Week 3: Software User Interfaces

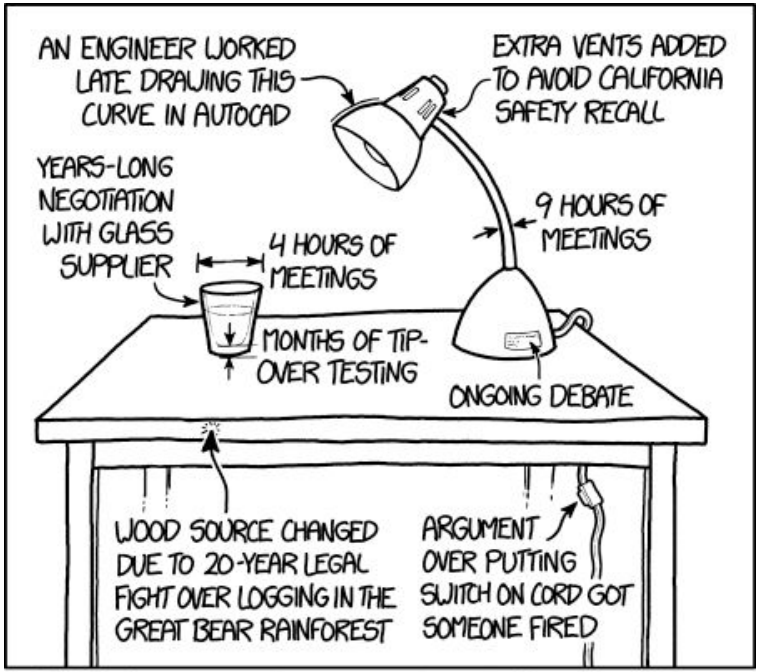
Dr. Sridhar Iyer, IIT Bombay
Dr. Prajish Prasad, FLAME University

Software Engineering

Introduction to Interaction Design

Dr. Sridhar Iyer, IIT Bombay
Dr. Prajish Prasad, FLAME University

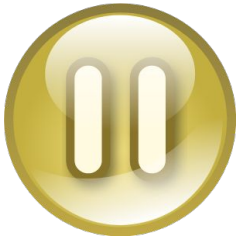
Design in Everyday Objects



https://xkcd.com/1741/

Reflection Spot

Can you think of experiences where you have been left frustrated by the user interface of a website or an app?



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DVD-Spiller
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EL-Scooter & Bil
Figurer
Golf-biler (m/skilt)
Hobby & RC
Hoverpod
HP-Måler (Bil)
Isbitmaskin
Kamera (trådløst)
Kino (bærbar)
Kompass (Bil/Båt)
Laser-Jamer (Bil)
Luft-Jekk
Lykt (oppladbar)
Mobil-telefon-1 ,2
Motorsykkel-Mini
Omformer (110V)
Oversetter (44 spr)
PC-mini (9 ")
Drone med Kamera
quattro-X
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Activities involved in Interaction Design

- Identifying needs and requirements
- Developing alternative designs that meet those requirements
- Build interactive versions
- Evaluate

Usability Goals

Dr. Sridhar Iyer, IIT Bombay
Dr. Prajish Prasad, FLAME University

Recap

- Importance of designing “good” user interfaces

Goals + principles required to design “usable” interfaces

Usability

ISO 9241-11 standard

“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”

Usability Goals

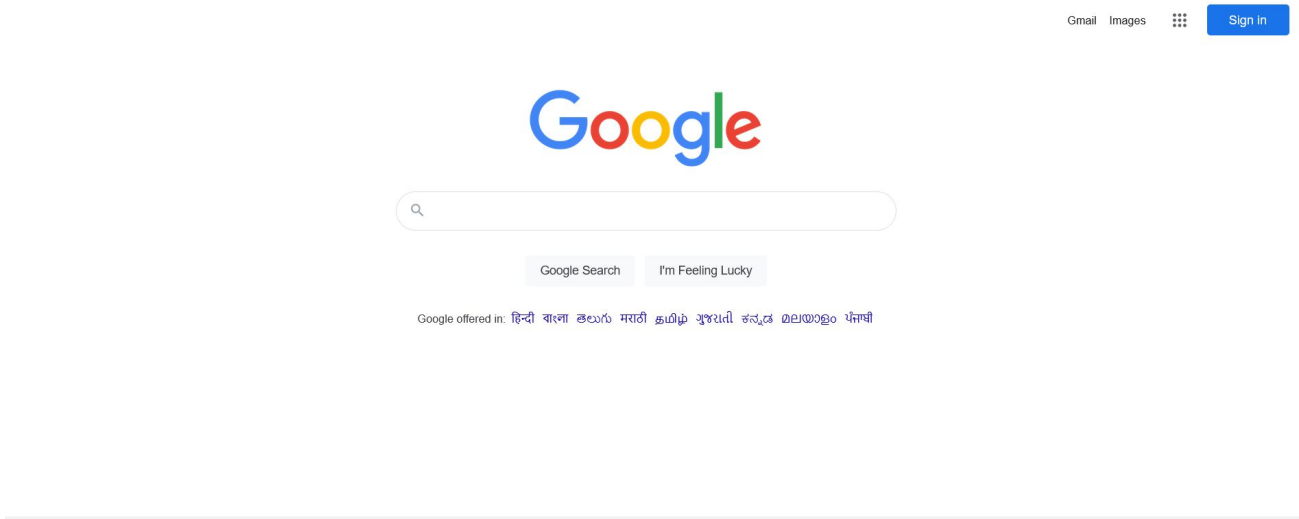
- Effectiveness
- Efficiency
- Safe to use
- Learnability
- Memorability

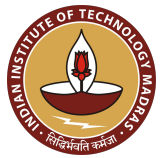
Effectiveness

- How good a system is at doing what it is supposed to do

- Is the system capable of
  - allowing people to learn well
  - carry out their work efficiently
  - access the information they need
  - buy the goods they want etc.?

Effectiveness Examples

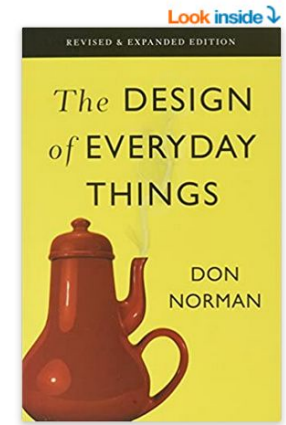




Effectiveness Examples

‹ Back to results

Sponsored



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by Don Norman (Author)

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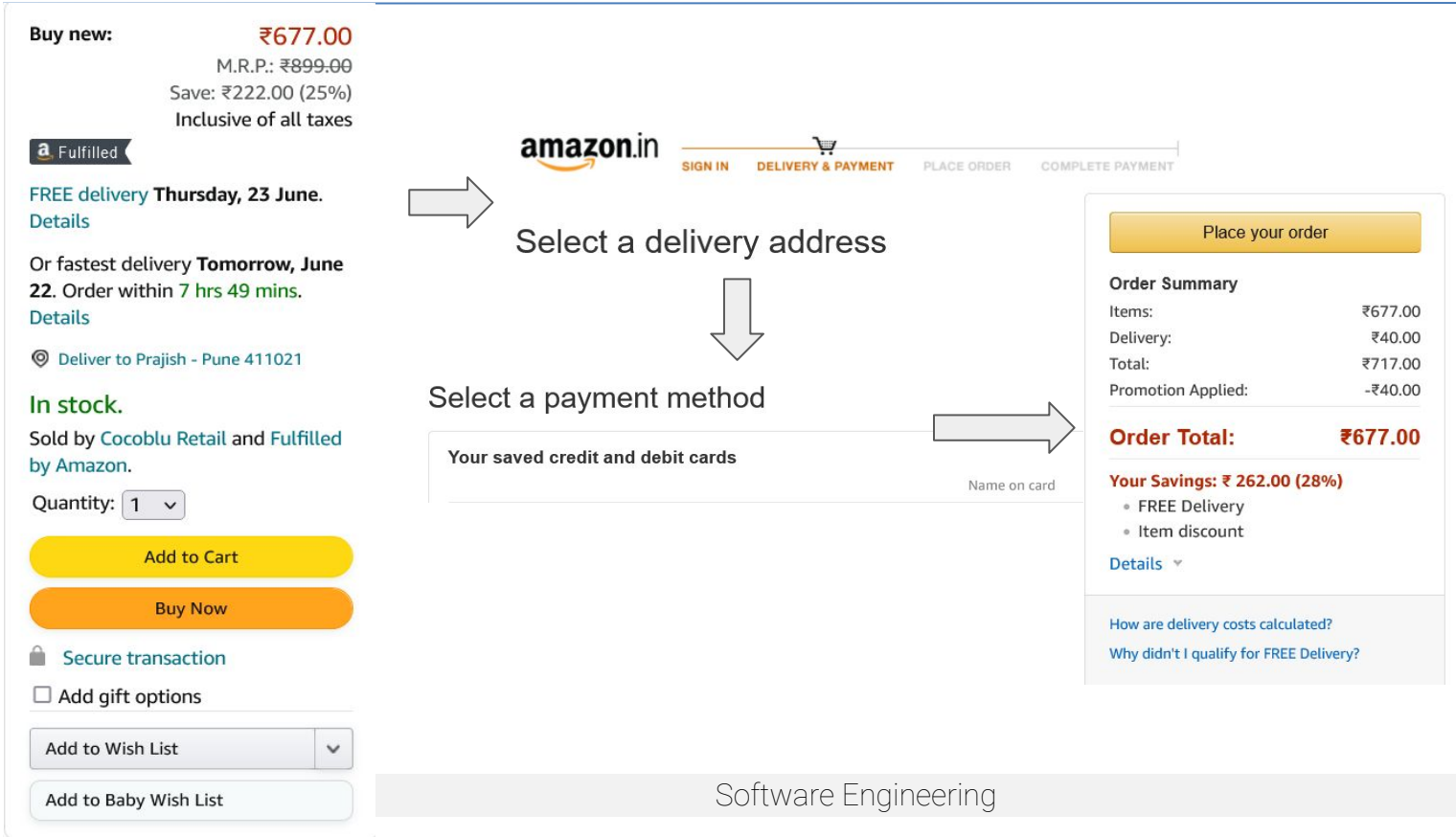
Efficiency

- How does a system support users in carrying out their tasks
- Common tasks through a minimal number of steps

Efficiency Example



Safety

- Protecting the user from dangerous conditions and undesirable situations
- E.g. X ray machines, chemical plants

Therac - 25

Safety

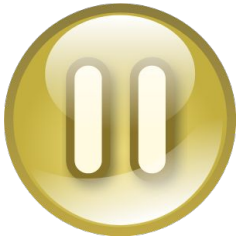
- Helping users in any situation to avoid carrying out unwanted actions accidentally
  - Reduce the risk of wrong keys being pressed
  - Provide a means of recovery if you made errors

Reflection Spot

Recall software applications that you have used.

