HUMAN-COMPUTER INTERACTION

THIRD EDITION

DIX
FINLAY
ABOWD
BEALE

chapter 7

design rules

design rules

Designing for maximum usability
– the goal of interaction design

- Principles of usability
  - general understanding

- Standards and guidelines
  - direction for design

- Design patterns
  - capture and reuse design knowledge

types of design rules

- principles
  - abstract design rules
  - low authority
  - high generality
- standards
  - specific design rules
  - high authority
  - limited application
- guidelines
  - lower authority
  - more general application
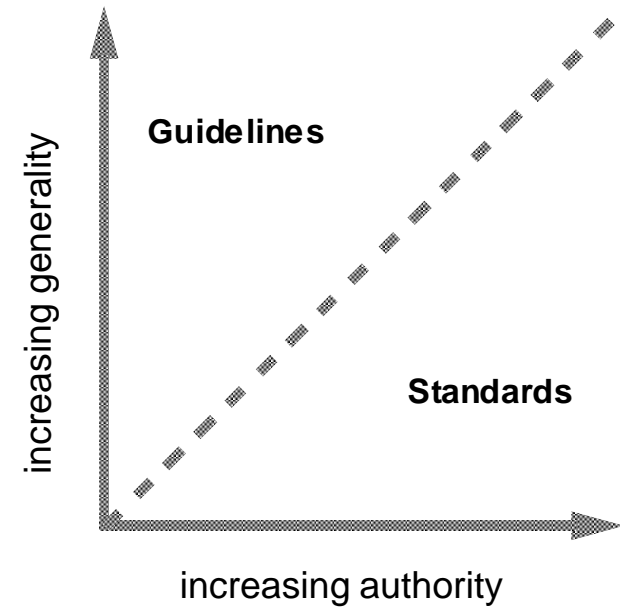
Principles to support usability

Learnability

the ease with which new users can begin effective interaction and achieve maximal performance

Flexibility

the multiplicity of ways the user and system exchange information

Robustness

the level of support provided the user in determining successful achievement and assessment of goal-directed behaviour

Principles of learnability

Predictability
– determining effect of future actions based on past interaction history

Predictable?

operation visibility

VU UNIVERSITY AMSTERDAM

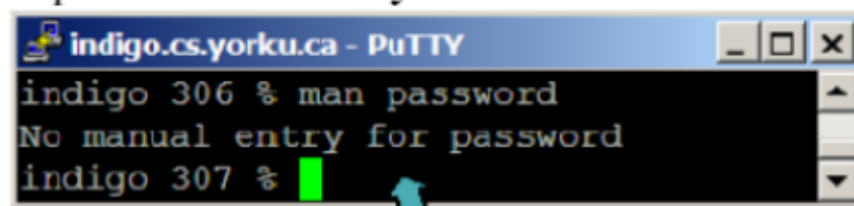Human-Computer Interaction Course 2014: **Lecture 3**
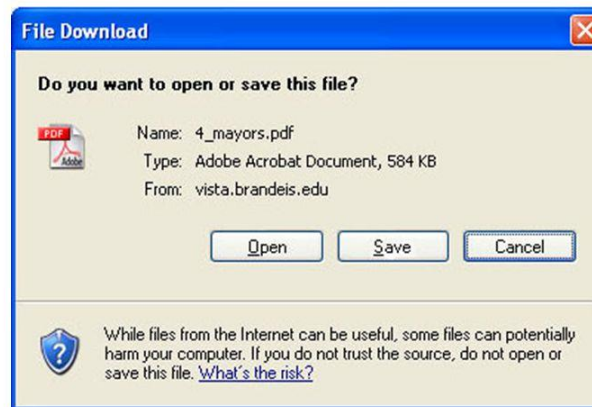
Visibility (perceived affordance)

The Principle of Visibility:
- It Should Be Obvious What a Control Is Used For

◄Goooooooooogle ►
Previous   1 2 **3** 4 5 6 7 8 9 10 11 12   Next

UP

DOWN

Continued…

Operation visibility – NOT!

indigo.cs.yorku.ca - PuTTY

```
indigo 306 % man password
No manual entry for password
indigo 307 %
```

Gee… What's the command to change my password?

Next slide

6 Recognition rather than recall

"I know what I need to do here"

🚫 *Important actions should be easy to access and identify.*

In an earlier version of Windows 8, it was almost impossible to shut down the computer without googling how to do it.

