IDI – Design Principles

Dep. Computer Science – UPC

Usability

- Usability: Defined in ISO 9241 standard as
  - The ability in which a product may be used by **specific** users in order to carry out **specific** tasks *effectively, efficiently, and with satisfaction* in a **specific** use environment.
  - **Usability is always referred to a concrete user group and a concrete user application**

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Outline

- **Design Principles**
- Common Design Mistakes
- Perception Laws in Design

Design Principles

Based on the **Bruce Tognazzini** document:
http://asktog.com/atc/principles-of-interaction-design/

- Effective interfaces:
  - Instilling in their users a sense of control
  - Do not concern the user with the inner working of the system,
- Effective applications:
  - Perform a maximum of work while requiring a minimum of information from users.

1. Aesthetics

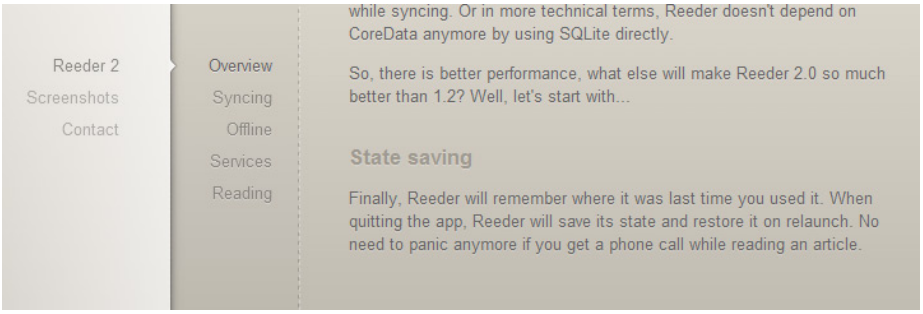
Fashion should never trump usability

- Aesthetical appearance is appealing
- But design based on fashion will artificially generate obsolescence
- A new fashion should not detract from user-performance

- The current trend of contrast reduction is really painful (see examples)

- In any case, user test

- Text that must be read should have high contrast:
  - Check contrastrebellion.com/
  - This is unacceptable:

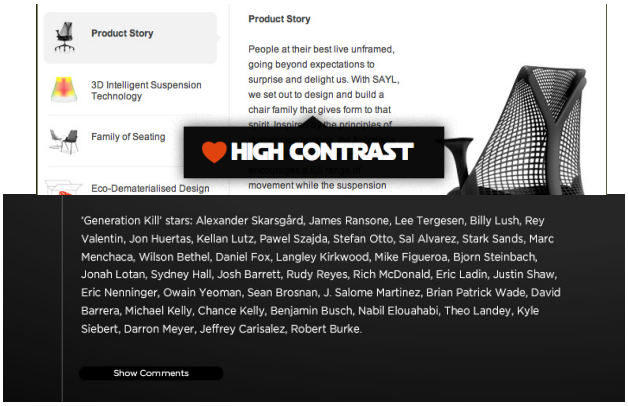


Text that must be read should have high contrast:

- Favor black text on white or pale yellow backgrounds. Avoid gray backgrounds.
- Use font sizes that are large enough to be readable on standard displays
- Favor particularly large characters for the actual data you intend to display
  - As opposed to labels and instructions.

More principles for usability

- High contrast can be aesthetically pleasant



2. Anticipation

Bring to the user all the information and tools needed for each step of the process

- Should anticipate the user's needs
- Information in place & visible
  (if the user cannot fid it, it will never be used)
- Requires deep understanding of both the task domain and the users
- The penalty may be the complete lost of the user or client

- In any case, user test

3. Autonomy$_1$

Computer interface, and task environment all "belong" to the user but user-autonomy doesn't mean we abandon rules

- Give users some breathing room
  - e.g. provide a certain degree of customization –desktop-
- Enable the users make their own decisions
  - Otherwise they may feel constrained and frustrated

3. Autonomy$_2$

Keep the user informed

- Autonomy/Control cannot be exerted in the absence of sufficient information
  - Provide information on current state, tasks
- Keep the information timely, and accurate
  - Progress indicators that are inaccurate are annoying
    E.g. Updated indicator showing a 5' task that turns and hour!!!!
  - Lying the user is never a good practice

4. Color

When using color to convey information in the interface, also use clear, secondary cues