Are there ways in which these applications helped -

- Reduce the risk of wrong keys being pressed
- Provide a means of recovery if you made errors



Please pause the video and written down your responses

Safety

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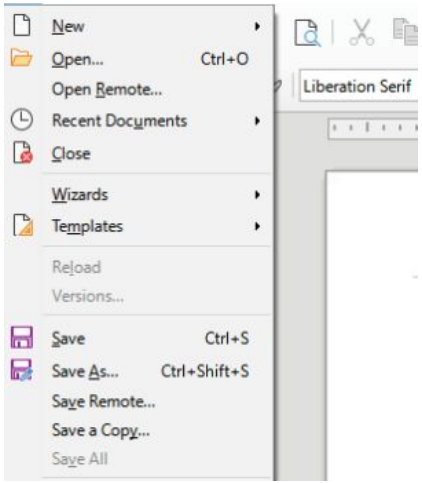


Save and close are far apart

Safety

- Helping users in any situation to avoid carrying out unwanted actions accidentally
  - Provide a means of recovery if you made errors

    - Accidentally deleted a file ➜ recover from trash
    - Computer accidentally shut down while editing a document ➜ recovery options
    - Undo - Ctrl Z
    - WhatsApp - Delete a message!

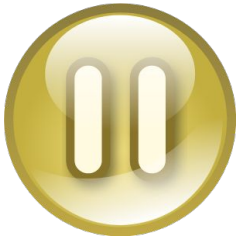
Learnability

- How easy a system is to learn to use
- Want to get started right away and carry out tasks without much effort
- E.g. - FB, Instagram, WhatsApp, Amazon

Reflection Spot

But what about complex tasks?

What are ways in which you can help users learn how to use your system?



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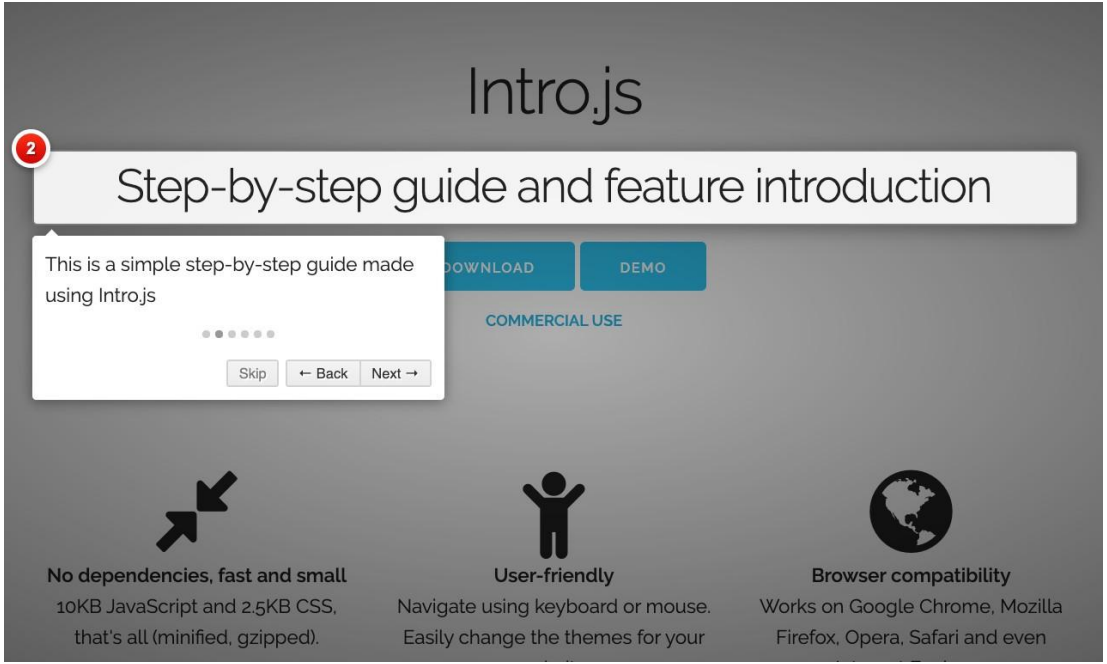
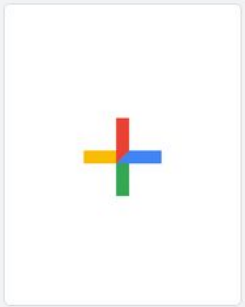
Learnability - Complex Tasks

Learnability - Complex Tasks



Learnability - Complex Tasks

Recently used



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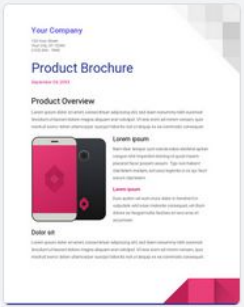
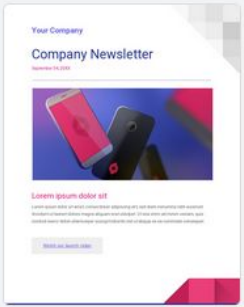
Sales quote
by PandaDoc

Statement of work
by Upwork



Brochure
Geometric



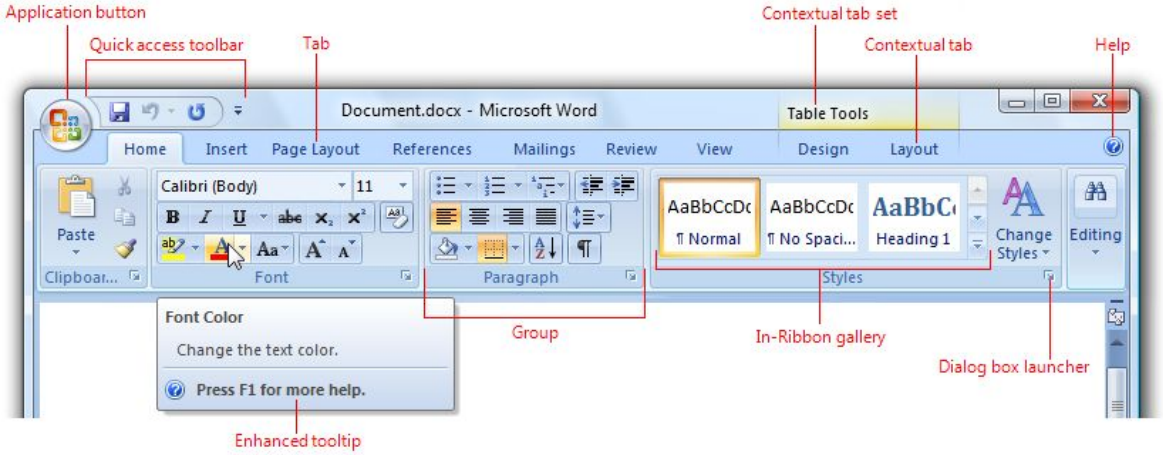
Newsletter
Geometric

Resume
Serif

Resume
Coral

Memorability

How easy a system is to remember how to use, once learned



User Experience Goals

- Want users to experience positive emotions while using the software
- E.g. - satisfying, enjoyable, fun, helpful, entertaining, helpful, motivating, emotionally fulfilling etc.
- More subjective
- How users experience a product from their perspective

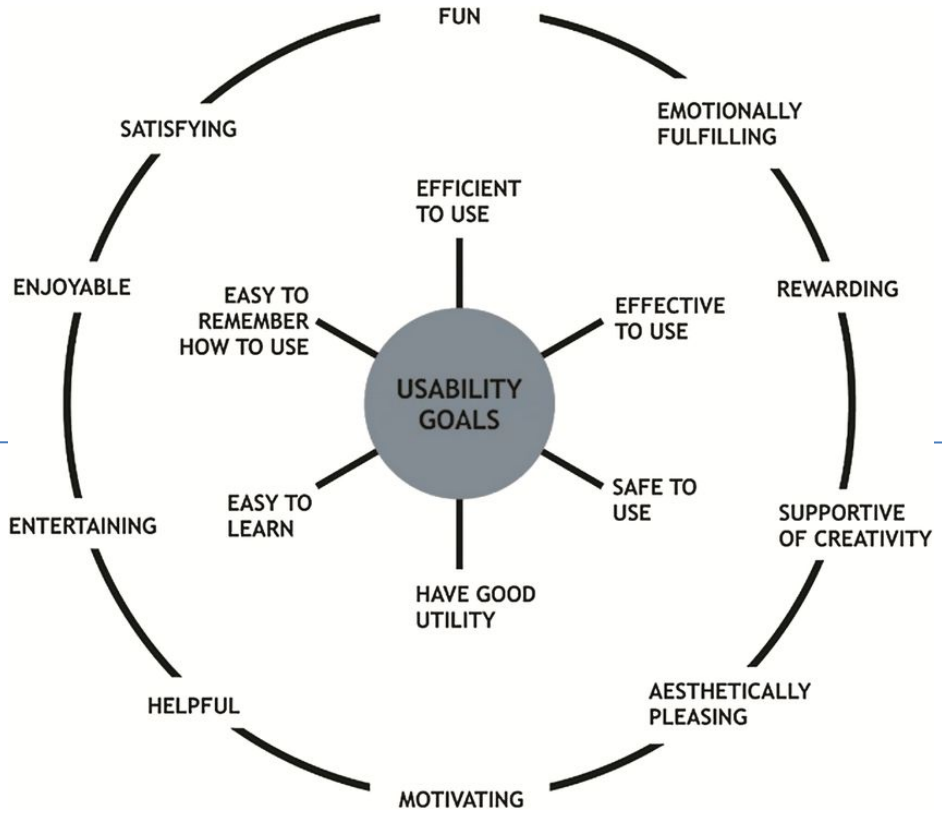


Diagram Jennifer Preece on usability goals and user experience.
Source: www.sharritt.com/CISHCIExam/preece.html

Prototyping Techniques

Dr. Sridhar Iyer, IIT Bombay
Dr. Prajish Prasad, FLAME University

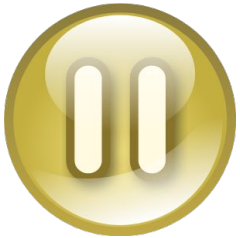
Recap

- Goals and principles to design “usable” interfaces

- Process of interaction design -
  - Identifying needs and requirements
  - Developing alternative design that meet those requirements
  - Build interactive versions
  - Evaluate

Reflection Spot

Are we ready to code? Why shouldn't we code the UI right away?



