UI Design Guidelines & Principles

Chapter 5

Interaction Model

Interaction models help us understand the communication between the user and the system.

Before we propose a design solution, we must articulate the problem.Model help us identify the problem space:

- what the problem is with the current interface
- what the users find difficult
- what functionality the users want
- whether all users have the same requirements
- etc….

Interaction Model :Donald Norman’s model

The interactive cycle can be divided into two major phases: execution and evaluation.

- Seven stages
  - user establishes the goal
  - formulates intention
  - specifies actions at interface
  - executes action
  - perceives system state
  - interprets system state
  - evaluates system state with respect to goal

Understand few keywords :

Goal – what you want to achieve. e.g. invite a friend to lunch.

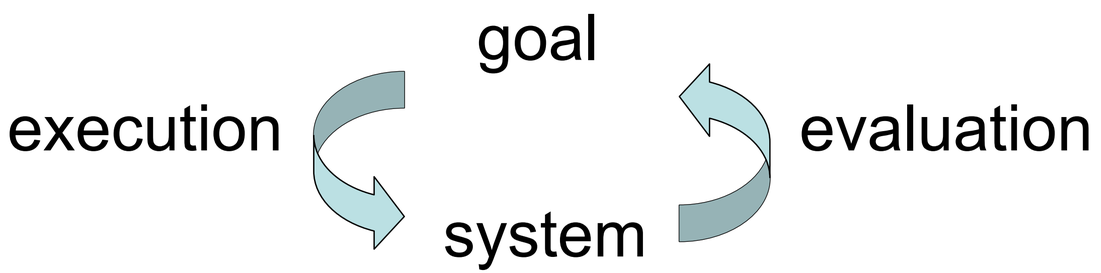
Intentions – Texting? voice call? email? ,

Actions – pick up a phone -> unlock ->…..-> Send out the message.

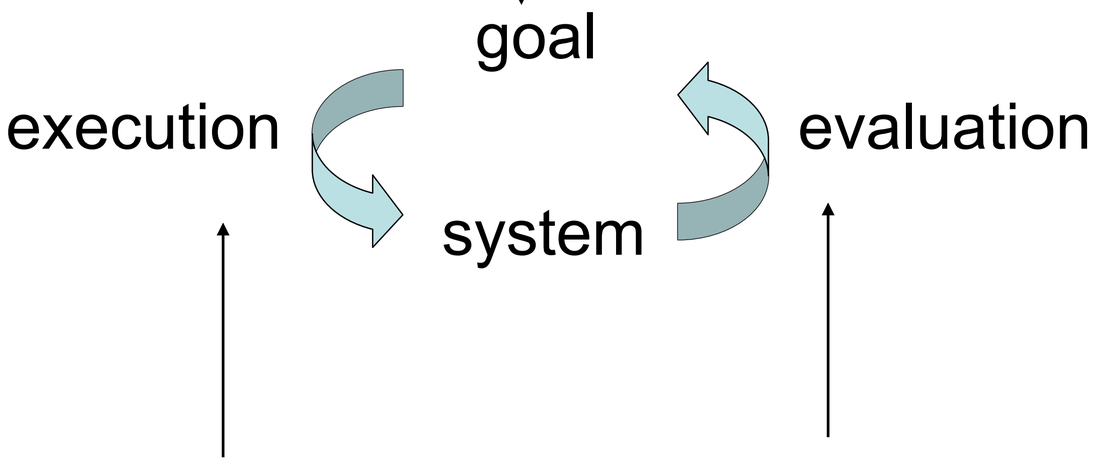
- Goals do not specify particular actions
- Goals and intentions do not have a one-to-one relationship
- “Delete text” goal
  - Intention that involves the Edit menu
  - Intention that involves the Delete key
- Each intention involves a sequence of actions

execution/evaluation loop

- user establishes the goal
- formulates intention
- specifies actions at interface
- executes action
- perceives system state
- interprets system state
- evaluates system state with respect to goal



1) user establishes the goal



2) formulates intention
3) specifies actions at interface
4) executes action

5) perceives system state
6) interprets system state
7) evaluates system state with respect to goal

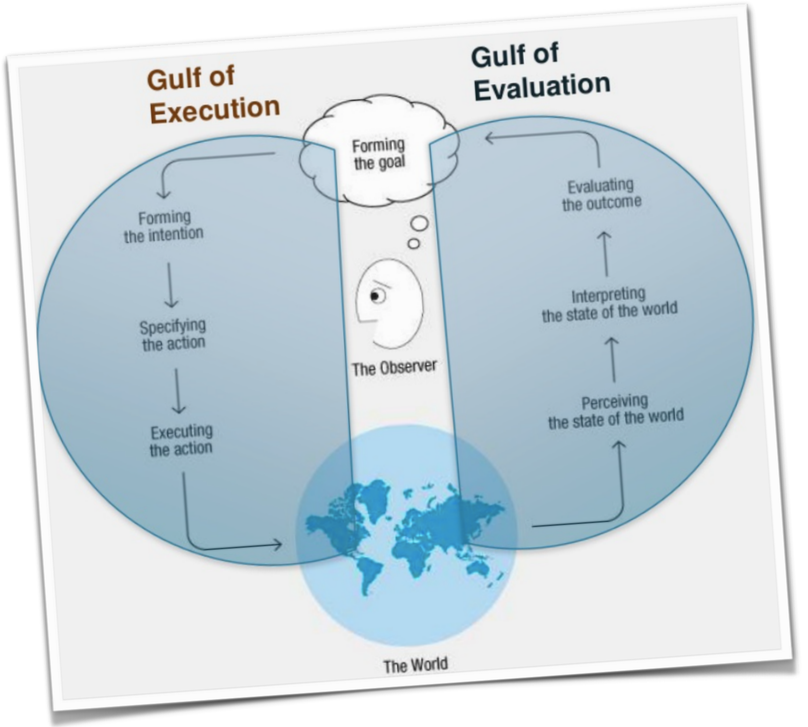
Using Norman's model

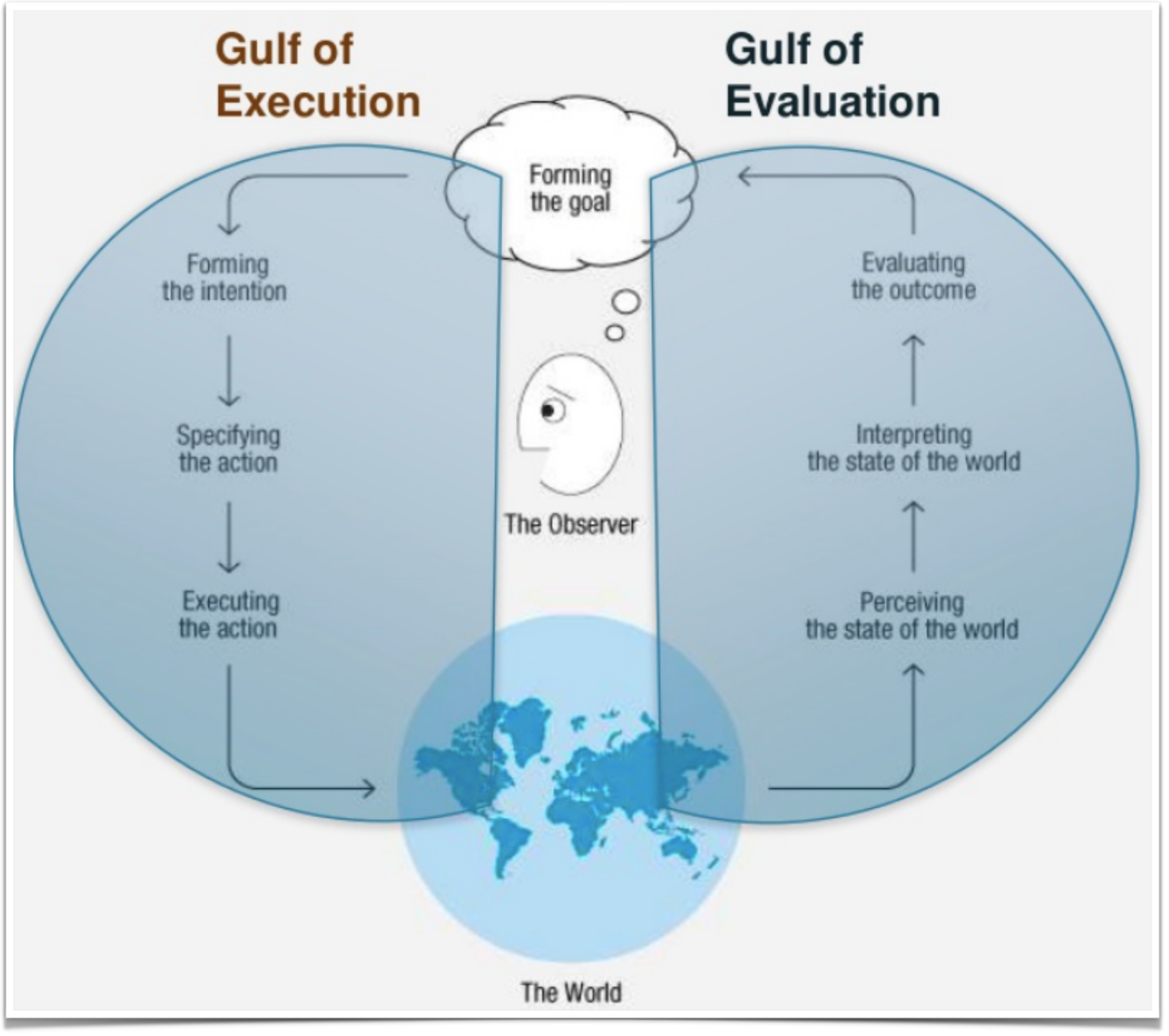
Some systems are harder to use than others, because of :

Gulf of Execution : User's formulation of action ≠ action allowed by the system

Gulf of Evaluation: User's expectation (system state) ≠ actual presentation of this sate (from system)

The gulf of evaluation is the distance between the physical presentation of the system state and the expectation of the user.




Gulf of Execution
Gulf of Evaluation
Forming the goal
Forming the intention
Specifying the action
Executing the action
Evaluating the outcome
Interpreting the state of the world
Perceiving the state of the world
The Observer
The World

Each of the seven stages are good for checking that the gulfs of execution and evaluation are bridged. How easily can one:

Determine The Function of the Device?

Tell What Actions Are Possible?

