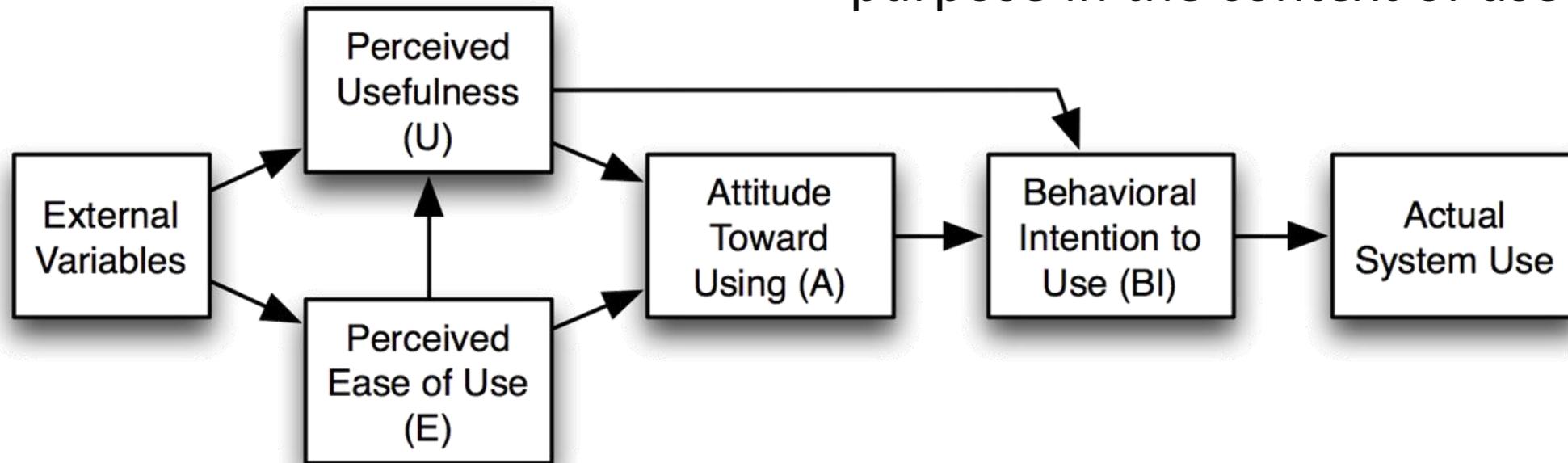
Usability is an imperative for safety-critical systems



ACCEPTABILITY

ACCEPTABILITY

- Acceptability refers to fitness for purpose in the context of use



(Source: https://en.wikipedia.org/wiki/Technology_acceptance_model)

- Personal preferences that contributes to users 'taking to' an artefact or service, or not