Please pause the video and written down your responses

Why we shouldn’t start coding

- Initial design ideas might not be the best ones
- Developing an interface takes time, money, effort

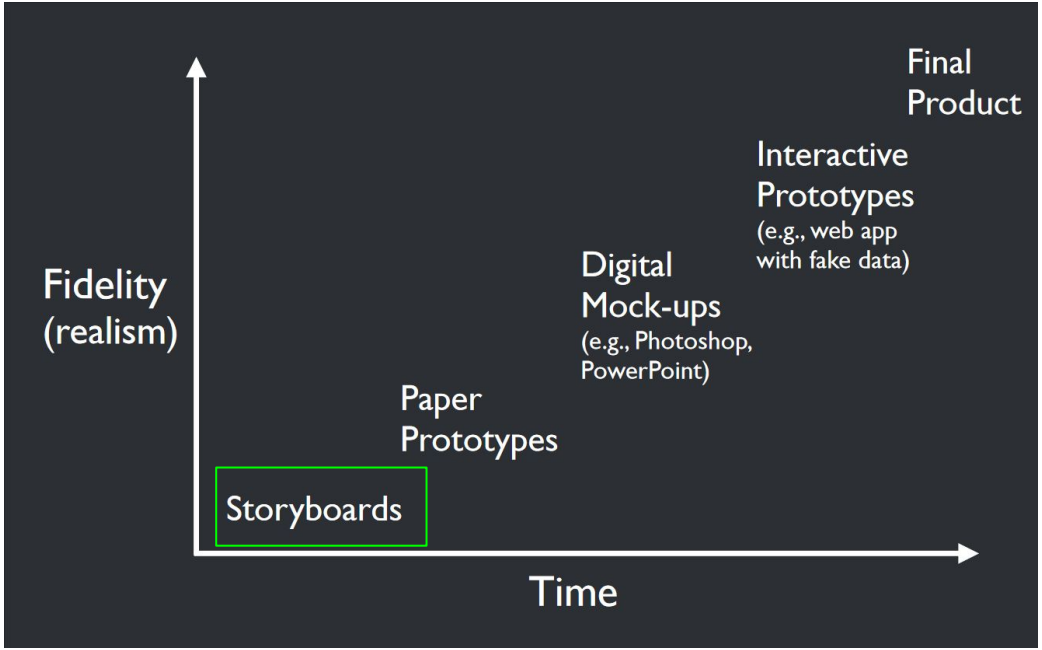
- Prototypes allow you to quickly test on users, get feedback, iterate, and pivot

Prototyping

- Prototypes answer questions and support designers in choosing between alternatives.

- Purpose -
  - Test out technical feasibility of an idea
  - Clarify some vague requirements
  - User testing and evaluation

Types of Prototypes



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Storyboard

A hand-drawn comic that features:

Setting + Sequence + Satisfaction

Setting
- People involved
- Environment
- Task being accomplished

Sequence
- What steps are involved?
- What leads someone to use the app?
- What task is being illustrated?

Satisfaction
- What motivates people to use the system?
- What does it enable people to accomplish?
- What need does the system fill?

Storyboard example

Speak-Up - Virtual reality tool to help give effective presentations

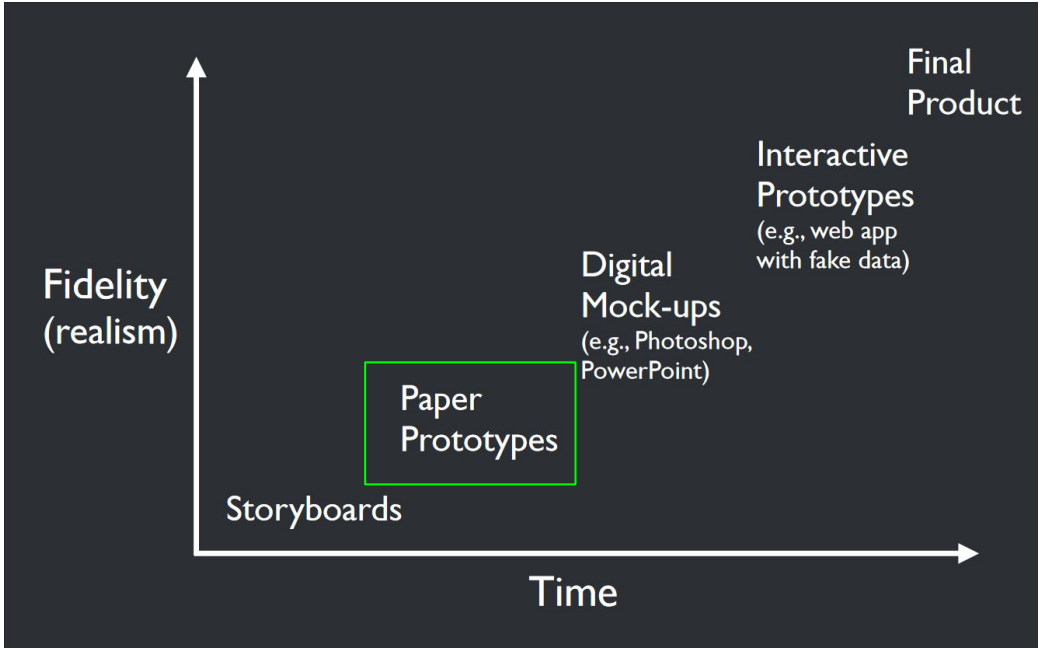
- Simulate a presentation setting
- Recording of audio during the presentation
- Hints are provided during the presentation process

Taken from Introduction to Human Computer Interaction course - Prof. Chandan Dasgupta - IIT Bombay
Team members - Nagesh Pokle, Deepika Kanojia, Vishvanath Falegaonkar, Dr. Veenita Shah

Benefits of Storyboard

- Emphasizes how interface accomplishes a task
- Avoids commitment to a particular user interface
- Shared understanding among stakeholders

Types of Prototypes



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Paper Prototypes

- Hand-drawn interface
- Multiple pieces of paper

Paper Prototypes Example

Online Library for Deaf and Hard of Hearing (DHH) and Speech Impaired Students

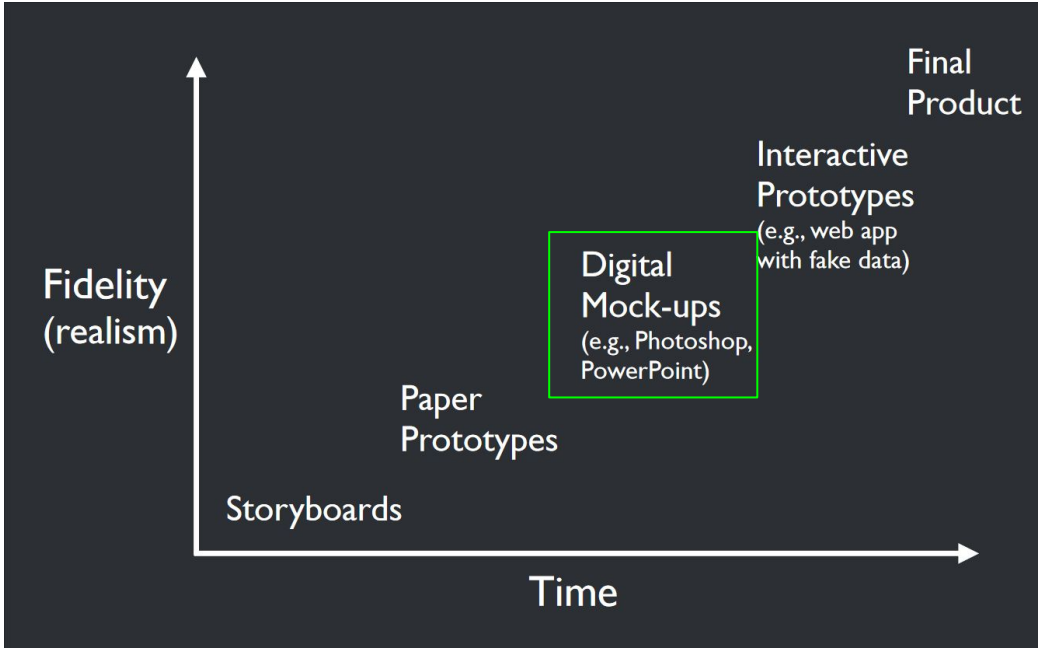
- Books in Indian Sign Language (ISL)
- Speech Therapy

Taken from Introduction to Human Computer Interaction course - Prof. Chandan Dasgupta - IIT Bombay
Team members - Meera Daulatrao Pawar, Jyoti Kolap, Nisumba Soodhani K, Vijaya Singh, Devanshu Saindane

Benefits of Paper Prototypes

- Easier than writing code for user interface
- Starts conversation about user interactions
- Elements can be changed immediately based on given feedback

Types of Prototypes



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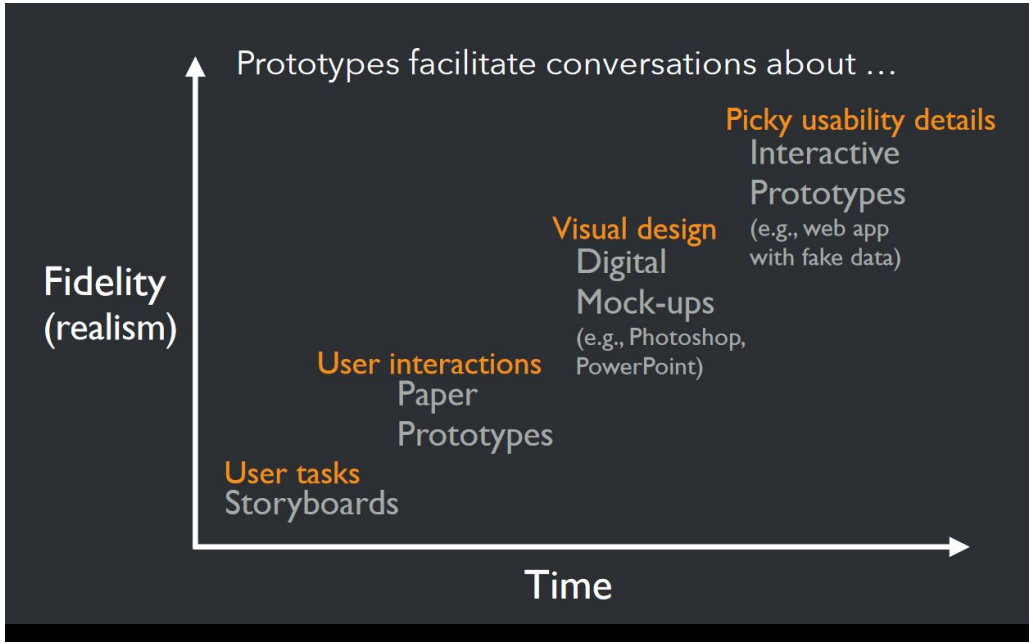
Summary



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Evaluation using Design Heuristics - Heuristics for Understanding

Dr. Sridhar Iyer, IIT Bombay
Dr. Prajish Prasad, FLAME University

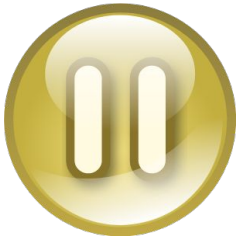
Recap

- Usability, user experience goals
- Prototyping

How do we evaluate the UI of the prototype?

Reflection Spot

What are ways in which you can evaluate the user interface of your prototype?