How To Shutdown Windows 8

1. Close all desktop apps you have opened.

2. Swipe in from the right edge of the screen, and then tap Settings. If you're using a mouse, point to the upper-right corner of the screen, move the mouse pointer down, and then click Settings.

Synthesizability

– assessing the effect of past actions

– immediate vs. eventual honesty

The typical global search and replace function performs this substitution without revealing the changes made to you. Suddenly, a careless typing error is transformed into unacceptable grammar as the sentence

> We will prove <u>the the</u>orem holds as a corollary of the following lemma.

is transformed to

> We will prove <u>the</u>orem holds as a corollary of the following lemma.

Principles of learnability (ctd)

Familiarity
- – how prior knowledge applies to new system
- – guessability; affordance

Familiarity

☐ Familiarity: the extent to which a user's knowledge and experience in other real-world or computer-based domains can be applied when interacting with a new system.
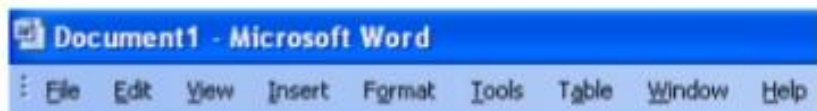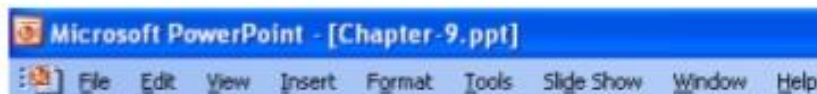
Generalizability

– extending specific interaction knowledge to new situations

Consistency

– likeness in input/output behaviour arising from similar situations or task objectives

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Consistency

Uniformity in appearance, placement, and behavior

Microsoft PowerPoint - [Chapter-9.ppt]

File   Edit   View   Insert   Format   Tools   Slide Show   Window   Help

Document1 - Microsoft Word

File   Edit   View   Insert   Format   Tools   Table   Window   Help

Microsoft Excel - Book1

File   Edit   View   Insert   Format   Tools   Data   Window   Help

Metaphors

Principles of flexibility

Dialogue initiative
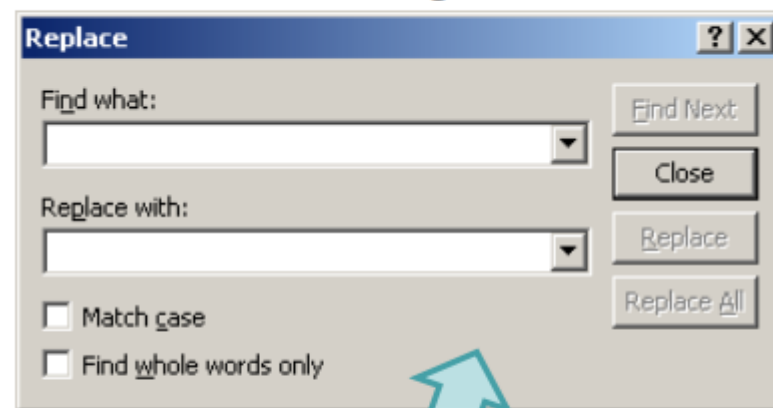- – freedom from system imposed constraints on input dialogue
- – system vs. user pre-emptiveness