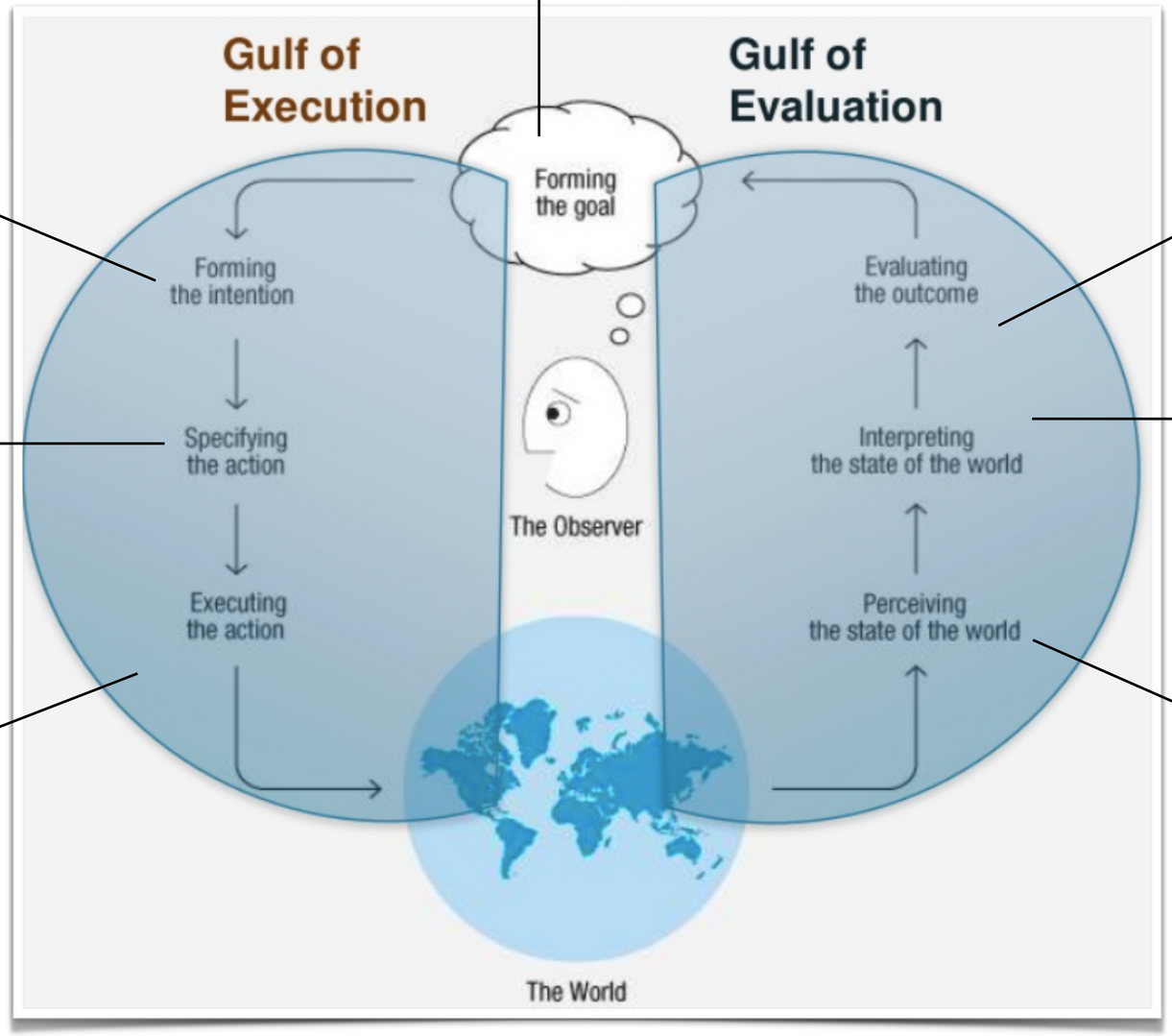
Tell if System is in Desired State?

Determine Mapping from Intention to Physical Movement?

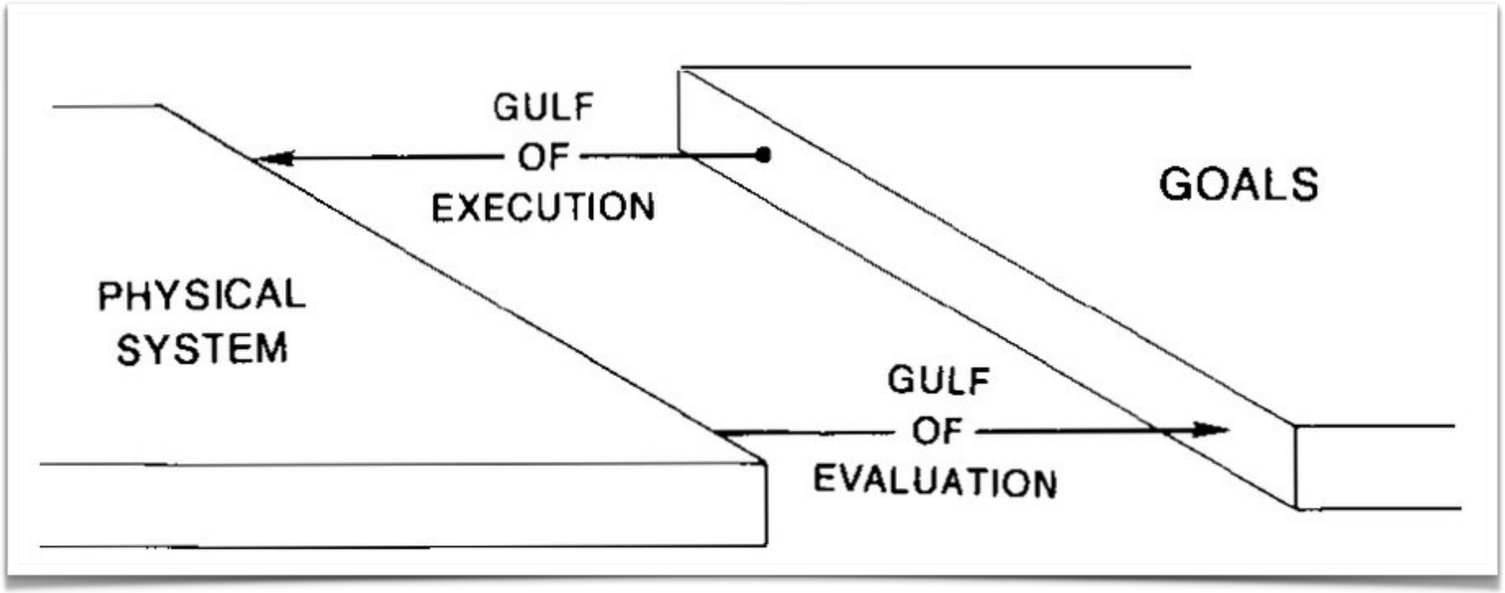
Determine Mapping from System State to Interpretation?

Perform the Action?

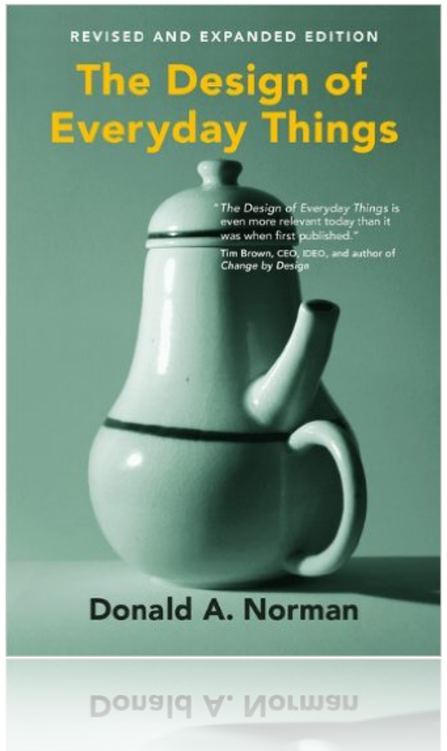
Tell What State the System is In?

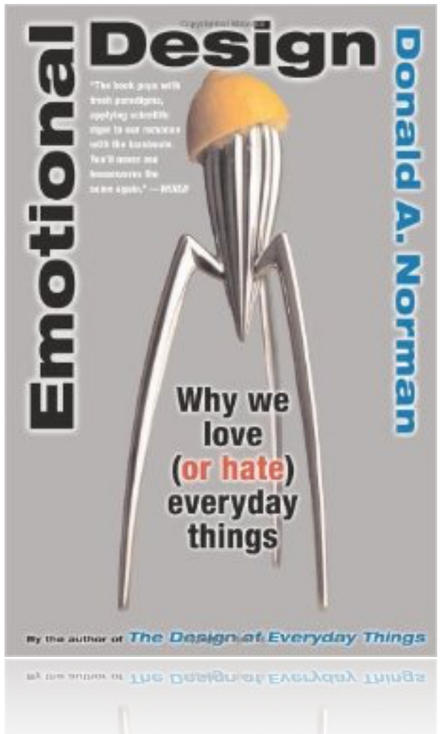


In HCI, we aim to reduce the gap in these gulfs.



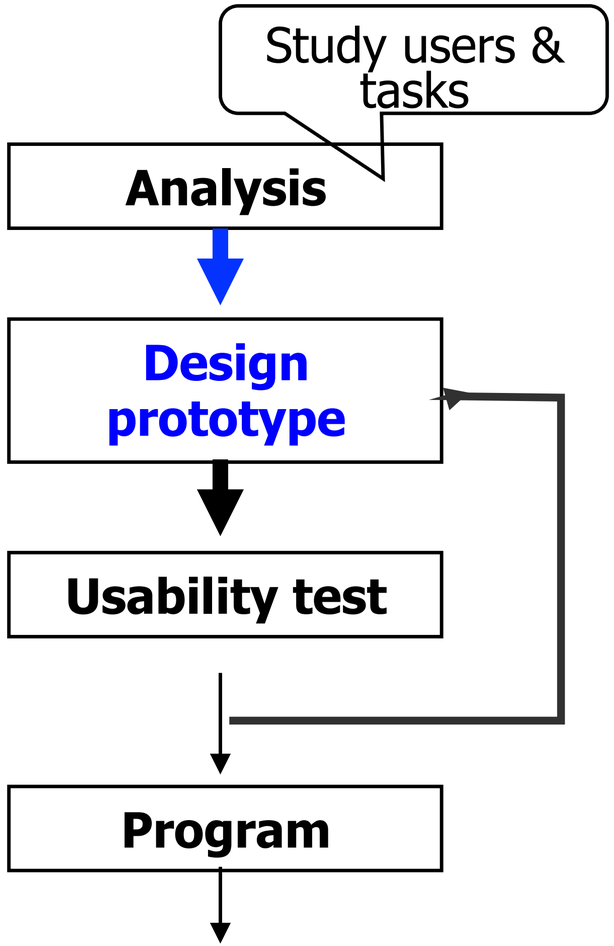
Donald Norman





UI Design Guidelines & Principles

- Can be used to:
  - Guide the design of UIs.
  - Evaluate UIs.