Please pause the video and written down your responses

Evaluation of User Interface

- Assess with real users
- Critique from expert designers
  - Subjective?
  - Specific guidelines

Heuristic Evaluation

- Heuristics are the strategies derived from previous experiences with similar problems

- Rules of thumb/guidelines

Heuristic Evaluation

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Heuristic Evaluation

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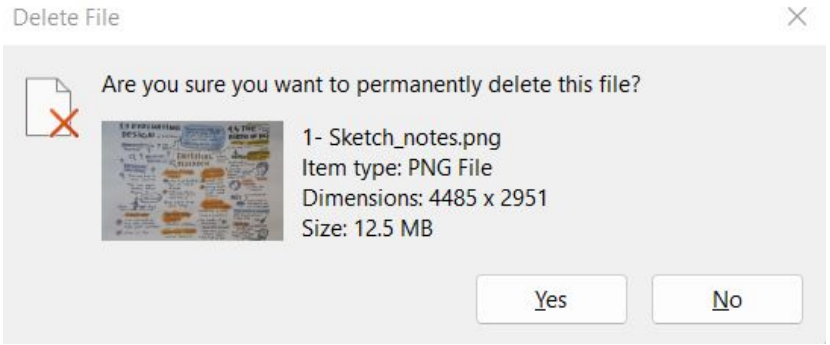
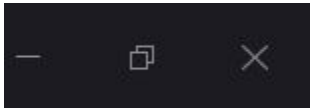
Heuristics for Understanding

- Consistency
  - Consistent Layout





Heuristics for Understanding

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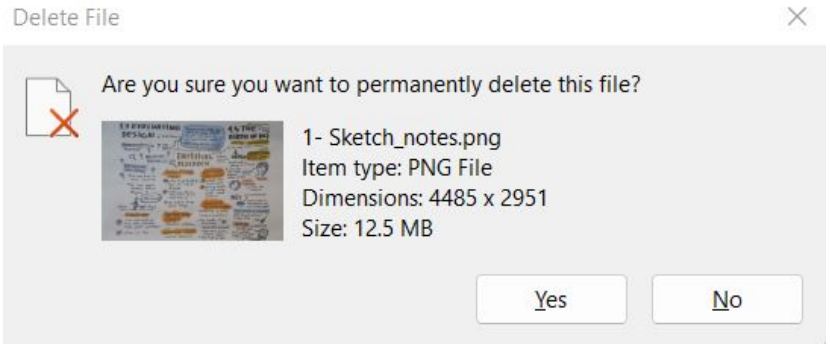
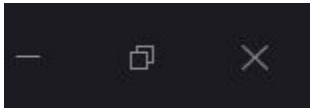
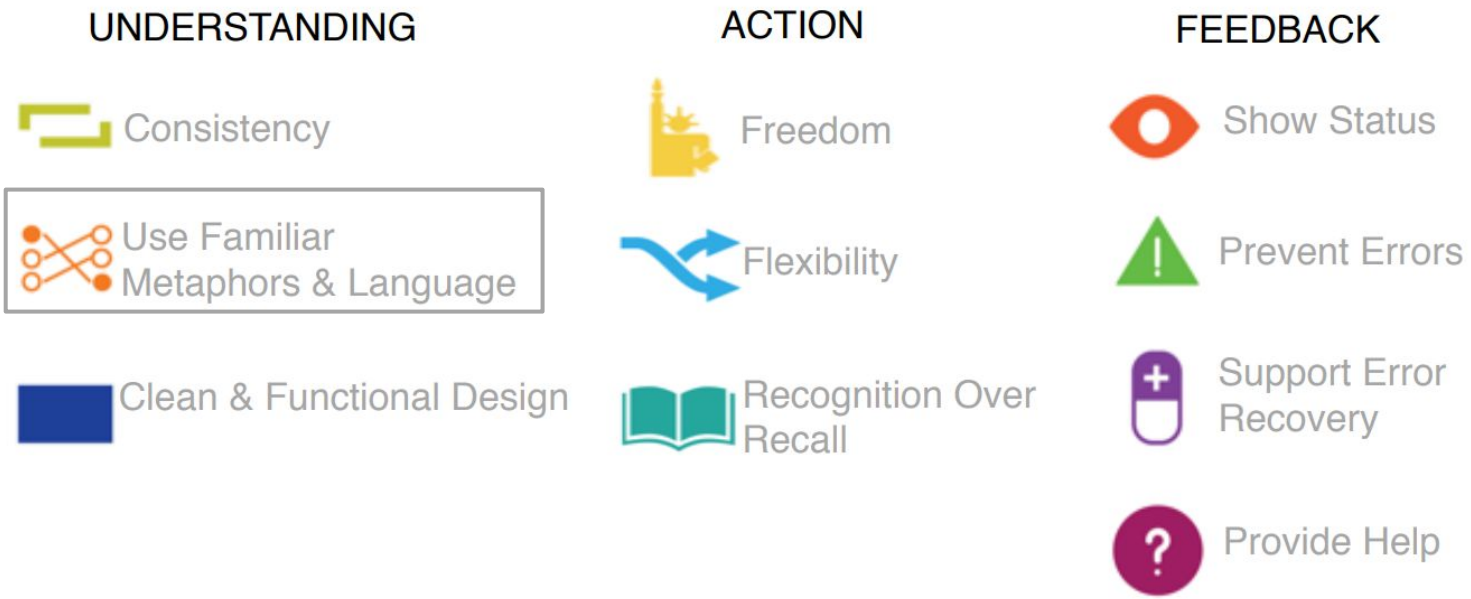




  - Consistent Name

Heuristic Evaluation



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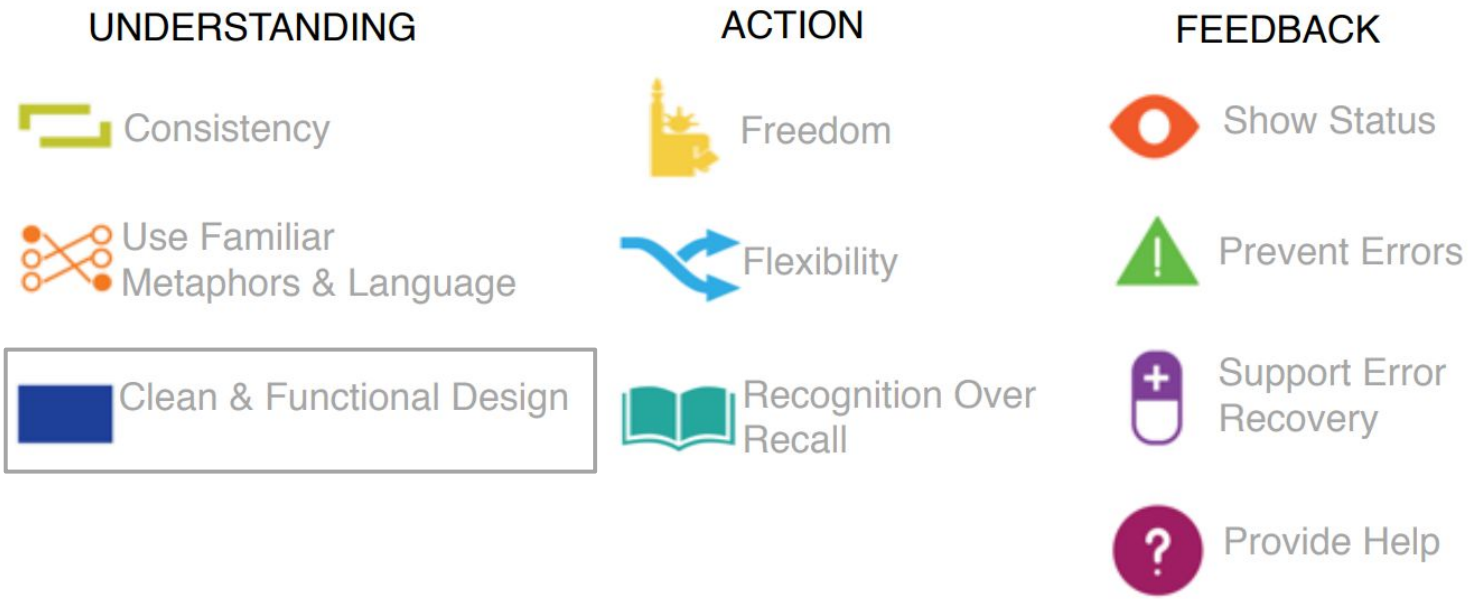
Heuristics for Understanding

Use Familiar Languages and Metaphors

- Online Shopping

- Paying Online - “Mobile Wallet”

Heuristic Evaluation



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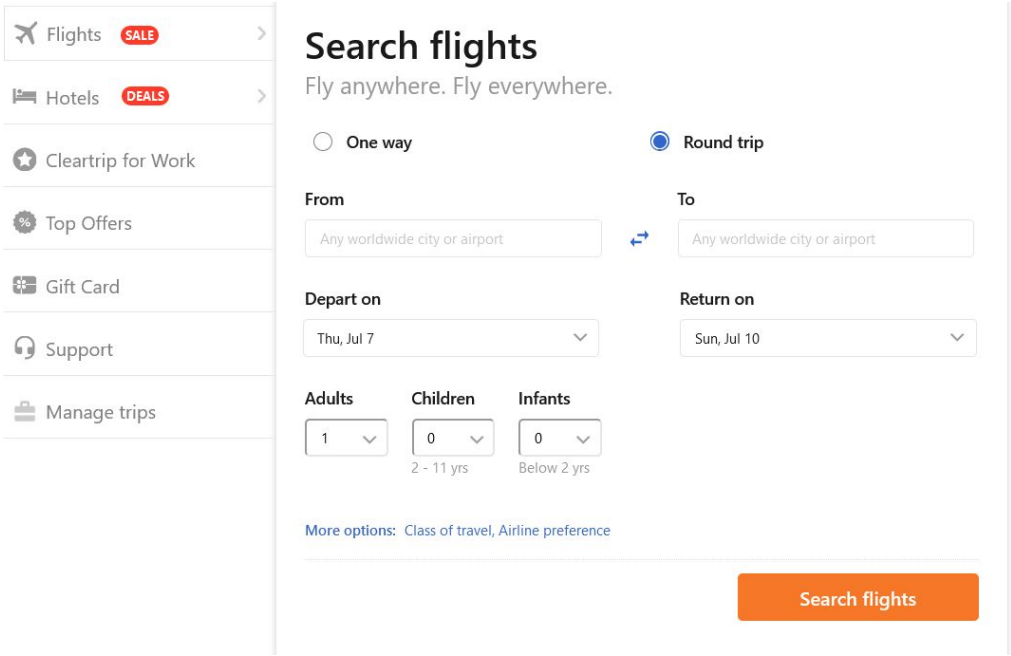
Heuristics for Understanding