ETHICAL CONSIDERATIONS

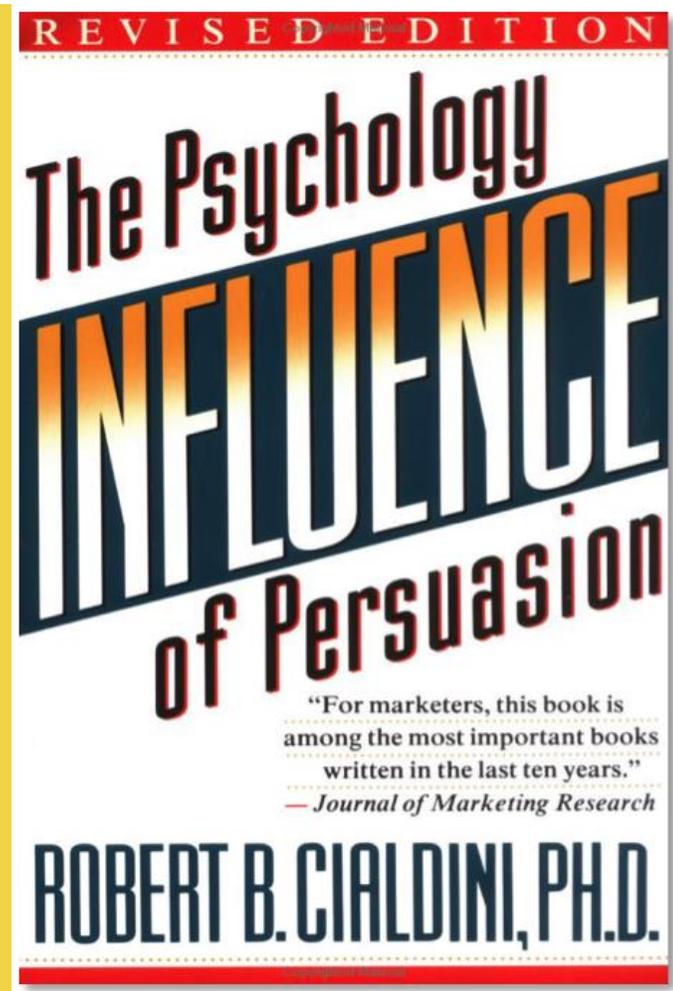
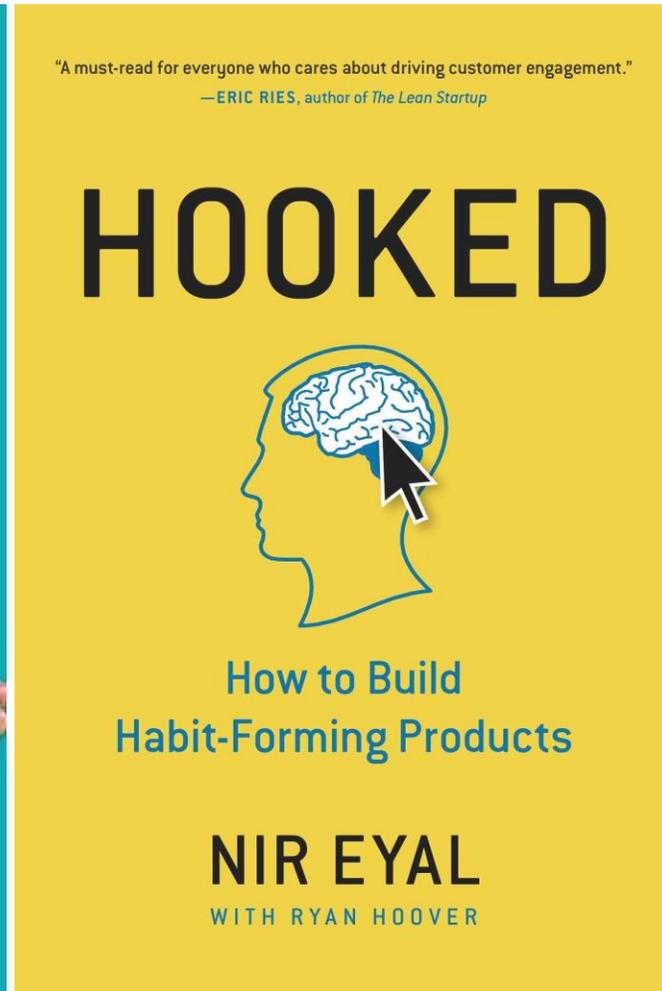
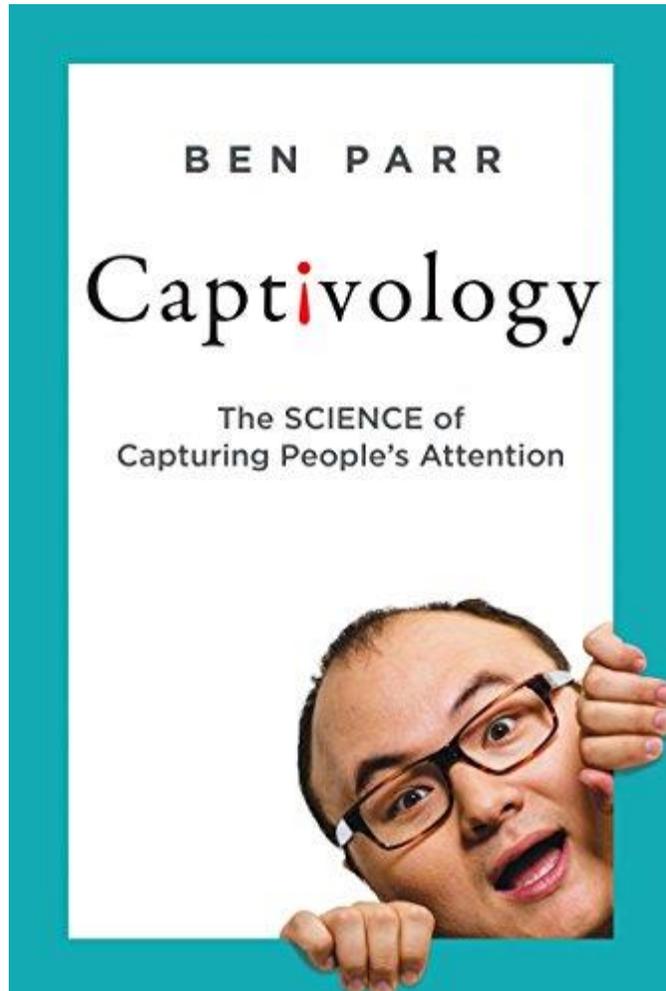
ETHICS

- Interface Designers' role is not to optimize user experience regardless of system purpose.
- Designers need to understand the values that their designs are aiming at (Cockton, 2008).
- Designers need to consider what worth their designs bring to the world! (Benyon 2013).