System initiated dialog

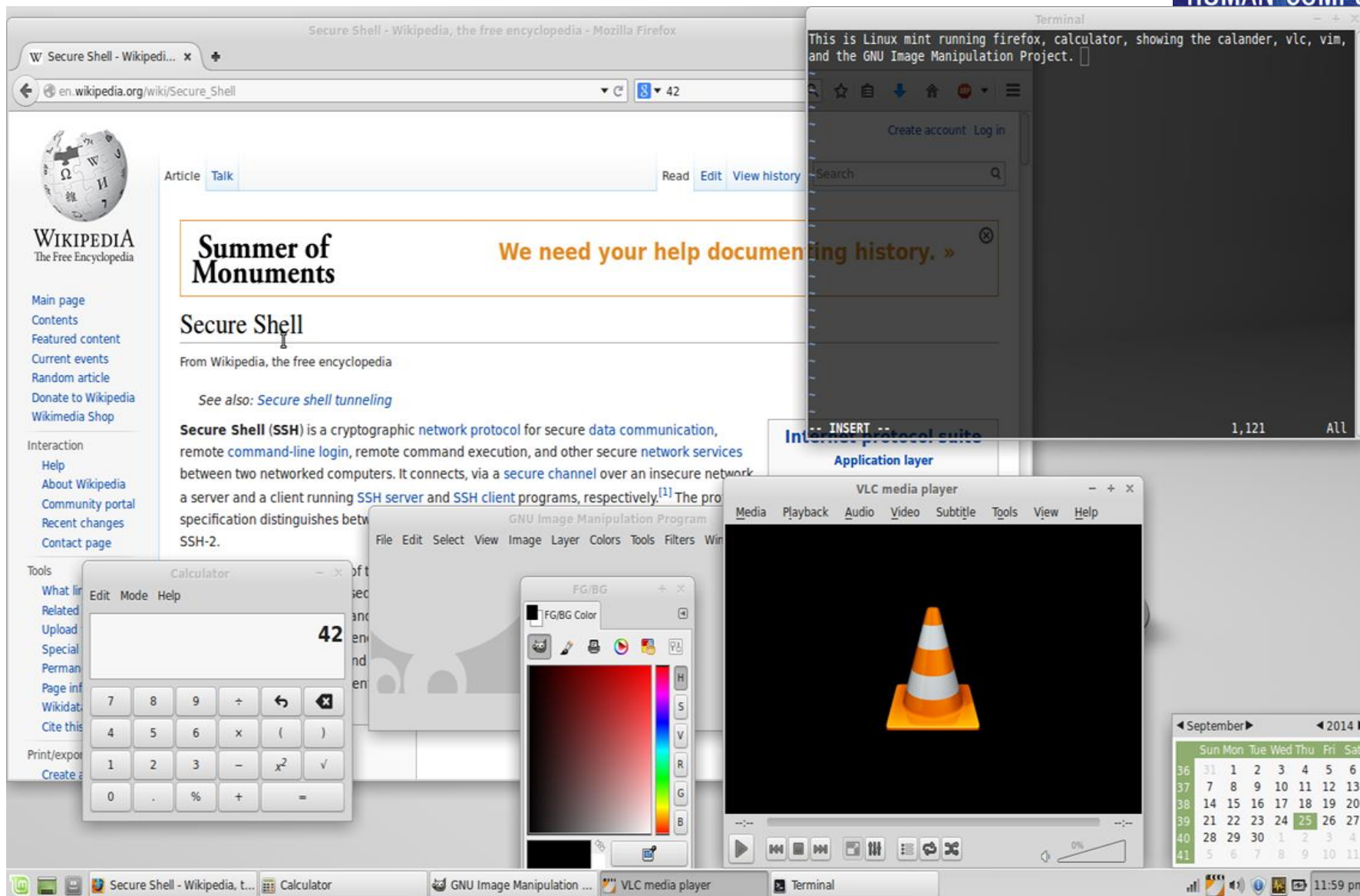User initiated dialog
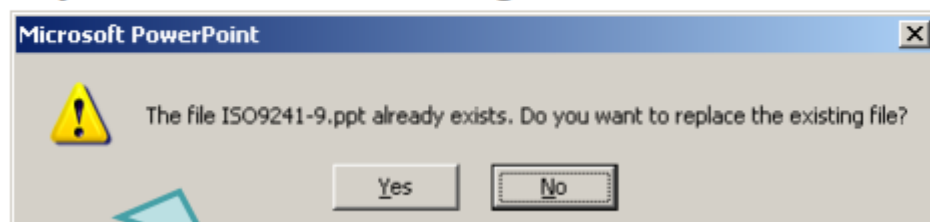
Popped up by system

Popped up by user

Continued...

Multithreading
- ability of system to support user interaction for more than one task at a time
- concurrent vs. interleaving; multimodality

Secure Shell - Wikipedia, the free encyclopedia - Mozilla Firefox

W Secure Shell - Wikipedi... ✕ ✚

en.wikipedia.org/wiki/Secure_Shell ▾ C 8 ▾ 42

Terminal

This is Linux mint running firefox, calculator, showing the calander, vlc, vim, and the GNU Image Manipulation Project.