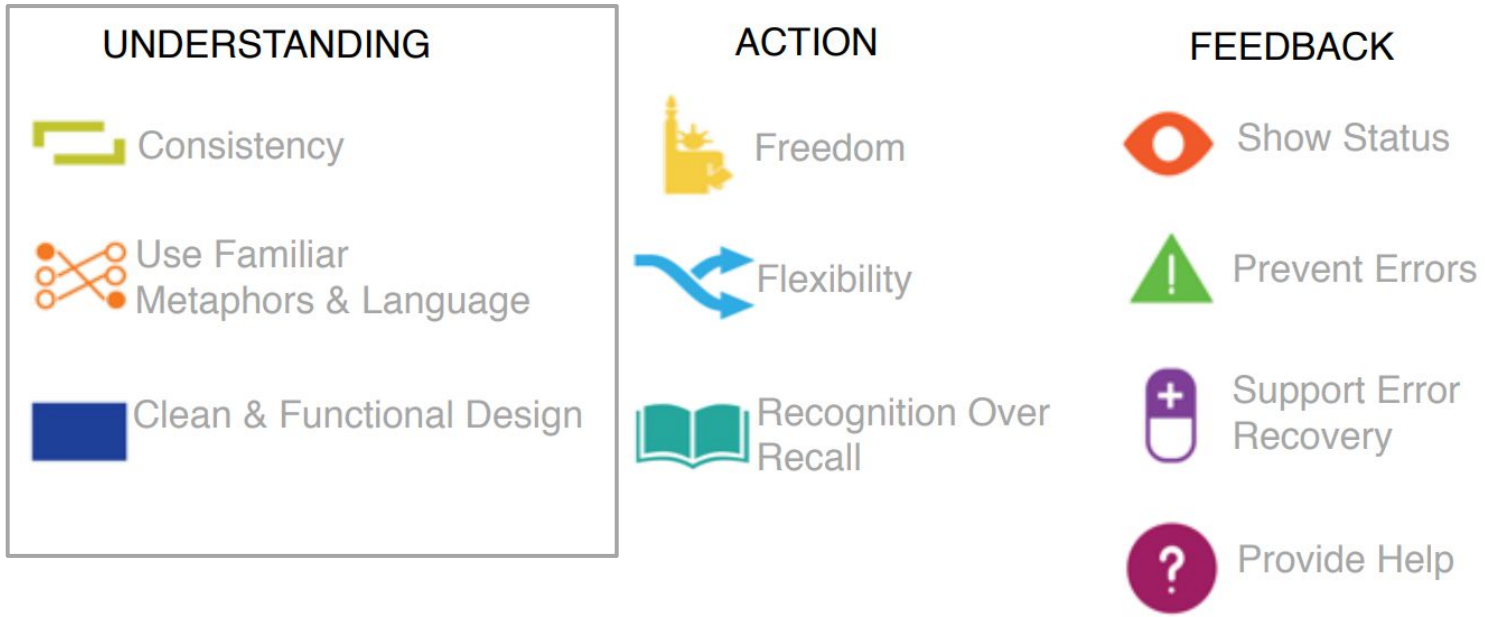
Clean and Functional Design

Heuristics for Understanding

Clean and Functional Design



Summary



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Evaluation using Design Heuristics - Heuristics for Action

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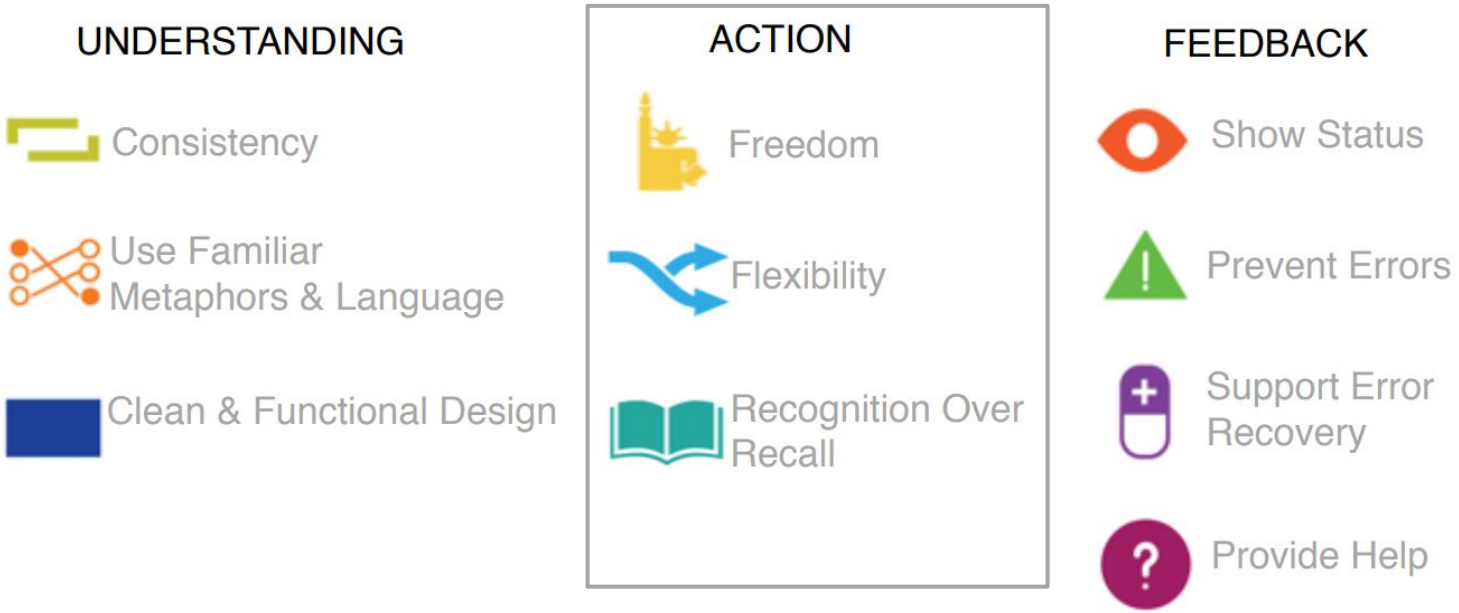
Heuristic Evaluation



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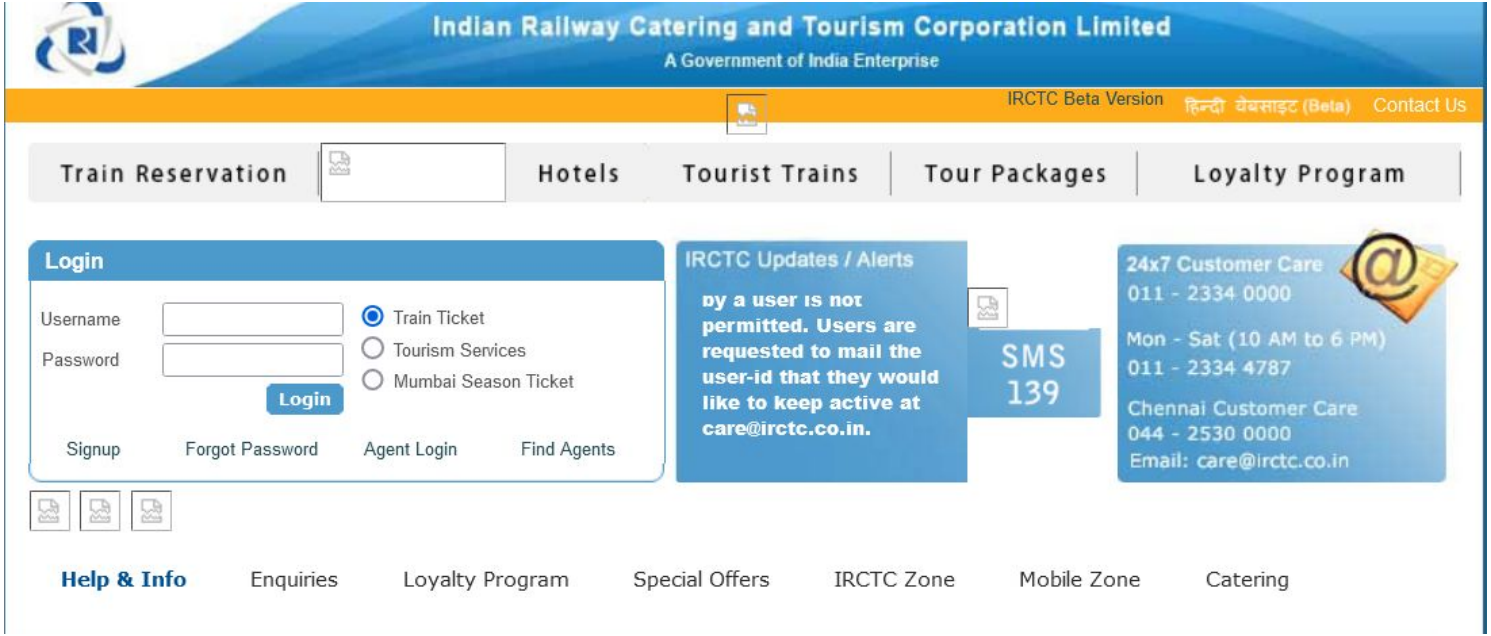
Freedom

- Freedom to Undo
  - Deleted a file? Recover from trash
  - Document - recovery options
  - Undo - Ctrl Z