- Approximately 10% males and up to 1% females have some form of color blindness
- With age, people start having vision problems
- Use websites such as http://enably.com/chrometric/ to test
- Use color, but use it wisely
- In any case, use test after aesthetic color changes

5. Consistency

Must be analyzed in different dimensions

- Levels of consistency
- Induced inconsistency
- Induced continuity
- Consistency with user expectations

5_1. Consistency. Levels of Consistency

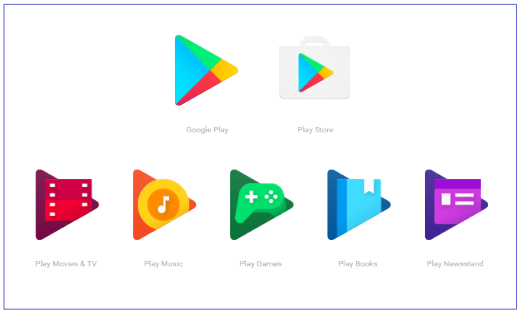
- **Platform consistency**
- **Across suite of products**
- **In-app: in a single app/web**
- **Visible structures**
- **Invisible structures**
- **User behavior**

5_1. Consistency. Levels of Consistency

- **Platform consistency**
  - Guidelines (e.g. UX Android, iOS…) and *in-house* (same company…)
  - Unwritten rules (assumed by the community)
  - Keep a general *look & feel* across products/services
    - Communicates brand
    - Makes adoption easier

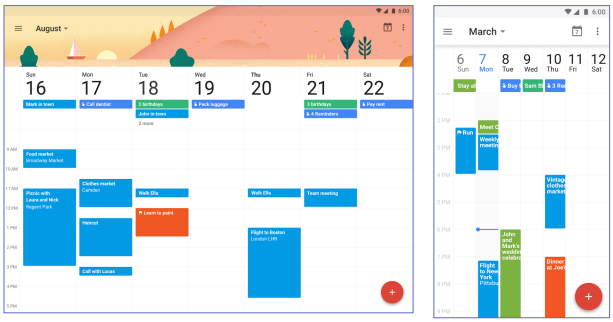
5_1. Consistency. Levels of Consistency

- Platform consistence
- **Across suite of products**:
  - Communicates family (e.g. Microsoft Office, Google apps)



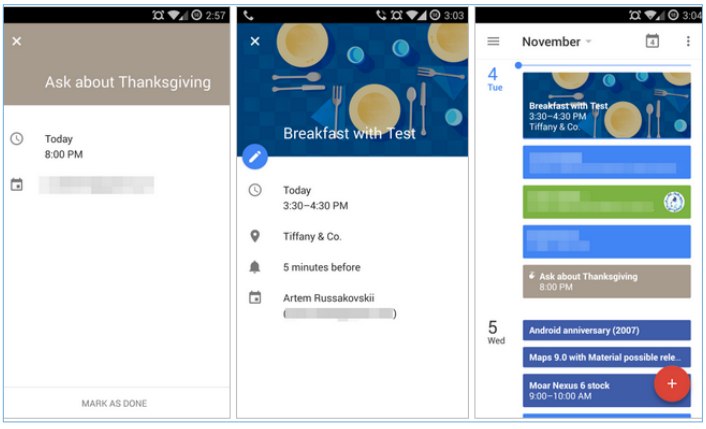
5_1. Consistency. Levels of Consistency

- Platform consistence, Across suite of products
- **In-app: in a single app/web**
  - specific look & feel