Create account Log in

Search

Article Talk

Read Edit View history

WIKIPEDIA
The Free Encyclopedia

Summer of Monuments

We need your help documenting history. »

Secure Shell

Main page
Contents
Featured content
Current events
Random article
Donate to Wikipedia
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From Wikipedia, the free encyclopedia

See also: Secure shell tunneling

Interaction
Help
About Wikipedia
Community portal
Recent changes
Contact page

Secure Shell (SSH) is a cryptographic network protocol for secure data communication, remote command-line login, remote command execution, and other secure network services between two networked computers. It connects, via a secure channel over an insecure network, a server and a client running SSH server and SSH client programs, respectively.[1] The pro... specification distinguishes betw... SSH-2.

-- INSERT --   1,121   All

Internet protocol suite

Application layer

Tools
What lin
Related
Upload
Special
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Page inf
Wikidat
Cite this

Calculator

Edit Mode Help

42

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1	2	3	−	x^2	√
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Print/expo
Create a

GNU Image Manipulation Program

File Edit Select View Image Layer Colors Tools Filters Win

FG/BG

FG/BG Color

H
S
V
R
G
B

VLC media player   − + ✕

Media Playback Audio Video Subtitle Tools View Help

◄September►   ◄2014►

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36	31	1	2	3	4	5	6
37	7	8	9	10	11	12	13
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39	21	22	23	24	25	26	27
40	28	29	30	1	2	3	4
41	5	6	7	8	9	10	11

Secure Shell - Wikipedia, t... Calculator GNU Image Manipulation ... VLC media player Terminal

11:59 pm

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classroom.google.com/u/0/w/Mjc1MTU4NTE2NzBa/t/all

Apps | Suggested Sites | CS147 Autumn 200... | Interaction Design |... | Open Courseware -... | Articles | ComputerLogicDesi... | Course | CourseEraAlgo-1 | Cricket | Other bookmarks

CS422

Stream   Classwork   People   Grades

+ Create

🎥 Meet   📅 Google Calendar   📁 Class Drive folder

All topics

Project Proposal

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What it's like to be color blind   Posted Sep 15

Fitt's Law importance   Posted Sep 18

Inductive user interface   Posted Sep 22

Exam Sample-Paper   Posted Sep 27

Chapter 03 : Interaction   Posted Sep 30

self-supervision-ar....zip   Show all

6:41 PM
11/15/2020

- **Task migratability** passing responsibility for task execution between user and system
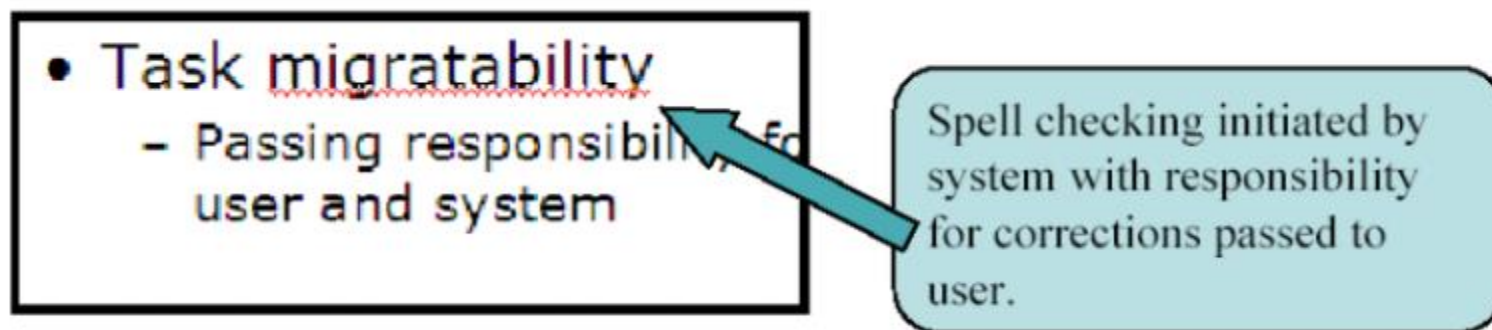
Principles of flexibility (ctd)

Substitutivity

– allowing equivalent values of input and output to be substituted for each other

– representation multiplicity; equal opportunity

Example: MS Word (Format | Paragraph)

Paragraph

Indents and Spacing | Line and Pa

Alignment: Left

Indentation

Left: 0"