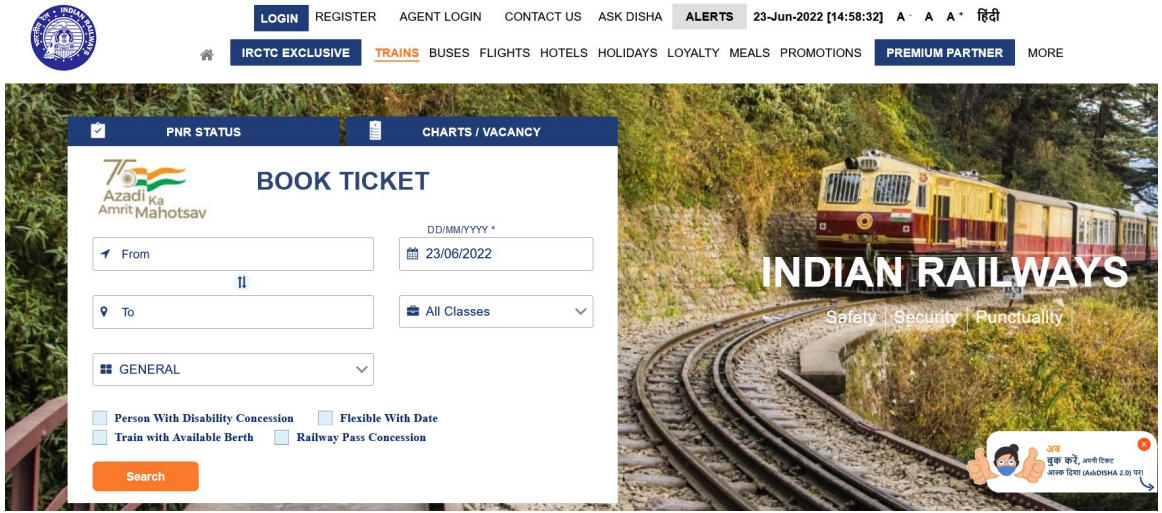
Freedom

- Freedom to Explore

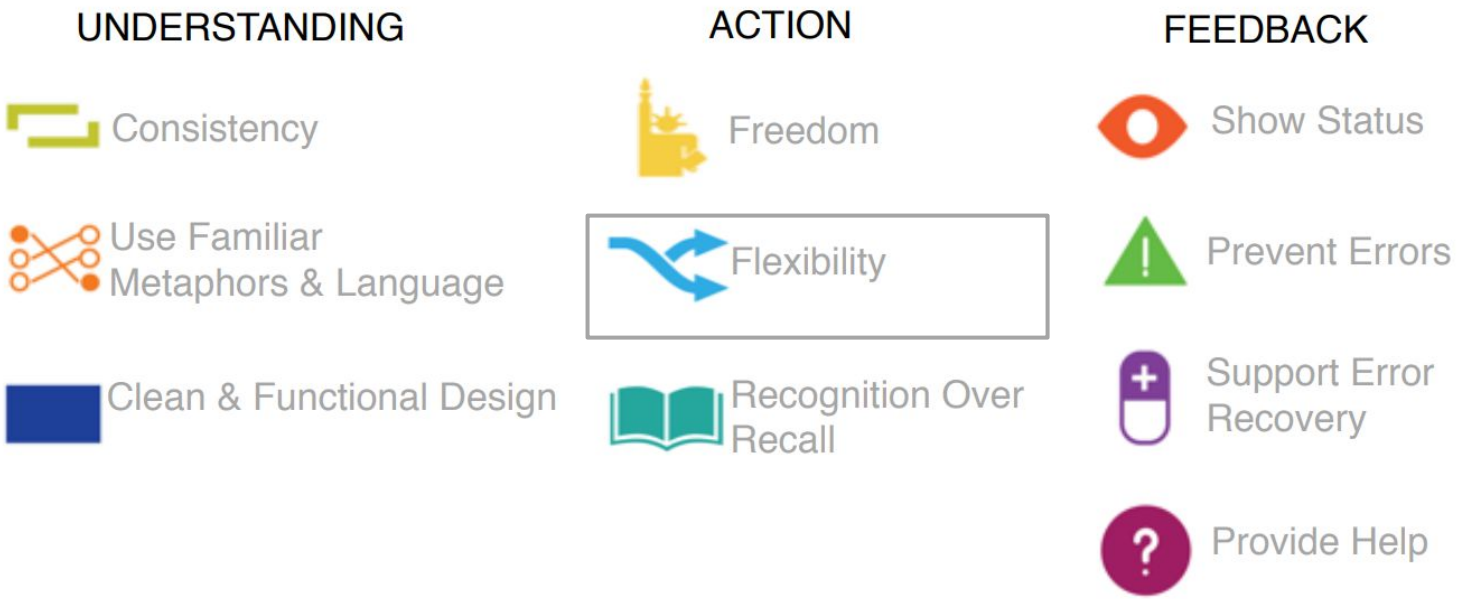


Freedom

- Freedom to Explore



Heuristic Evaluation



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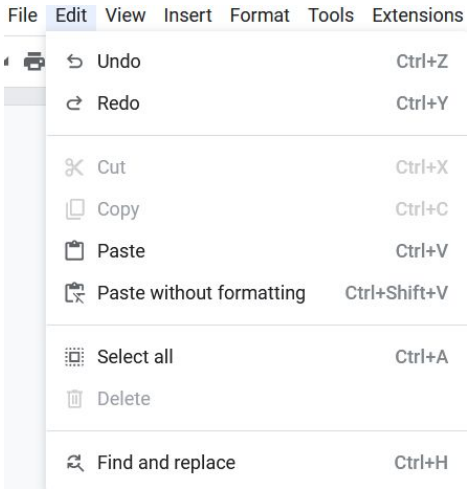
Flexibility

- Experts as well as new users should be able to carry out tasks efficiently
- Example: Word, Google Docs etc.

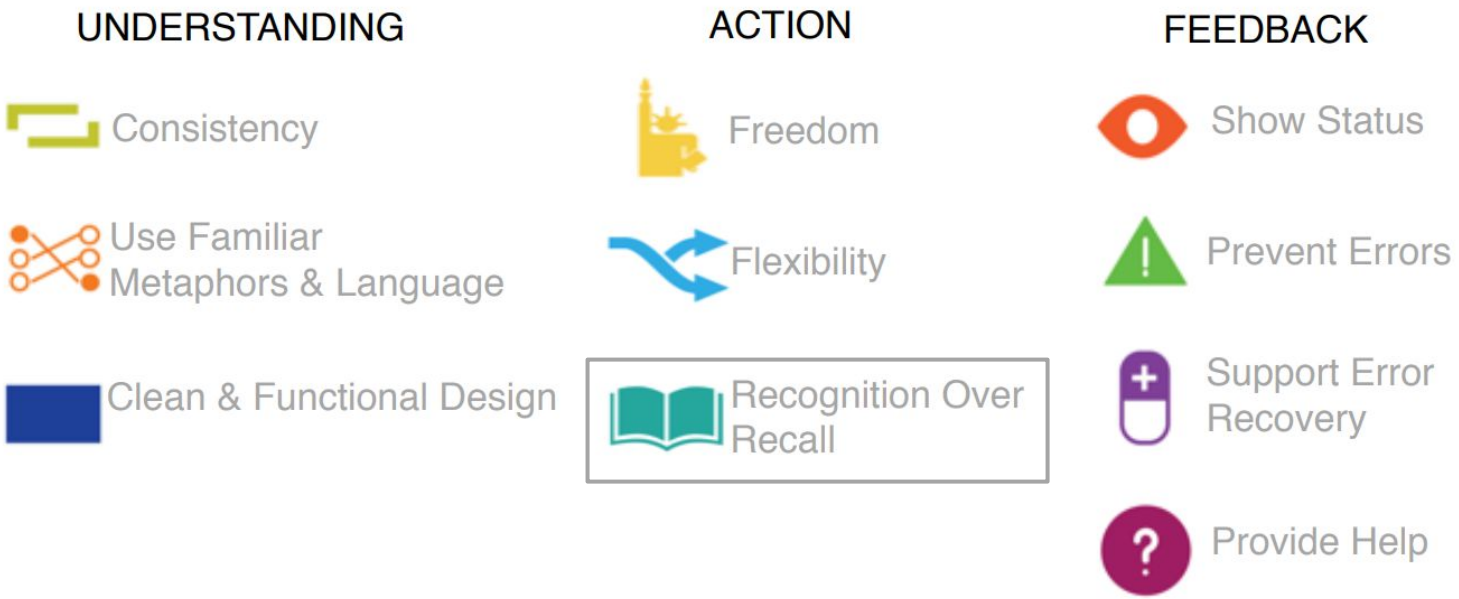


Flexibility

- **Personalization** - Tailoring content/functionality for individual users
  - Social media apps

- **Customization** - allow users to make selections about how they want the product to work
  - E.g. - News apps - asks users to select which topics they want news about

Heuristic Evaluation



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Recognition over Recall

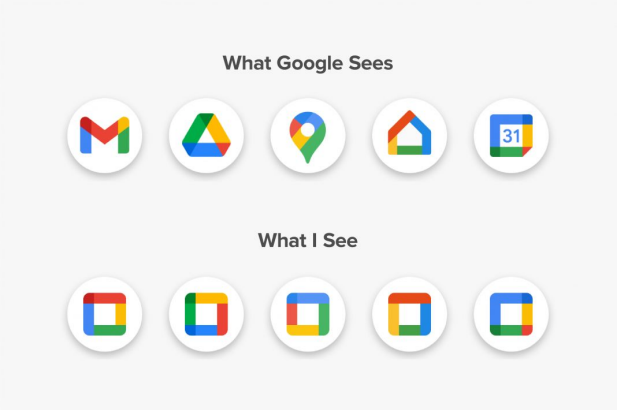
- Users find it easier to recognize something they have seen earlier

- E.g -
  - Pre-GUI era - Moving a file from one location to another in linux?
    - `mv temp.txt new_folder/`
  - Now - Moving a file from one location to another?
    - Right click on the file!

Recognition over Recall

- Interface - buttons, navigation etc. should help the user reach his goal

https://techcrunch.com/2020/10/06/googles-new-logos-are-bad/

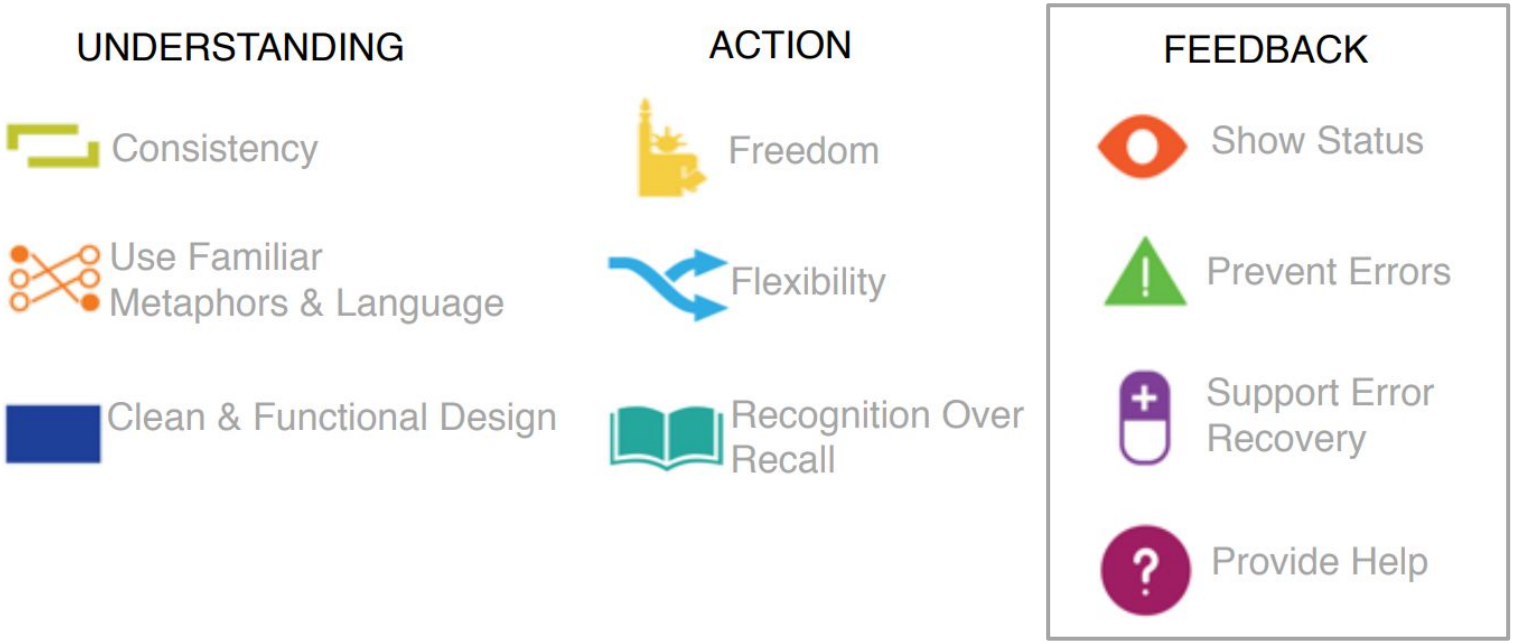


https://thehardcopy.co/is-the-criticism-of-google-icons-justified/

Evaluation using Design Heuristics - Heuristics for Feedback

Dr. Sridhar Iyer, IIT Bombay
Dr. Prajish Prasad, FLAME University

Heuristic Evaluation



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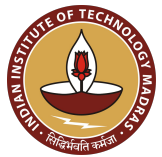
Show Status

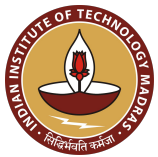
- Keep users informed about what is happening, through appropriate feedback within a reasonable amount of time.
  - Loading Status in browsers
  - How much time a particular action will take