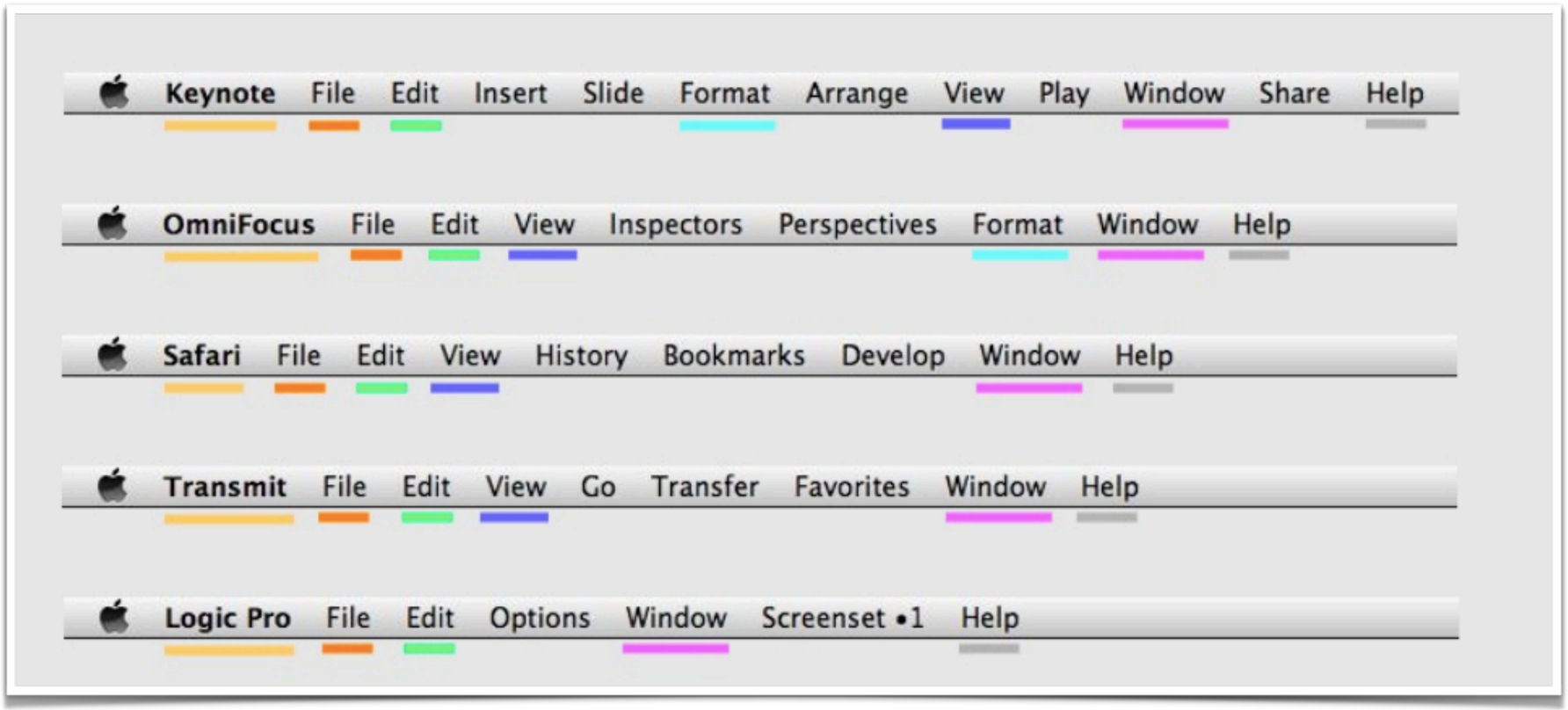
Shneiderman’s Eight Golden Rules

1. Strive for consistency.
2. Enable frequent users to use shortcuts.
3. Offer informative feedback.
4. Design dialog to yield closure.
5. Offer simple error handling.
6. Permit easy reversal of actions.
7. Support internal locus of control.
8. Reduce short-term memory load

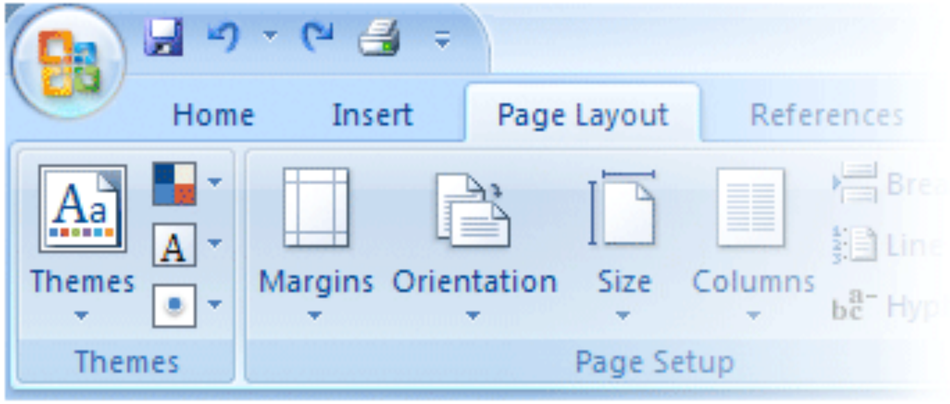
Shneiderman's Eight Golden Rules

Strive for consistency

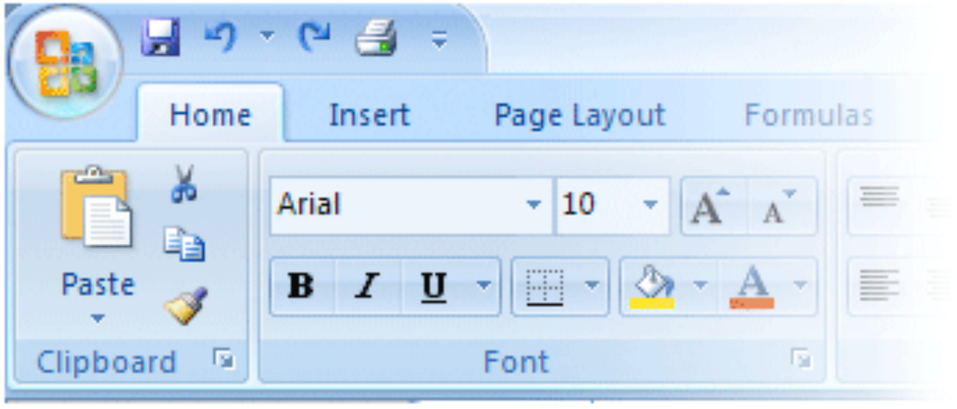
Consistent sequences of actions should be required in similar situations; identical terminology should be used in prompts, menus, and help screens.



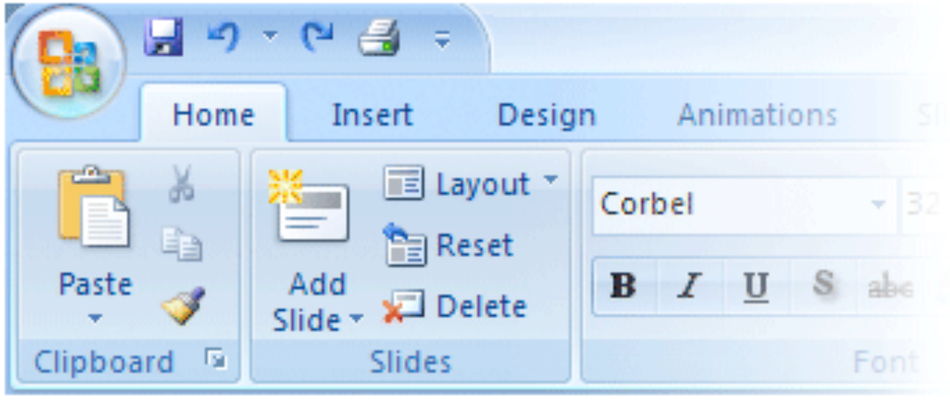
Microsoft Word



Microsoft Excel



Microsoft Powerpoint

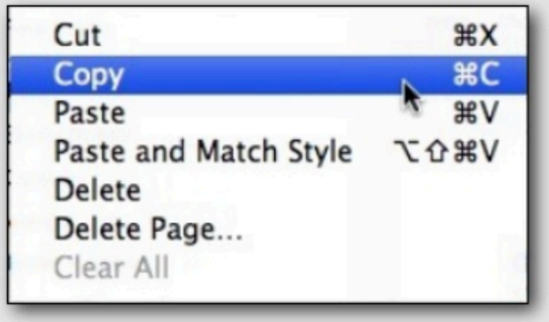


Shneiderman’s Eight Golden Rules

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.