Right: 0"
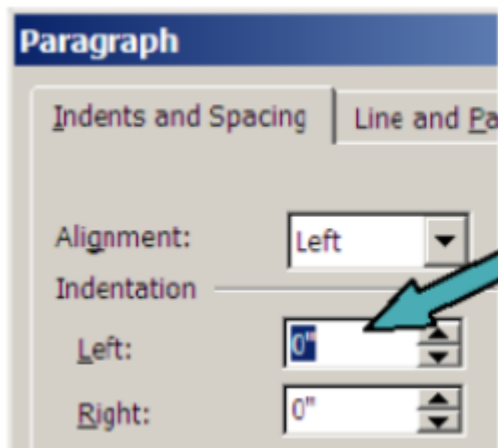
Can specify left margin as
- 5 in
- 5 cm
- 5 pt

Continued…

Customizability

– modifiability of the user interface by user (adaptability) or system (adaptivity)
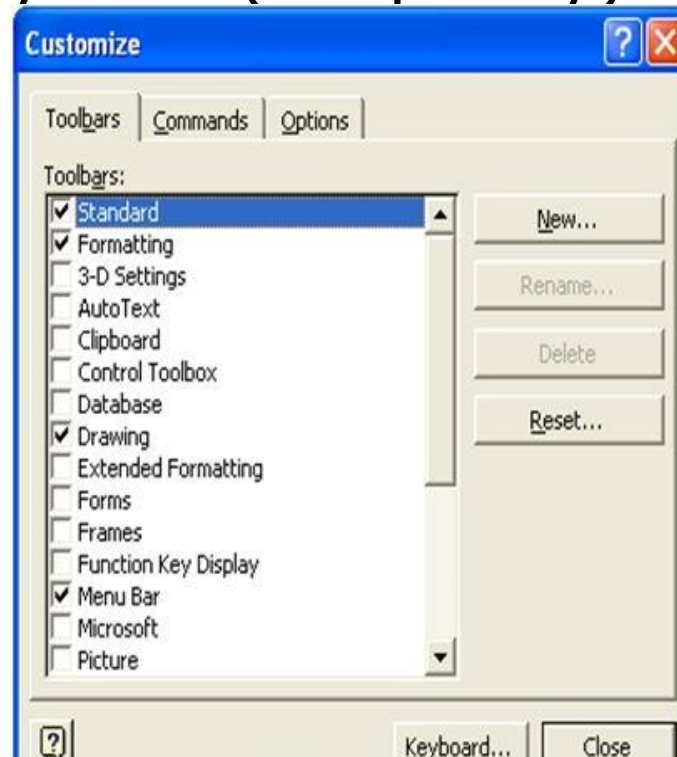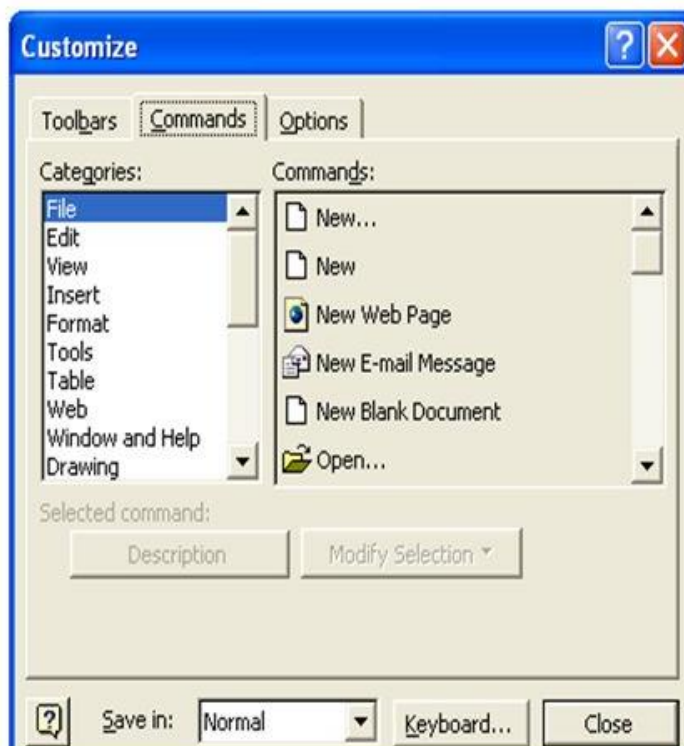
Principles of robustness

Observability
- – ability of user to evaluate the internal state of the system from its perceivable representation
- – Browsability (outlines of a document); defaults; reachability; persistence; operation visibility

Recoverability
- – ability of user to take corrective action once an error has been recognized
- – forward/backward recovery; acceptance of the current state and negotiation from that state towards the desired state