(Source: losspreventionmedia.com)

ETHICS



ETHICS

- Does your product honor both on and off-screen possibilities?
- Does your product make it easy to disconnect?
- Does your product enhance relationships, or keep people isolated?
- Does your product respect people's schedules and boundaries?
- Does your product minimize misinterpretations and empower truth-seeking?
- Does your product eliminate detours and distractions?



(Source: vimeo.com/timewellspent)

<https://humanetech.com/designguide>



WHAT IF TECHNOLOGY WERE CONSCIOUS OF YOUR TIME?

<https://www.youtube.com/embed/pyQg5vUg-pA>

ETHICS



Facebook and Instagram roll out new features to help us realize when we're wasting time on the apps

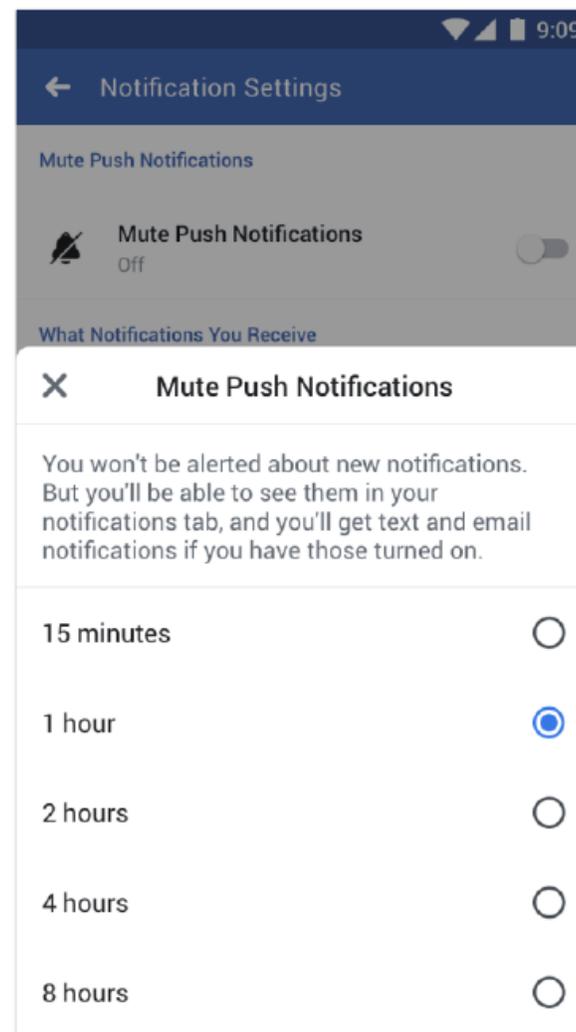
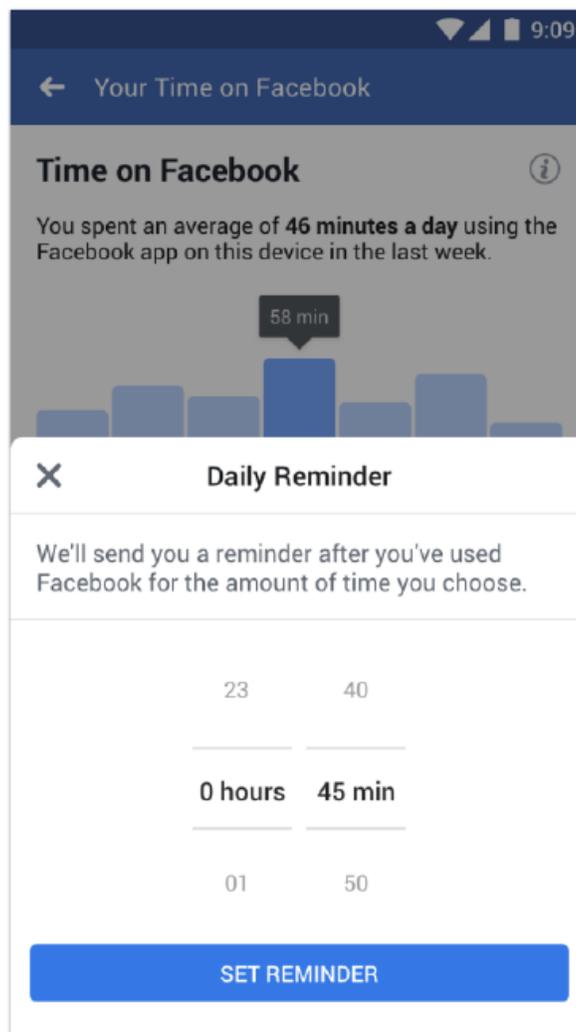
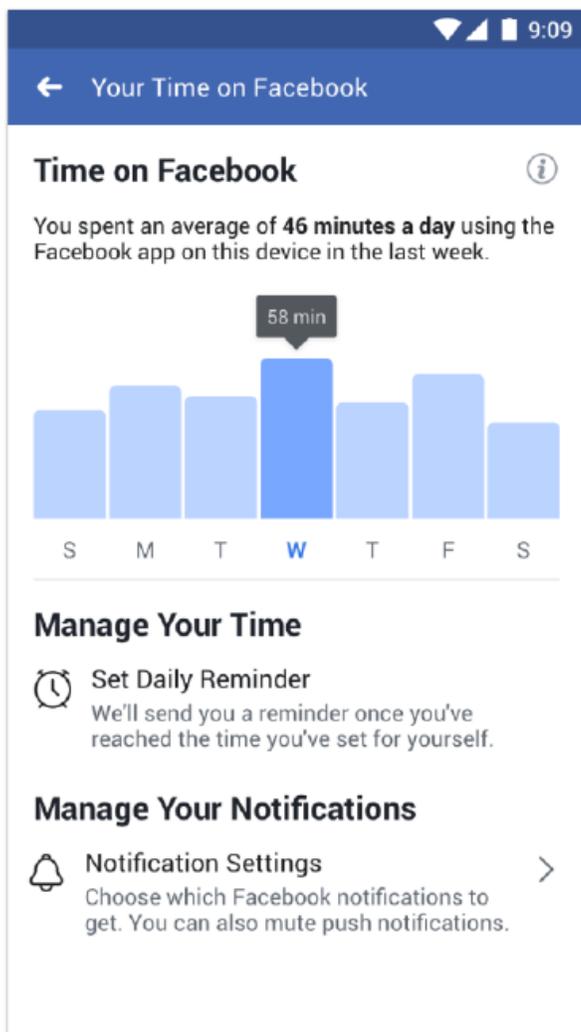
- Facebook and Instagram will roll out features that show people how much time they've spent on the apps.
- The effort is part of an ongoing effort to be more responsible with its community rather than push for engagement, the company tells CNBC.
- But academics aren't convinced these features will make a difference.