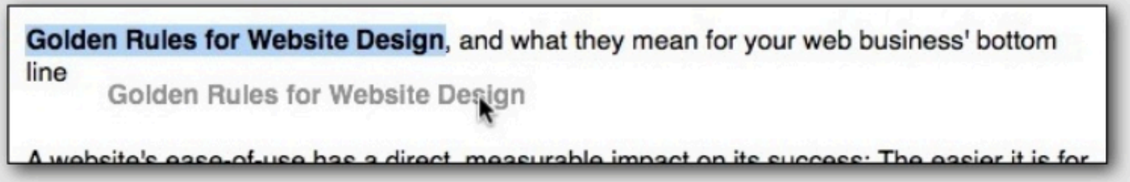
Level 1



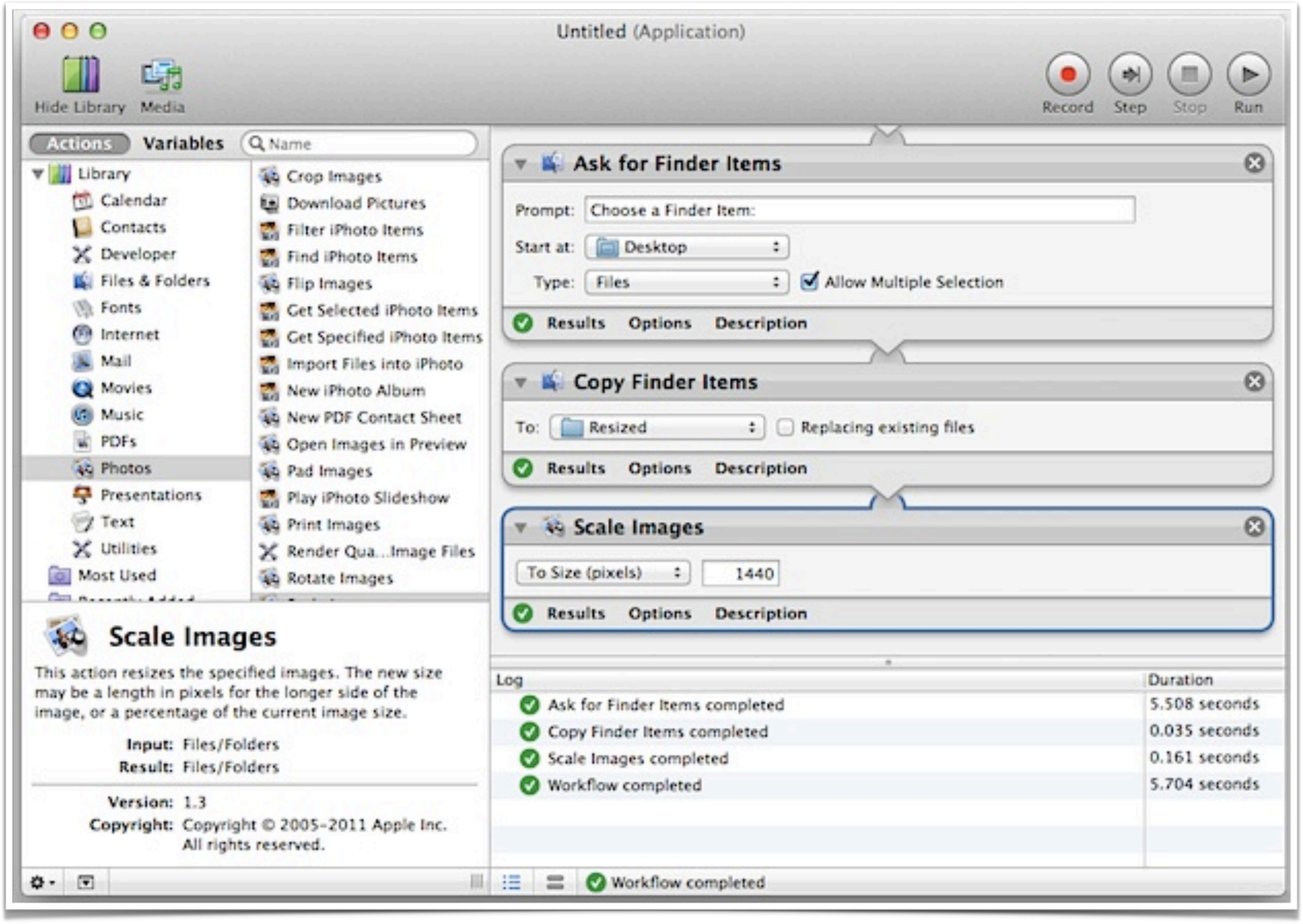
Level 2

⌘C / ⌘V

Level 3



select & drag


Untitled (Application)
Hide Library
Media
Record
Step
Stop
Run
Actions
Variables
Name
Library
Calendar
Contacts
Developer
Files & Folders
Fonts
Internet
Mail
Movies
Music
PDFs
Photos
Presentations
Text
Utilities
Most Used
Crop Images
Download Pictures
Filter iPhoto Items
Find iPhoto Items
Flip Images
Get Selected iPhoto Items
Get Specified iPhoto Items
Import Files into iPhoto
New iPhoto Album
New PDF Contact Sheet
Open Images in Preview
Pad Images
Play iPhoto Slideshow
Print Images
Render Qua...Image Files
Rotate Images
Scale Images
This action resizes the specified images. The new size may be a length in pixels for the longer side of the image, or a percentage of the current image size.
Input: Files/Folders
Result: Files/Folders
Version: 1.3
Copyright: Copyright © 2005–2011 Apple Inc. All rights reserved.
Ask for Finder Items
Prompt: Choose a Finder Item:
Start at: Desktop
Type: Files
Allow Multiple Selection
Results Options Description
Copy Finder Items
To: Resized
Replacing existing files
Results Options Description
Scale Images
To Size (pixels)
1440
Results Options Description
Log
Duration
Ask for Finder Items completed 5.508 seconds
Copy Finder Items completed 0.035 seconds
Scale Images completed 0.161 seconds
Workflow completed 5.704 seconds
Workflow completed

Shneiderman’s Eight Golden Rules

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.

- The system should show meaningful, clear reaction.
- Frequent actions can be anything like clicks/taps, loading, scrolling, icon changes, animations, icon badges. This type of feedback shows small changes in the system.
- Infrequent or major changes can create substantial changes to the system, consisting of state or page changes, color changes, alert windows
- Feedback should be immediate to prevent the system from looking slow.

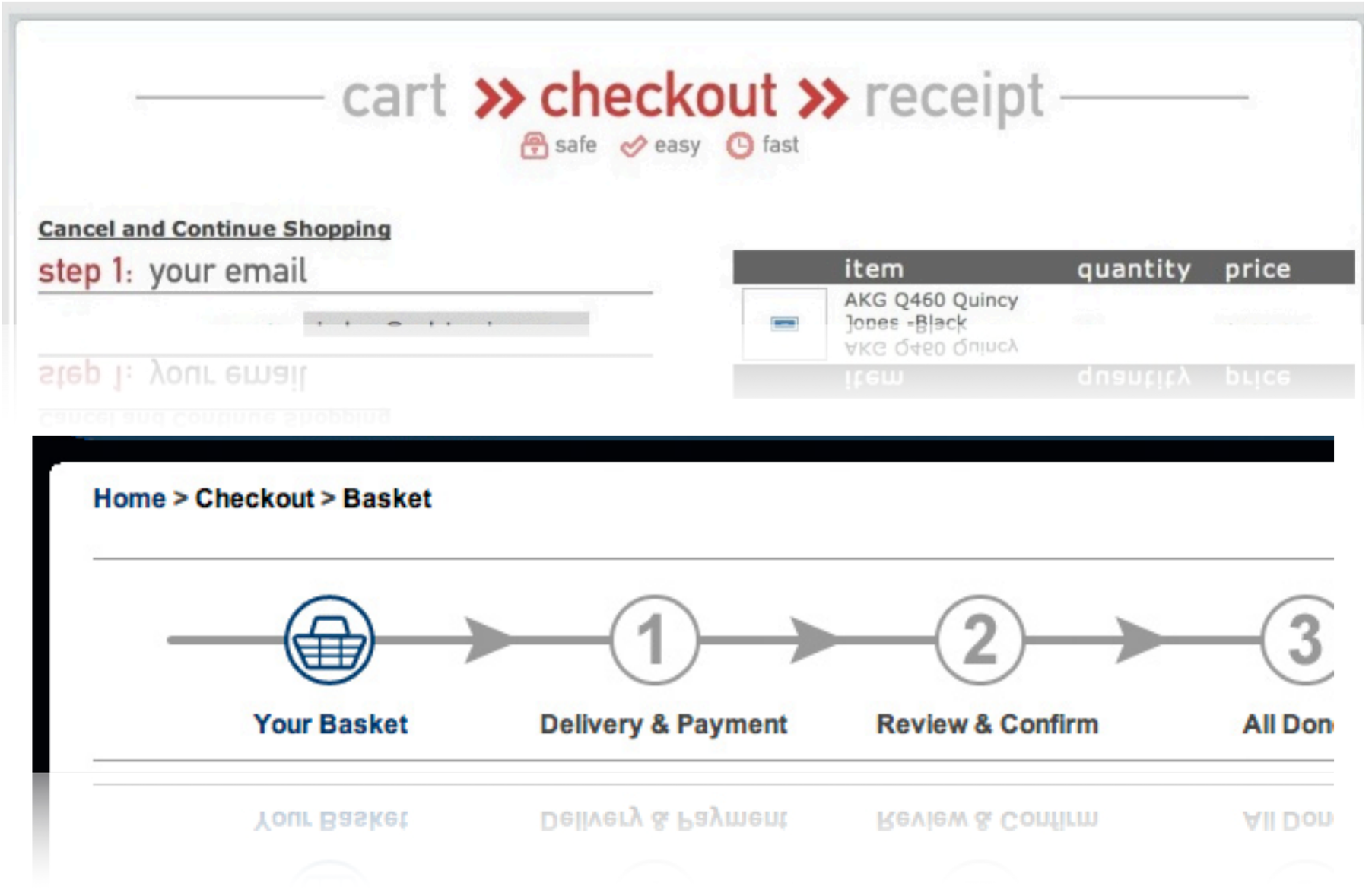
Shneiderman’s Eight Golden Rules

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, and an indication that the way is clear to prepare for the next group of actions.

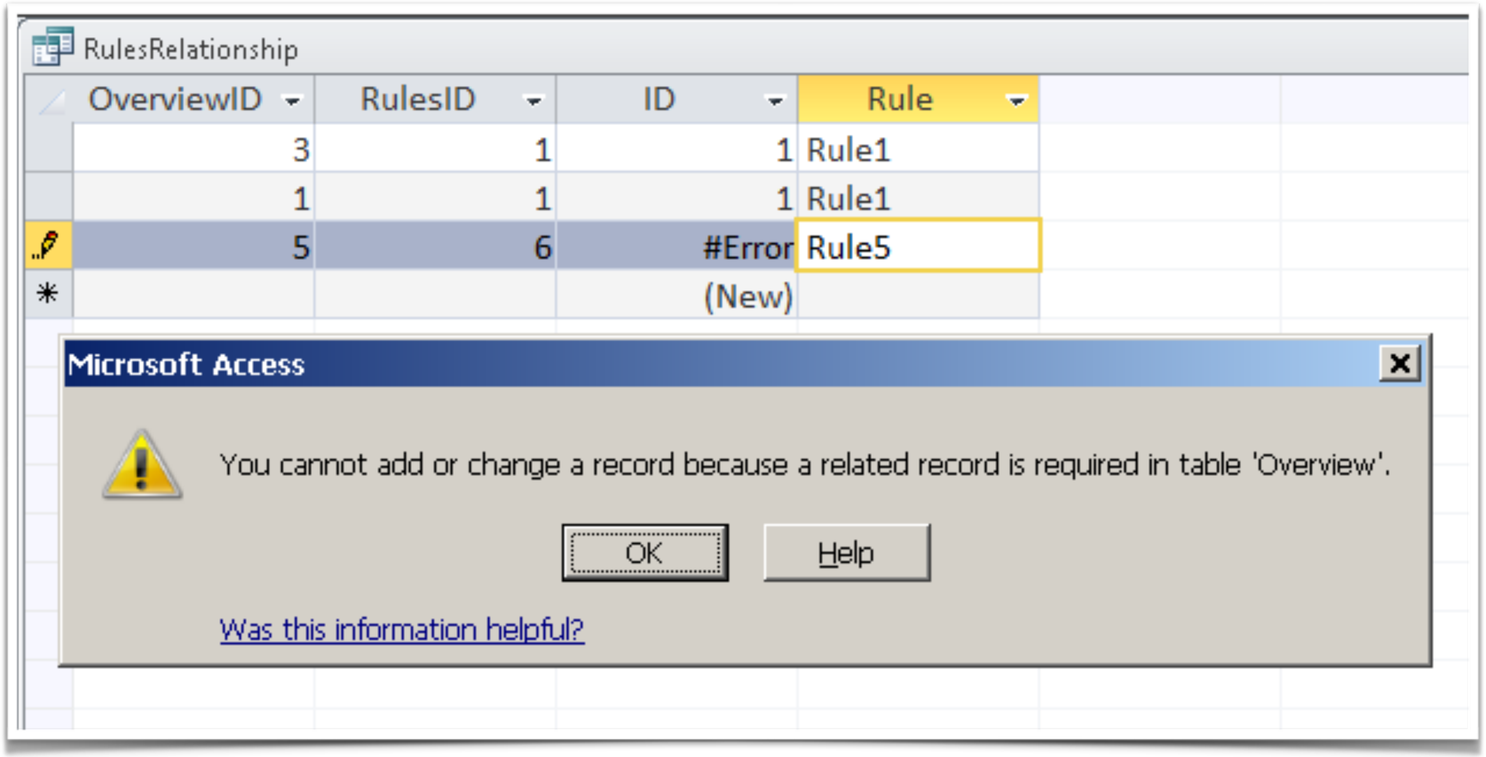
Example: When a purchase process is finished, remember to display a “Thank you” message. Let the user know that she has done all that’s needed, the purchase order is now in the system and she can navigate elsewhere on the site with ease of mind.