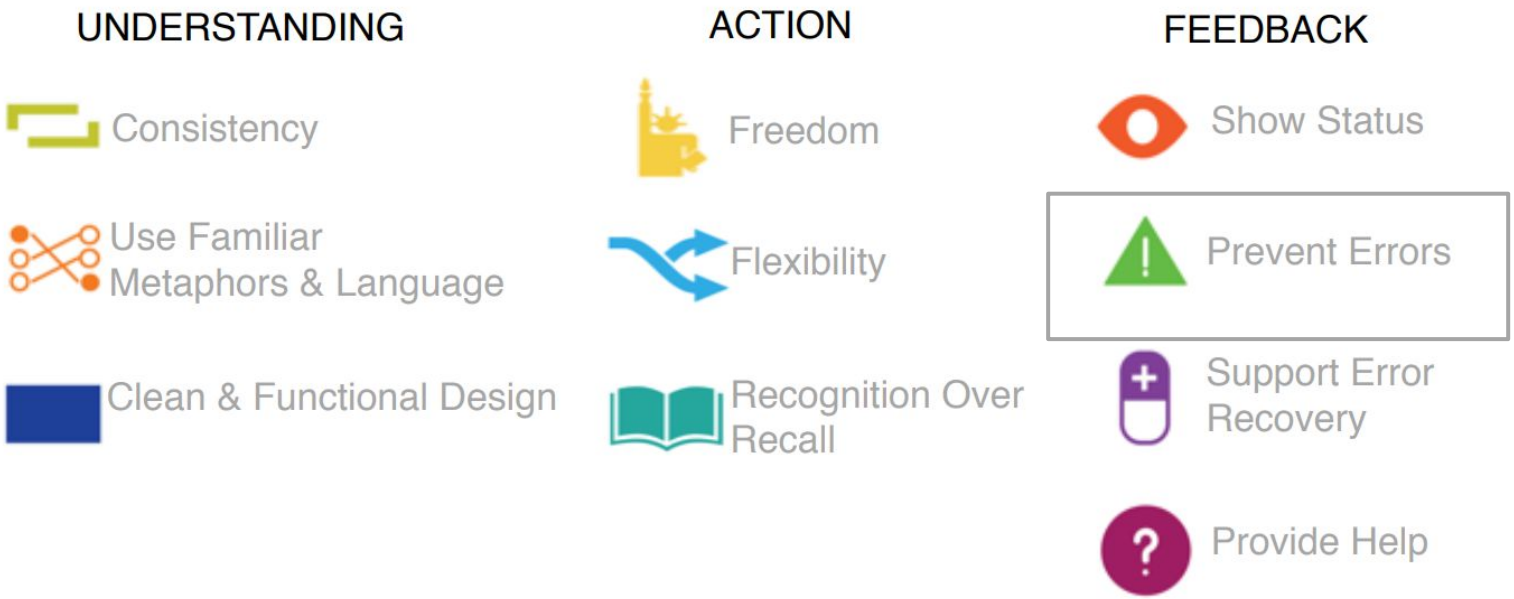
Show Status

- Provide next steps
  - Example form signup, email signup

- Provide warnings in advance



Heuristic Evaluation



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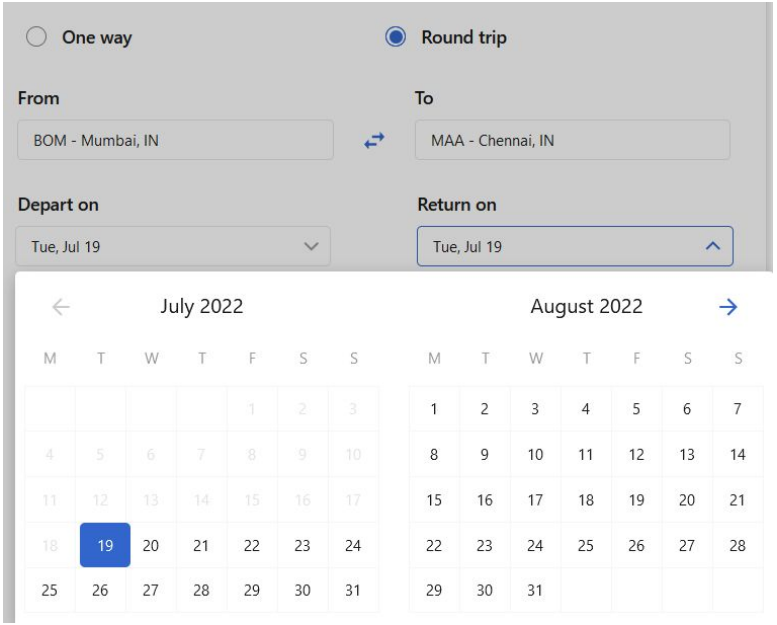
Prevent Errors

- Why do users make errors?