5_1. Consistency. Levels of Consistency

In-app

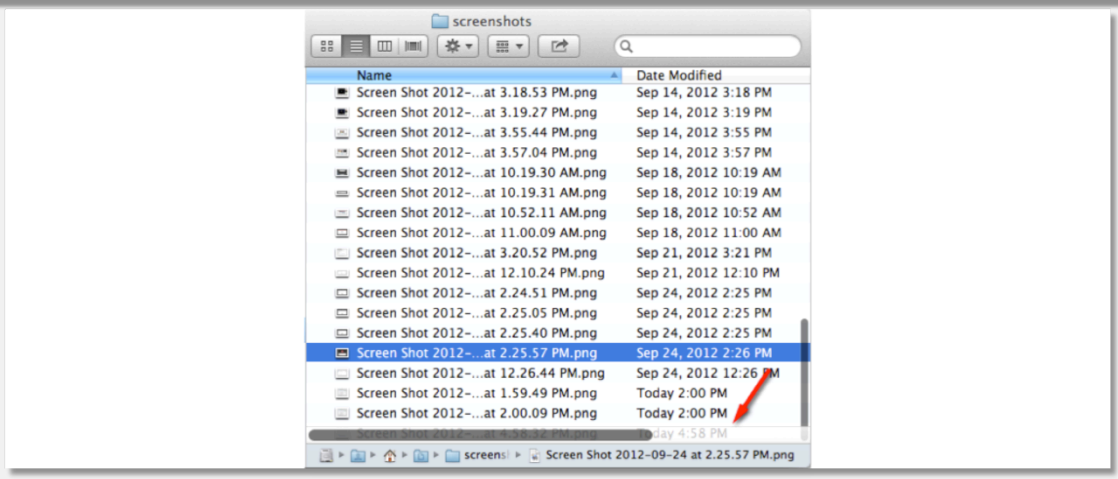


5_1. Consistency. Levels of Consistency

- Platform consistence, Across suite of products, In-app
- **Visible structures: Icons, symbols…**
  - The appearance must be strictly controlled
  - Positioning must also be similar
    - Ensures what people learn is valid across the app/webpage
    - Improves learn ability

5_1. Consistency. Levels of Consistency

- Platform consistence, Across suite of products, In-app, Visible structures
- **Invisible structures**
  - If implemented, make them strictly consistent everywhere
  - In any case, using invisible structures (hello Microsoft, hello Apple) just makes their use obscure and difficult
    - Expecting the user will google for learning your product features is not the solution



5_1. **Consistency.** Levels of Consistency

- Platform consistence, Across suite of products, In-app, Visible structures, Invisible structures
- **Interpretation of the user behavior:**
  - Never change the meaning of a habitual action
    - It is one of the worst things you can do to the user
    - User take a long time to learn things
    - Such actions become subconscious with time

      E.g. Changing a learnt gesture is extremely frustrating

5. Consistency

Must be analyzed in different dimensions

- Levels of consistency: Platform consistency, Across suite of products, In-app: in a single app/web, Visible structures, Invisible structures, User behavior
- Induced inconsistency
- Induced continuity
- Consistency with user expectations

5_2. Consistency. Induced inconsistency

- Make objects different if they act different
  - E.g. if the trash can is destroying the document, make it appear different than a trash can
- If your app/webpage has changed substantially, design can be changed to enforce this fact
  - Otherwise the user might not notice and continue using the app/ webpage the same way (and it might not work)

5_3. Consistency. Induced continuity

- Over time, strive for continuity, not for consistency
  - If your renewed app does a lot of different things and the look and feel is exactly the same, users will use it the same old way
- New versions of products may change big areas (e.g. new features…)
  - Make them slightly different from the previous version
  - Previous knowledge may serve the user to guide their path
    - E.g. maintain the familiar look: same button icons for the things that have not changed…

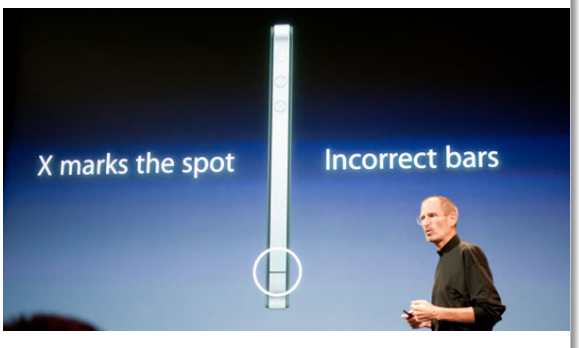
5_4. Consistency. With user expectations

- If users expect something in a certain way, do not force them to learn a new way
  - Even a new button/task may have some user expectations
  - If all the users expect the same, and it is different from what you are offering, go for the path of minimum resistance
  - It doesn't matter how fine a logical argument you can put together for how something should work.
- Unless your new way offers clear advantage

(p.e. Xerox Drag rule)

- Recall iPhone 4 death grip. The problem:

- Recall iPhone 4 death grip: The excuse and first solution
  - Issue a fix that increases the bars being shown!!!