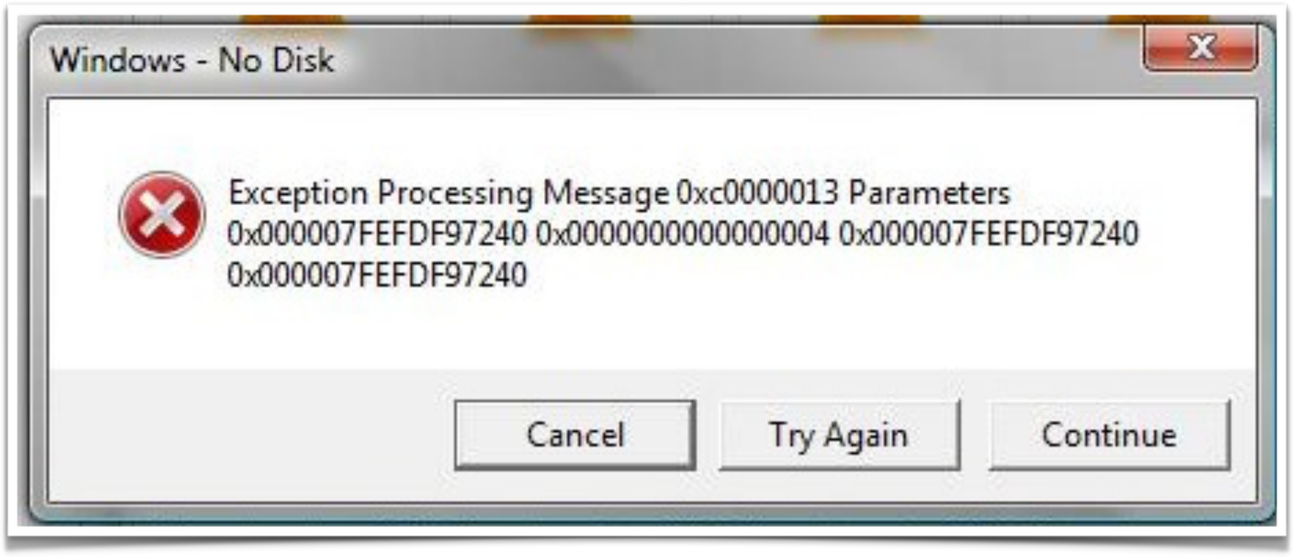

cart » checkout » receipt
safe easy fast
Cancel and Continue Shopping
step 1: your email
item
quantity
price
AKG Q460 Quincy Jones -Black
Home > Checkout > Basket
1
2
3
Your Basket
Delivery & Payment
Review & Confirm

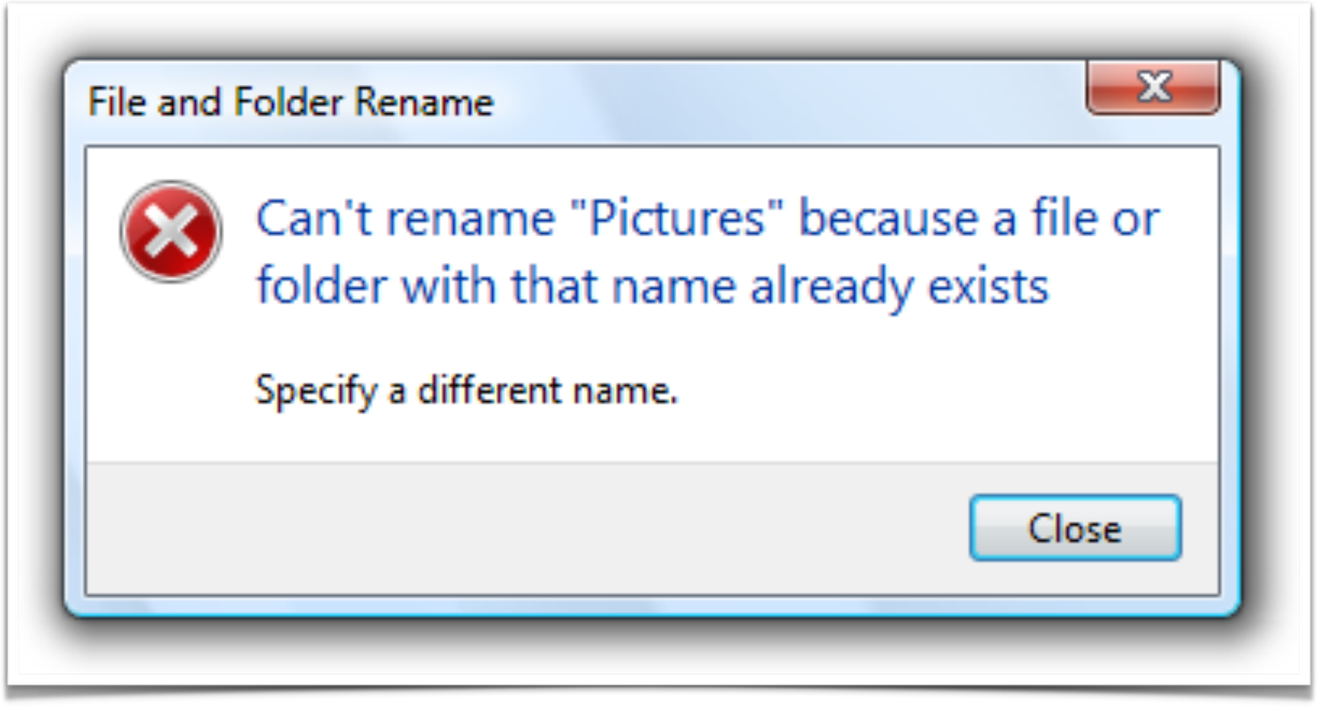
Shneiderman's Eight Golden Rules

Offer simple error handling

If an error is made, the system should be able to detect the error and offer simple, comprehensible mechanisms for handling the error.



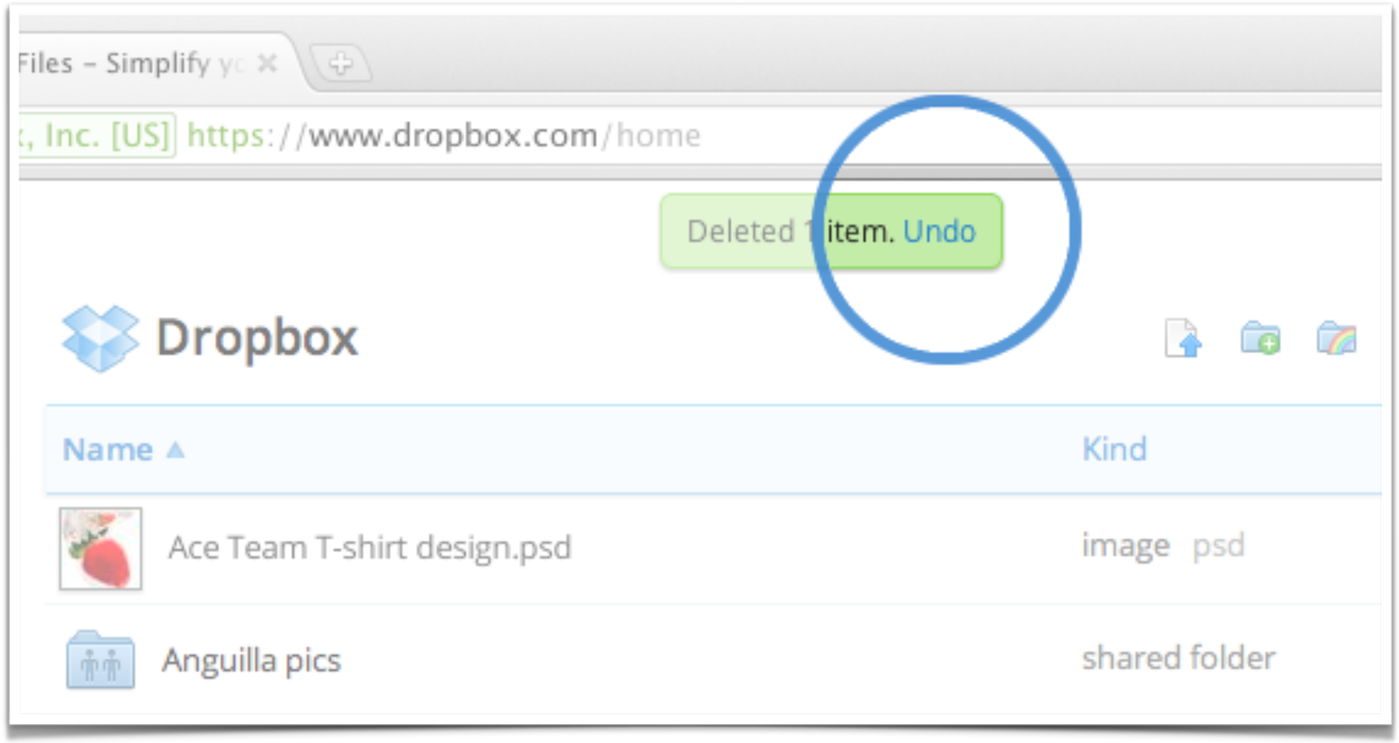

Windows - No Disk
Exception Processing Message 0xc0000013 Parameters 0x000007FEFDF97240 0x0000000000000004 0x000007FEFDF97240 0x000007FEFDF97240
Cancel
Try Again
Continue


File and Folder Rename
Can't rename "Pictures" because a file or folder with that name already exists
Specify a different name.
Close

Shneiderman’s Eight Golden Rules

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.

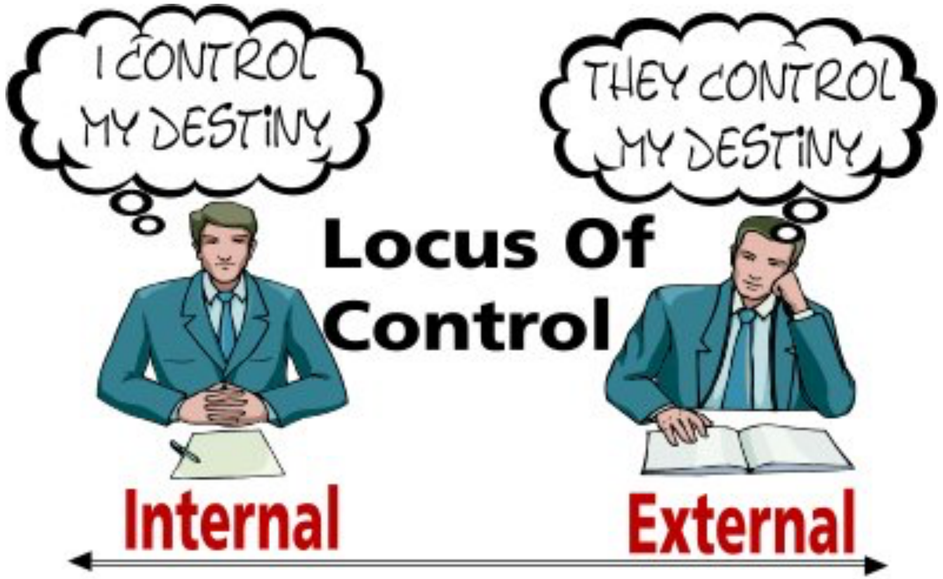


Shneiderman’s Eight Golden Rules

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.