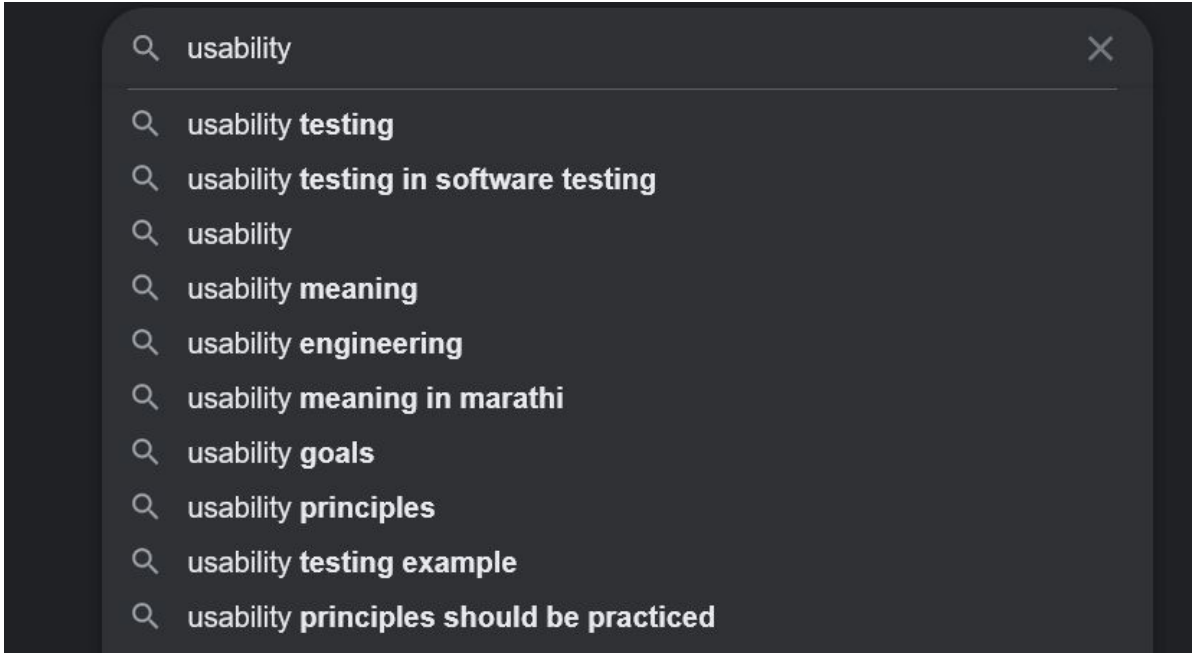
Prevent Errors

Include helpful constraints

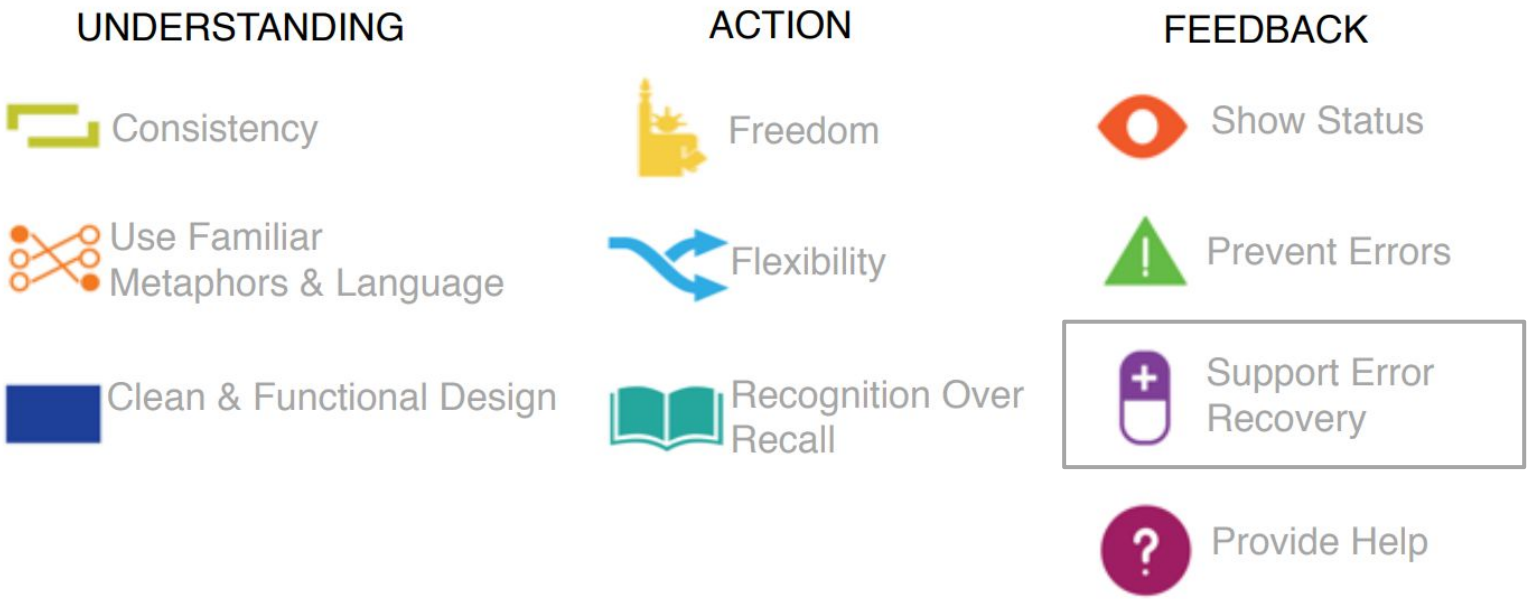


Prevent Errors

Offer Suggestions



Heuristic Evaluation



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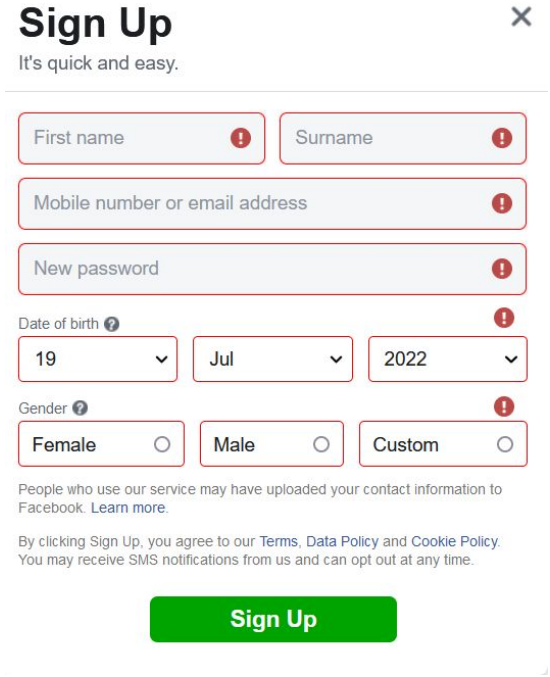
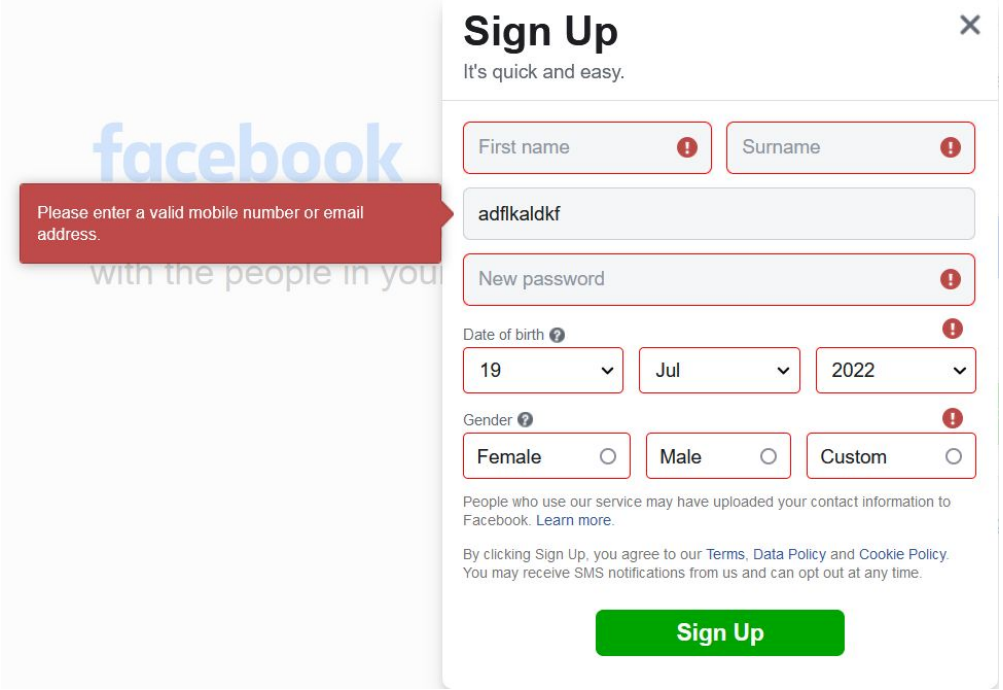
Support Error Recovery

Make the problem clear



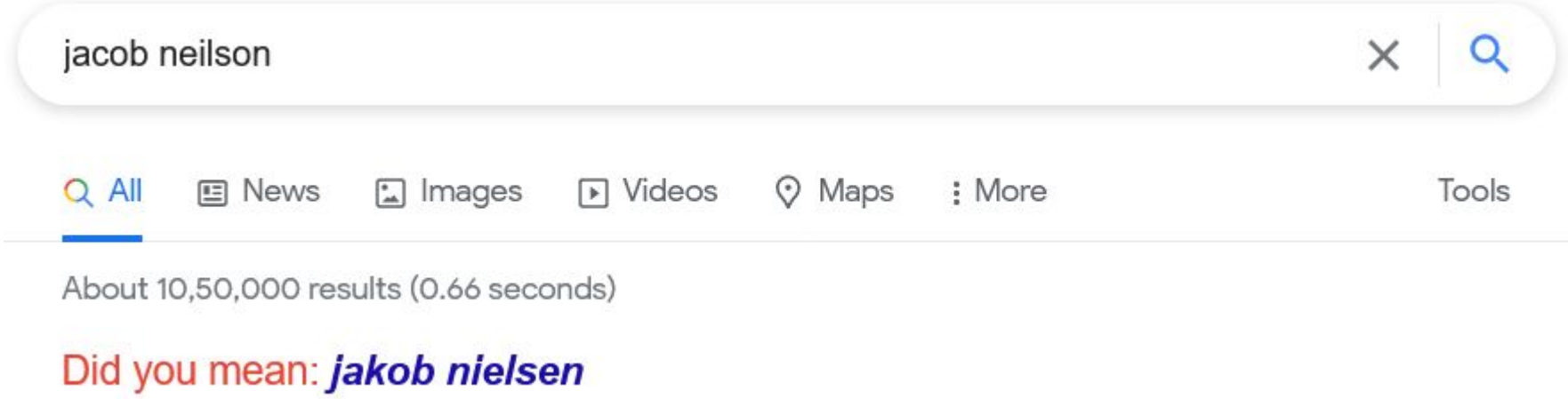
Support Error Recovery

Provide a solution

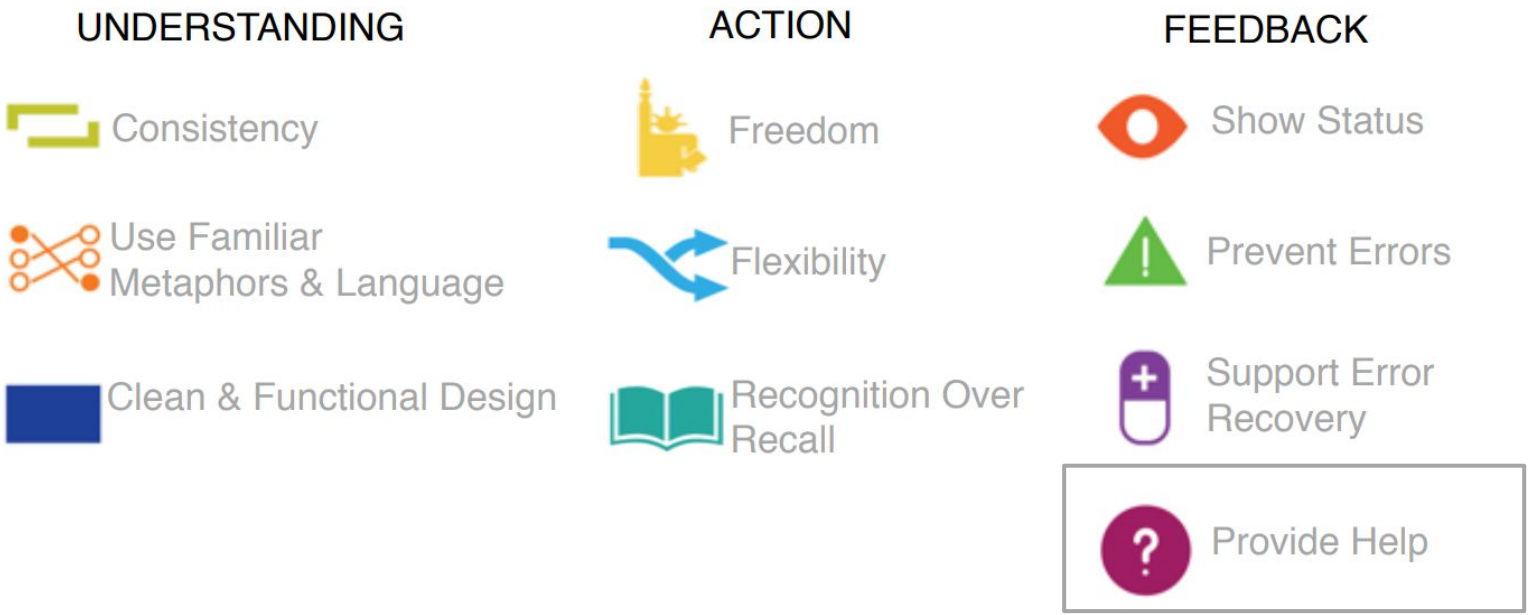


Support Error Recovery

Provide an alternative



Heuristic Evaluation



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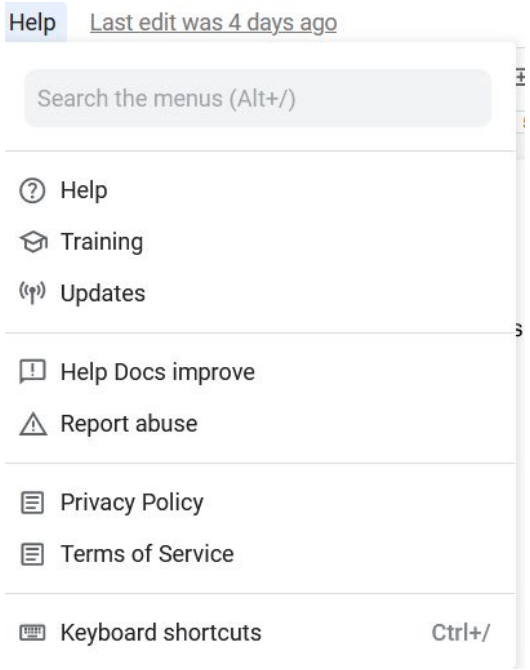
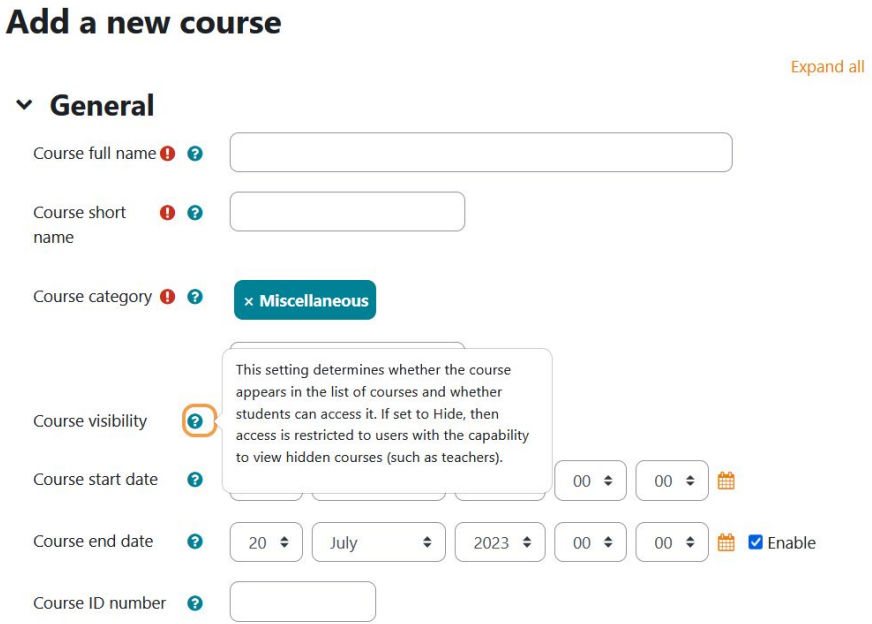
Provide Help

Ensure help is easy to search



Provide Help

Provide help in context



Heuristic Evaluation

- Experts evaluate the prototype
    - Do multiple passes
    - List of issues that violate design heuristics