Christina Farr | @chrissyfarr

Published 7:02 AM ET Wed, 1 Aug 2018



ETHICS





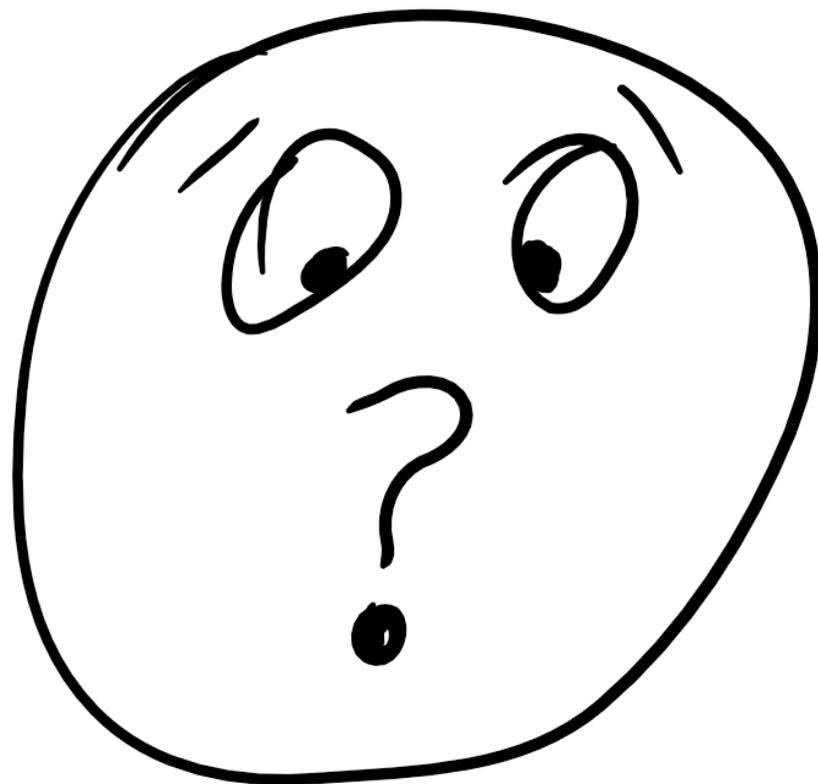
THE ATTENTION ECONOMY

<https://www.youtube.com/embed/50R21mbLLb0>



- Designing for UX
- Designing for accessibility
- Designing for usability
- Acceptability
- Ethics

QUESTIONS?





- Design principles for usability (Tafiqur)