75%
Thu 1:24 PM
OSXDaily
Updates Available
Do you want to install the updates now or try tonight?
Install
Later
Try in an Hour
Try Tonight
Remind Me Tomorrow

Software ▸ Operating Systems

Even in remotest Africa, Windows 10 nagware ruins your day: Update burns satellite link cash

Lives could have been put at risk by pushy upgrade

Protectors ... Anti-poachers on patrol for the Chinko Project (Source)

3 Jun 2016 at 22:11, Iain Thomson

325 80

The Chinko Project manages roughly 17,600 square kilometres (6,795 square miles) of rainforest and savannah in the east of the CAR, near the border with South Sudan. Money is tight, and so is internet bandwidth. So the staff was more than a little displeased when one of the donated laptops the team uses began upgrading to Windows 10 automatically, pulling in gigabytes of data over a radio link.

And it's not just bandwidth bills they have to worry about.

"If a forced upgrade happened and crashed our PCs while in the middle of coordinating rangers under fire from armed militarized poachers, blood could literally be on Microsoft's hands," said one member of the team.

http://www.theregister.co.uk/2016/06/03/windows_10_upgrade_satellite_link/

Shneiderman’s Eight Golden Rules

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.

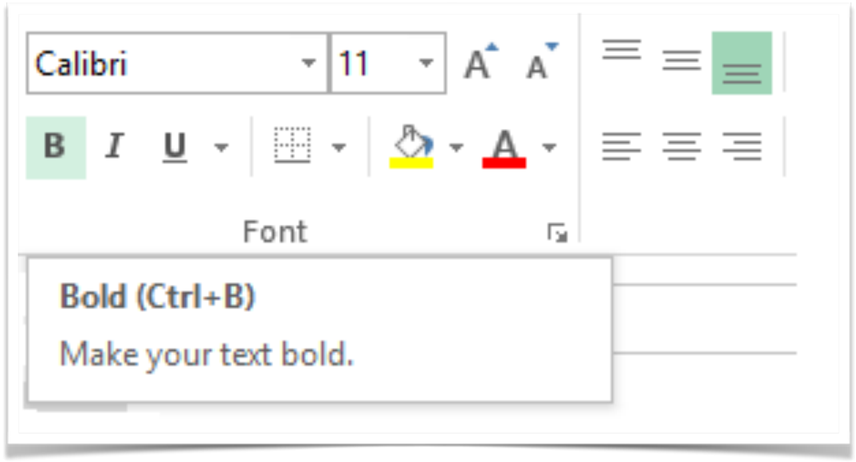
Example: Chuncking, Recognition rather than recall

Norman's Design Principles

Visibility

This refers to visible of function and clear controls or information.

The more visible functions are, the more likely users will be able to know what to do next. When functions are "out of sight," it makes them more difficult to find and know how to use.



Norman's Design Principles

Feedback

Feedback is about sending back information about what action has been done and what has been accomplished. It includes sound, highlighting, animation and combinations of these.

Norman's Design Principles

Constraints

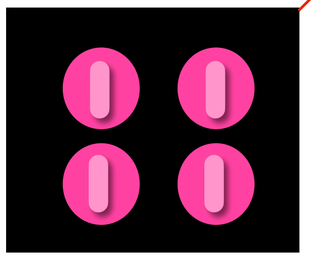
Restricting the kind of user interaction that can take place at a given moment.Preventing invalid data from being entered and prevent invalid actions from being performed.

Which is the better design ?

Norman's Design Principles

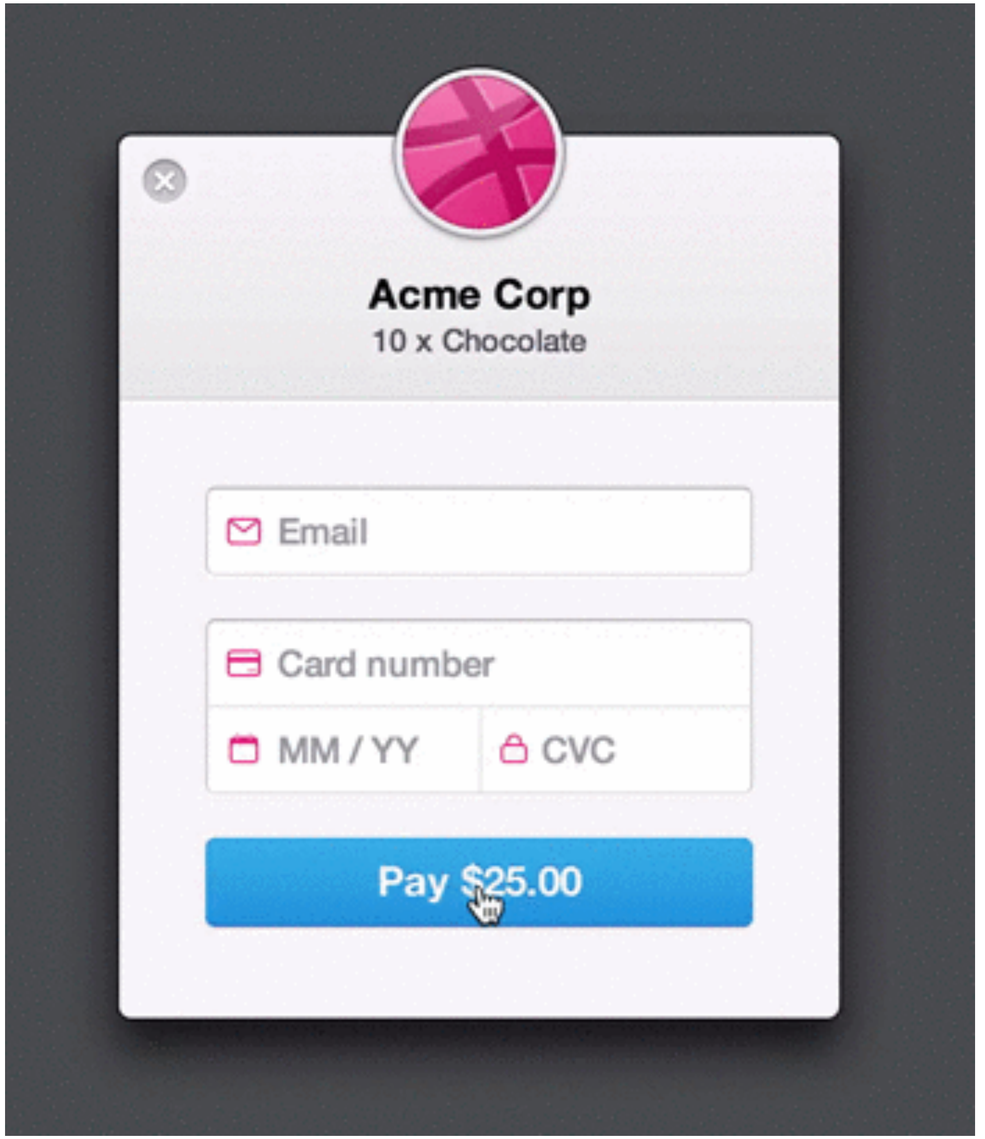
Mapping

This refers to the relationship between controls and their effects in the world



Better mapping of stove knob


OTIS


Acme Corp
10 x Chocolate
Email
Card number
MM / YY
CVC
Pay $25.00

Norman's Design Principles

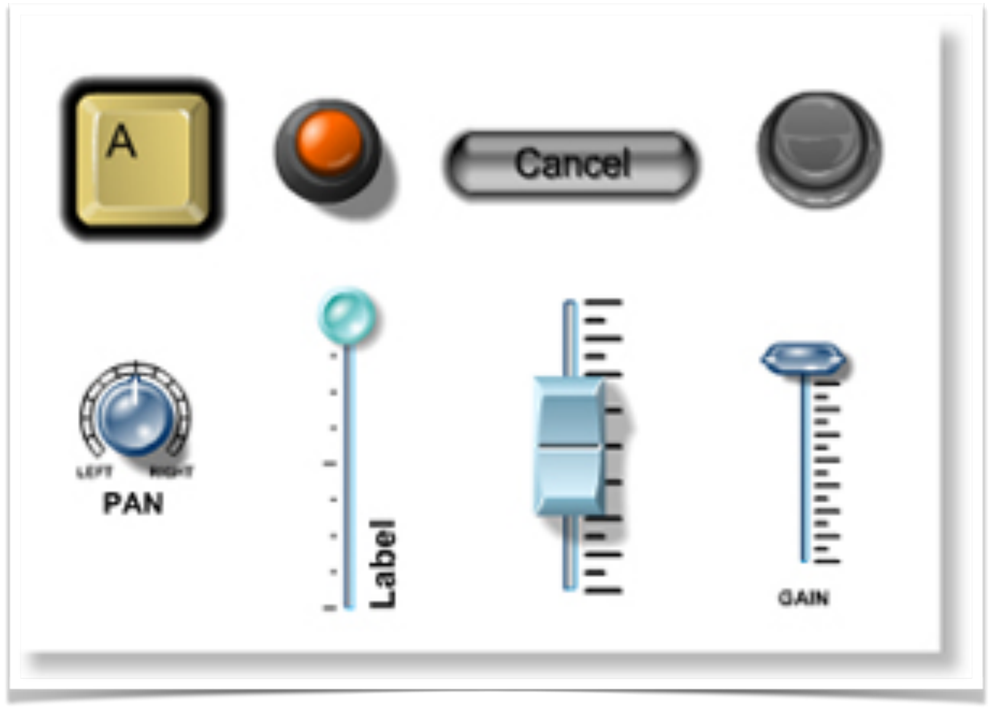
Consistency

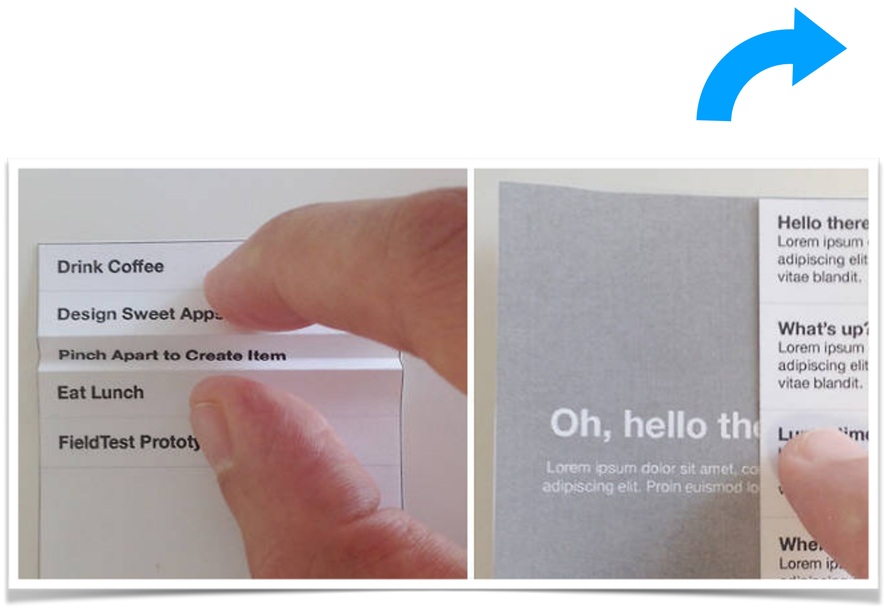
This refers to designing interfaces to have similar operations, and use similar elements for achieving similar tasks to enhance learnability.