- Recall iPhone 4 death grip. The real “solution”
  - Don’t touch the antenna

- Other “solutions”

6. Default values

- Avoid the cursor appear in unpredictable positions
- Should be easy to rewrite
  - E.g. automatic selection of the default text on a field
- Not all fields require a default value
- If no clear winner/advantage, do not put a default value at all

7. Discoverability$_1$

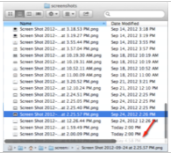
- Any attempt to hide complexity will serve to increase it
  - Generating the illusion of simplicity actually does not simplify things
    - E.g. invisible Mac scroll bars
- If the user cannot find it, it does not exist
  - Note the difference between the buyer and the actual user
- Use active discovery: offer (not tested) features to the user
  - Guide people to more advanced features
  - Mention a feature that exists
  - Recall it at intelligently spaced intervals
  - Stop mentioning it once explored or adopted

7. Discoverability$_2$

- All controls should be visible and not over the content area
  - Some exception only if space is limited (e.g. smartphones or tablets)
  - Should provide a standard trigger that will expose all controls
    - Don't do this in desktop
  - Communicate your gestural vocabulary with visual diagrams
- User test for discoverability

7. Discoverability$_3$

- Apple example: Invisible scroll bars
  - Scroll bars serve two different purposes:
    - Informing
    - Navigating
  - Making theminvisible does not inform the user on the relative position
    - Or where there is more content to be explored
  - Even worse: Apple renders scroll bars over the contents!
    - Making them occlude or prevent their selection



8. Efficiency$_1$

Look at the user's productivity, not the computer's

- Keep the user occupied:
  - Typically the highest expense by far in a business is labor cost
- Maximize every user efficiency
  - Don't improve IT's productivity by pushing work to users
  - Think organization-wise
- The great efficiency breakthroughs in software come from fundamental architecture changes
  - Not in the surface design of the interface

8. Efficiency$_2$

Error messages should actually help

1. Explain what's wrong
2. Tell the user specifically what to do about it
3. Leave open the possibility the message is improperly being generated by a deeper system malfunction

"Error-1264" does not mean anything to the average user

9. Explorable interfaces

- Users want to feel free when exploring interfaces
- Two important principles that facilitate exploration are:
  1. Make Actions reversible
     - E.g. “Back” in a webpage, cancelling long actions…
     - Promotes exploration
     - Otherwise, a perfect user is a slow user
  2. Always allow “Undo”
     - Otherwise you need to confirm everything
       - Again, slow
- Users should always have an easy way out

10. Fitts’s Law

- The time to acquire a target is a function of the distance to and the size of the target
  - Large objects for important functions
  - Small objects for functions you would prefer users not perform
  - Reduce the number of targets to acquire
    - Not only their distances
- More on this later…

11. Informing users$_1$

- Keep users informed when they face delay

Expected Delay	Indication
1/2 to 2 seconds	Use animated mouse cursor or other "busy" indicator 
> 2 seconds	Tell them potential length of wait
> 5 seconds	Use an animated progress indicator  Process must end by the time indicator is full!
> 10 seconds	Keep users a) informed & b) entertained
> 15 seconds	Same as >10 plus add at end a noticeable sound & strong visual indication so users know to return

11. Informing users$_2$

- Acknowledge all button clicks by visual clue within 50 ms
- Start making everything faster
  - Eliminate any element of the application that is not helping
  - Be ruthless
- Wearables come with an even higher level of expectation:
  - No one waits to see what time it is
  - Or to see who is calling, what the temperature is outside…

More principles for usability

- Choose metaphors that will enable users to instantly grasp the finest details of the conceptual model
- Try making your concepts visually apparent in the software itself
  - Buttons are pressed, sliders dragged…
- Expand beyond literal interpretation of real-world
  - If a metaphor is holding you back, abandon it

- Metaphors. iOS browser vs iOS compass

More principles for usability

- Ensure that users never lose their work
  - This principle is all but absolute
  - Users should not lose their work as a result of
    - error on their part,
    - the vagaries of Internet transmission,
    - or any other reason other than the completely unavoidable (e.g. travel sites)

Usability

- Limit the trade-offs between usability and learnability
  - Ideally, products would have no learning curve
- Learnanibility and usability are not mutually exclusive
- Take into account the frecuency of use

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