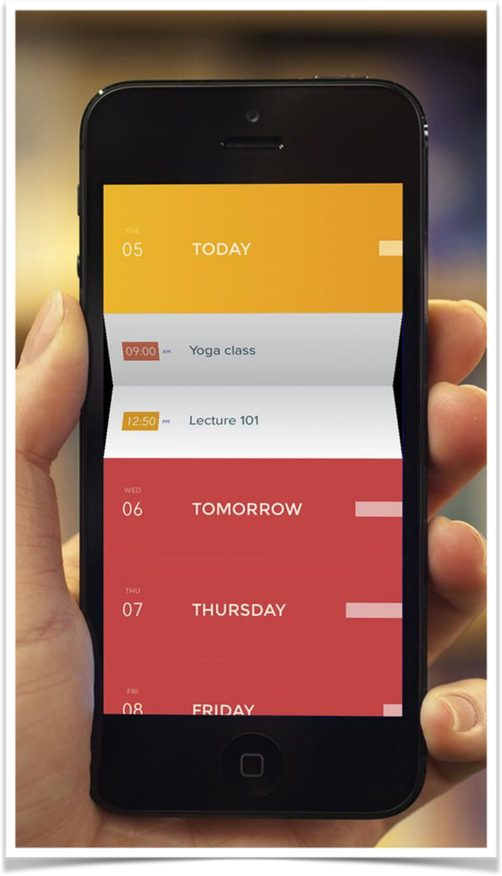
Norman's Design Principles

Affordance

This is a term used to refer to an attribute of an object that allows people to know how to use it.







Visual Affordance (virtual object)

Others UI design guidlines:

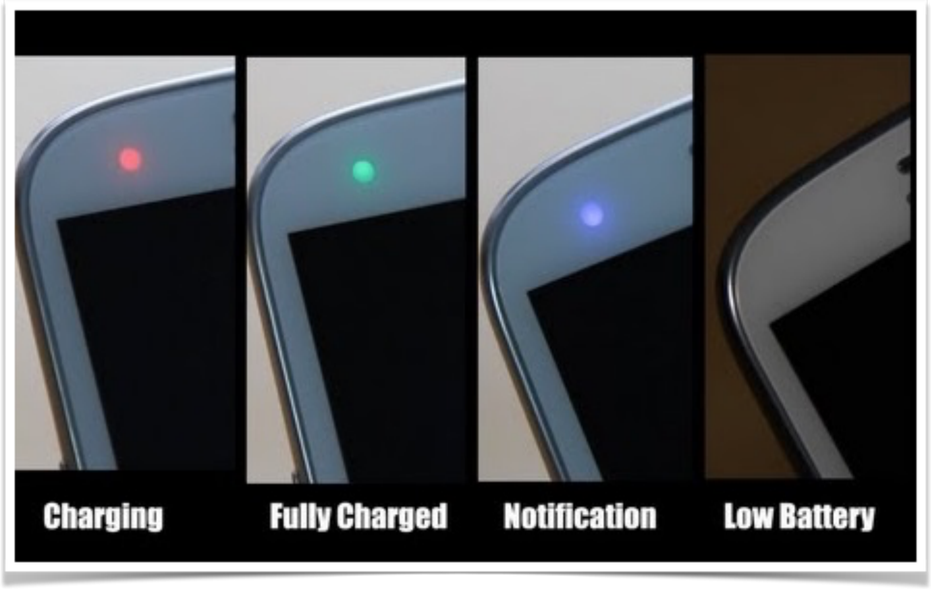
- Google Material design guidlines (https://material.io/guidelines/#)
- Apple ios design guidlines (https://developer.apple.com/ios/human-interface-guidelines/overview/design-principles/)
- Microsoft design guidlines (https://developer.microsoft.com/en-us/windows/apps/design)

Techniques to draw the user's attention

- Blinking/Flashing
- Bold
- Underlining
- Sound
- Using colour

1. Blinking/Flashing

- Draw attention
- **Urgent** messages only
- **No suitable** for long message (why?)
- **Annoying** if using frequently



Bold

- An effective way to make something stand out (e.g. Screen/Report title & caption)

Underlining

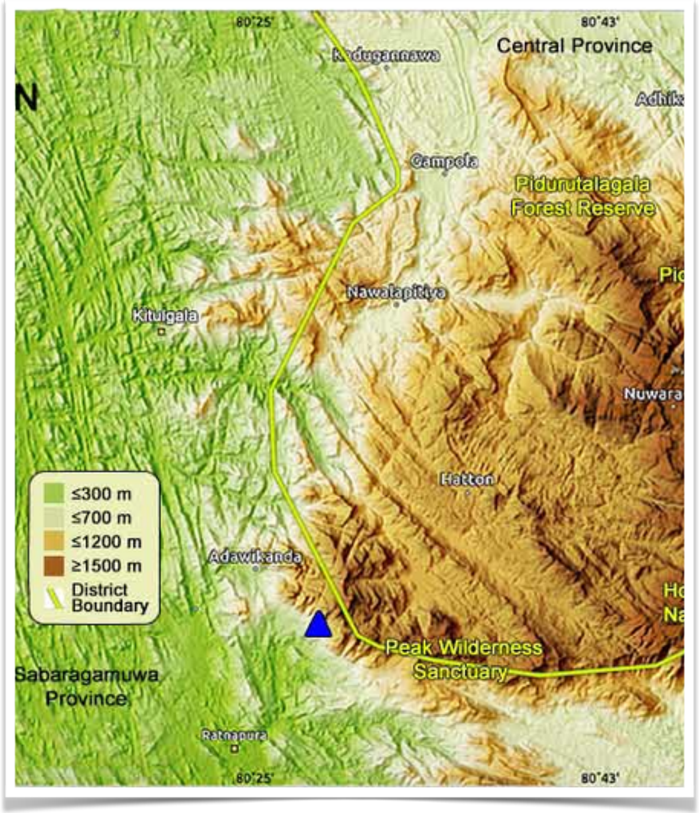
- A **simple** way to make a text object stand out on a display
- Should be used sparingly (Reduce legibility)

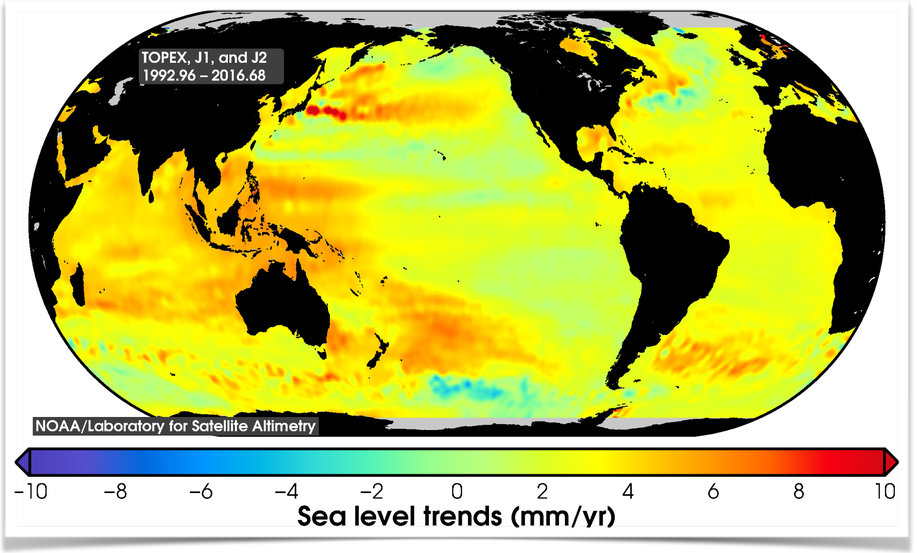
Sound

- Usually for **error messages**, e.g. “beep”,
- **Can be annoying,** user should have the turn-off option.

Colour

- Using a colour that stand out from the rest of the system
- Colour is most effective when used to:
  - highlight differences between information
  - group information
  - code simple messages (error message)
  - draw attention
  - indicate status





The use of colours must conform to human expectations (Colors often have specific meanings)

- **Red** – stop, fire, hot, danger
- **Yellow** – caution, slow, desert
- **Green** – go, OK, clear, vegetation, safe
- **Blue** – cold, water, calm, sky, neutral

Errors

Errors can be classified into 2 main types:

- Slip: the user understand system and goal, has correct formulation of action, BUT incorrect action.
  - **choosing Quit** when the user meant to choose the command next to it **.**
  - **closing a window** when the user meant to re-size it .

- Mistake: An **incorrect action** is taken based on an **incorrect decision. (**User may not even have right intention!)
  - using MS Word to design name card.

Solution :

- Slip – better interface design

1)**Provide adequate separation** between elements to be selected.

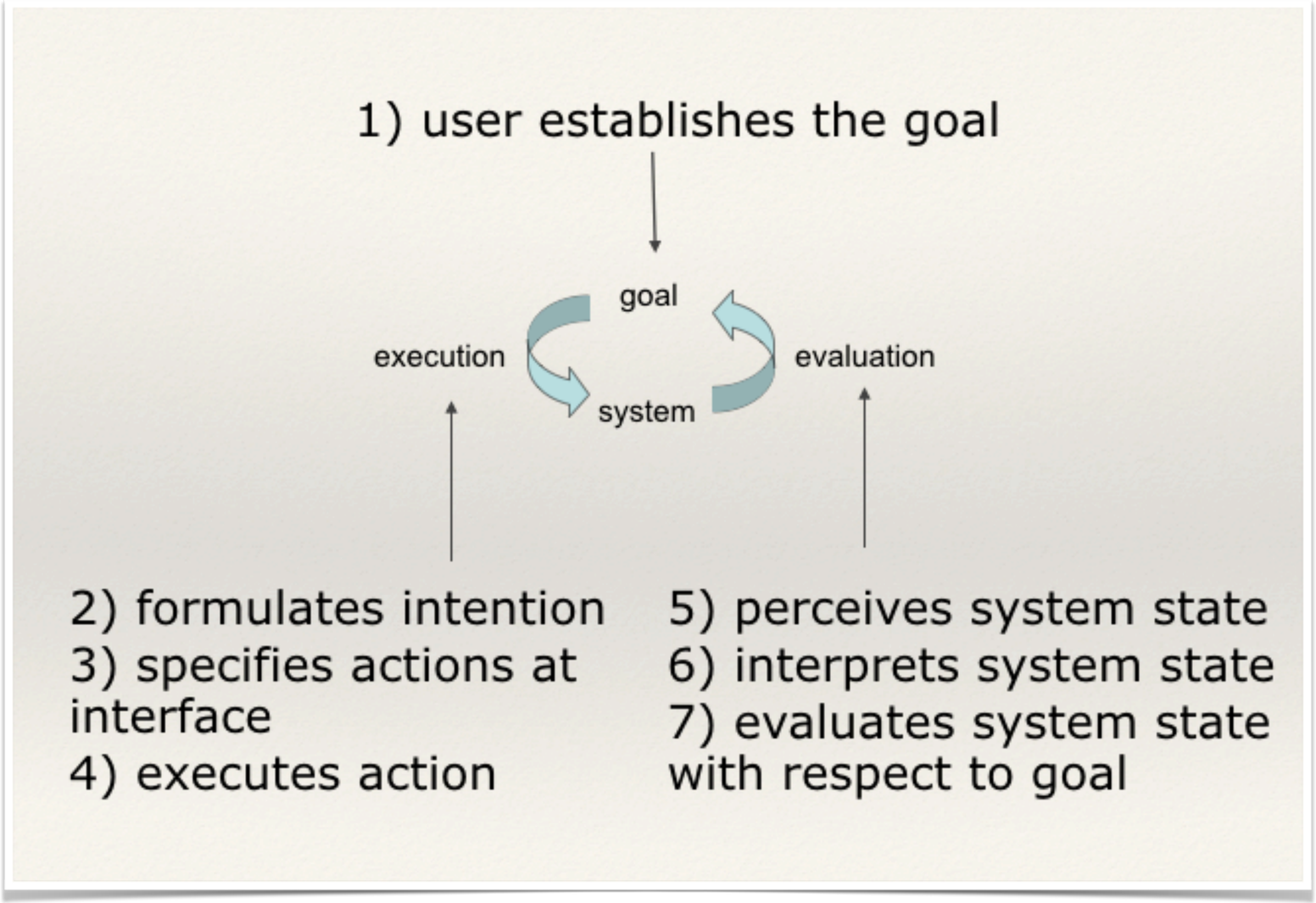
2) Minimize typing by using menus

3) Provide clear feedback on the system’s current state

- Mistake – better understanding of system.

More to read: https://www.nngroup.com/articles/user-mistakes/

Slip and mistake happen in which stage of Norman Model?

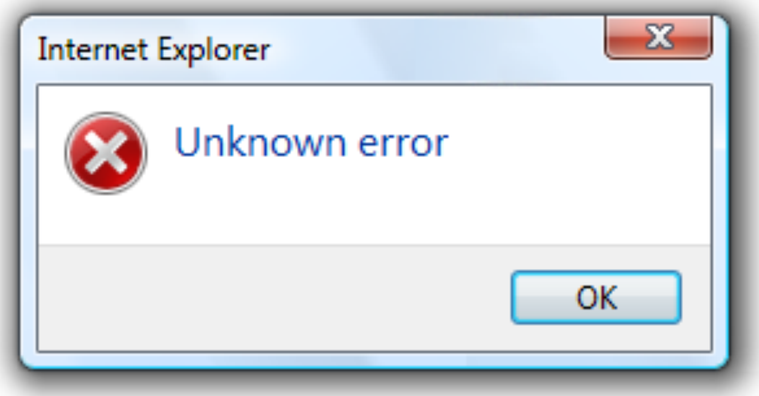


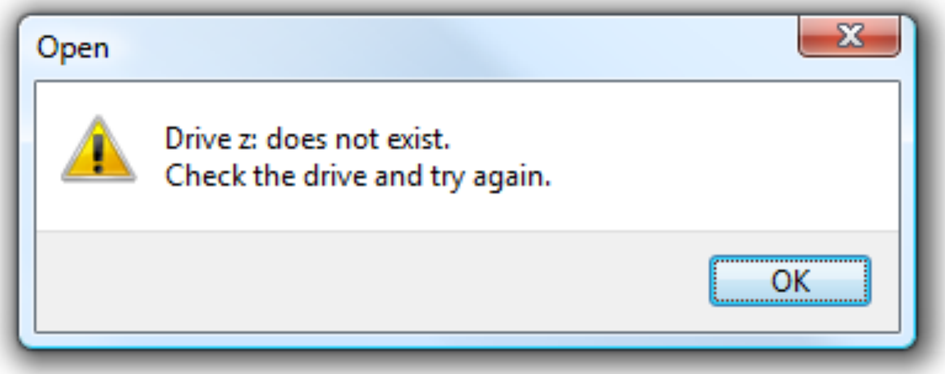
Norman ’s model

Error Messages Design

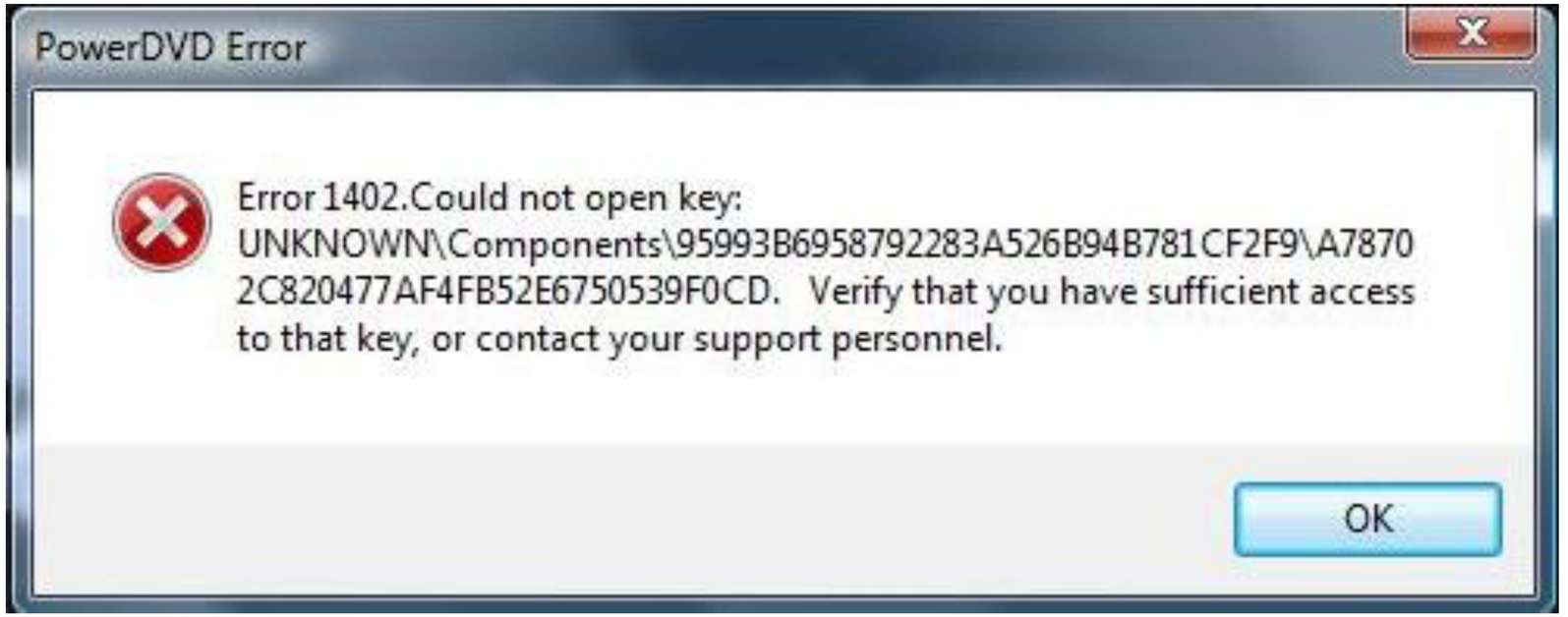
According to Nielsen (2001), good error messages are:

- EXPLICIT – indication that something has gone wrong.

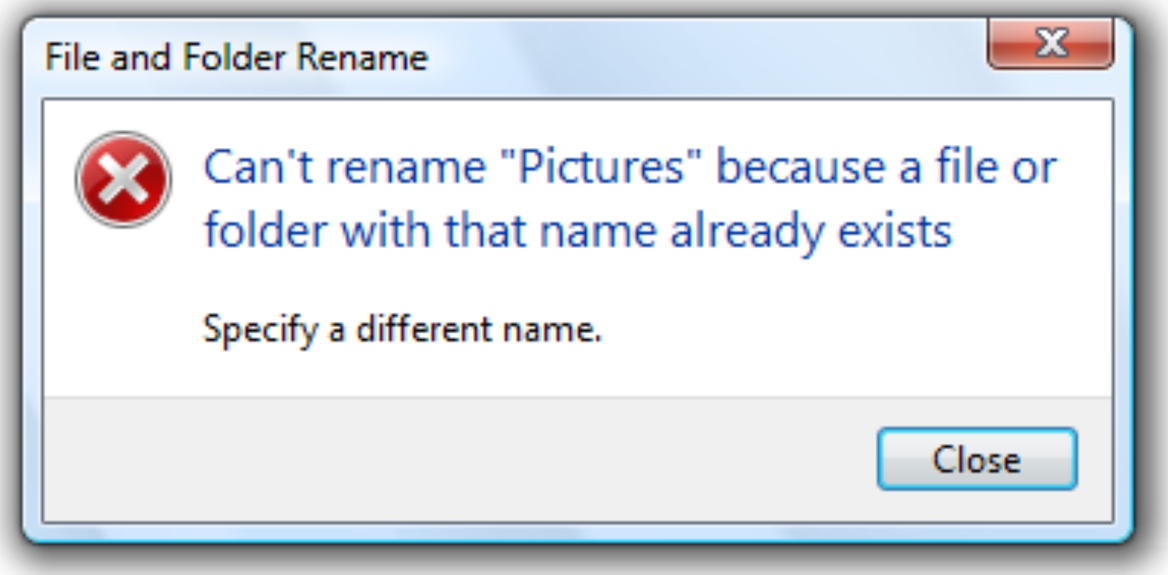




- HUMAN-READABLE – expressed clearly in plain language using words, phrases and concepts familiar to the user rather than in system-specific terms



- POLITE - phrase that doesn't blame users or imply that they are either stupid or doing something wrong
- PRECISE – describe the exact problem, rather than vague generalities.
- CONSTRUCTIVE – provide advice on how to fix the problem



Thank you