Forward/backward recovery

–
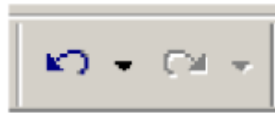
commensurate effort
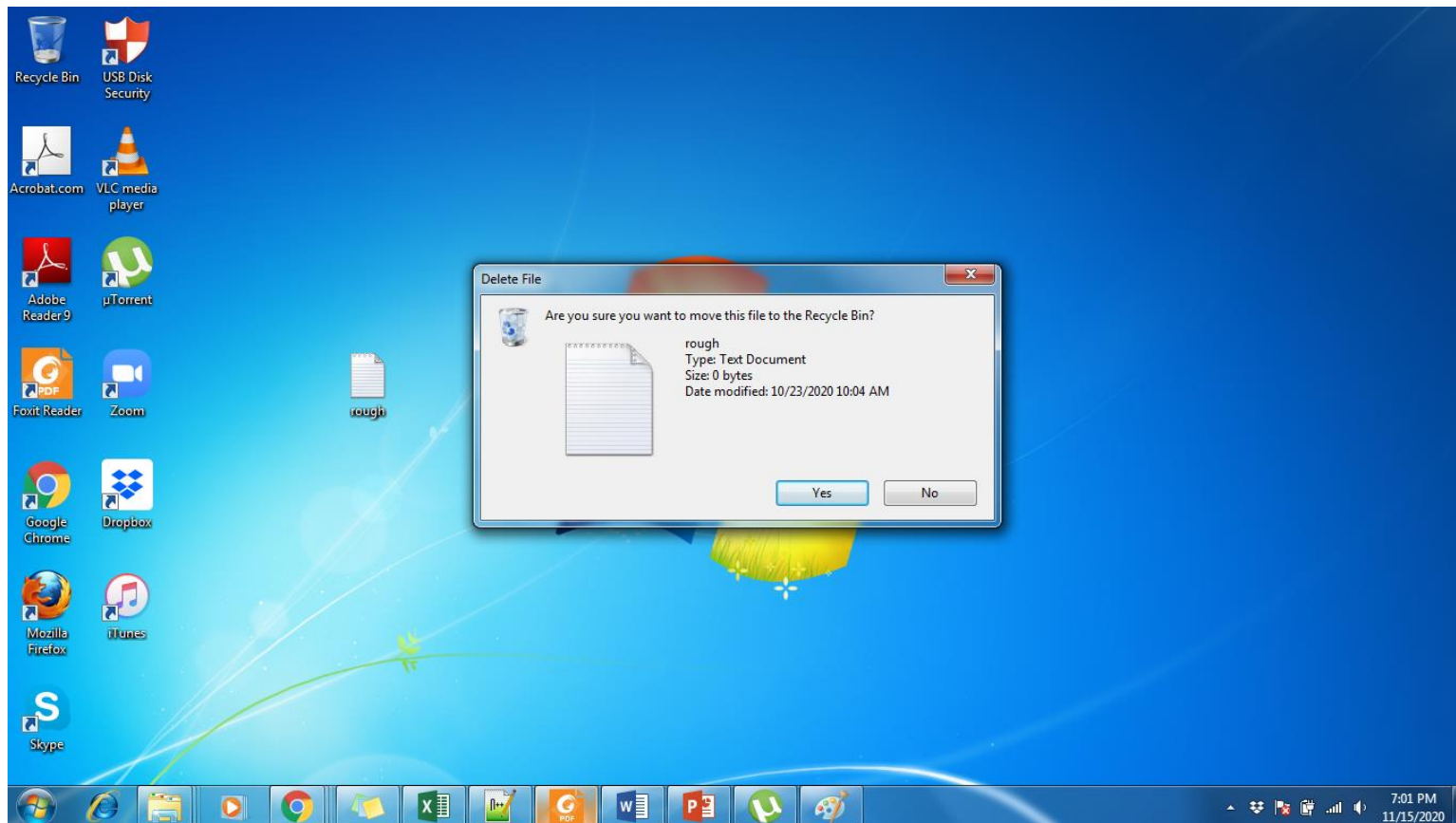
Principles of robustness (ctd)

Responsiveness
- – how the user perceives the rate of communication with the system
- – Stability

Task conformance
- – degree to which system services support all of the user's tasks
- – task completeness; task adequacy

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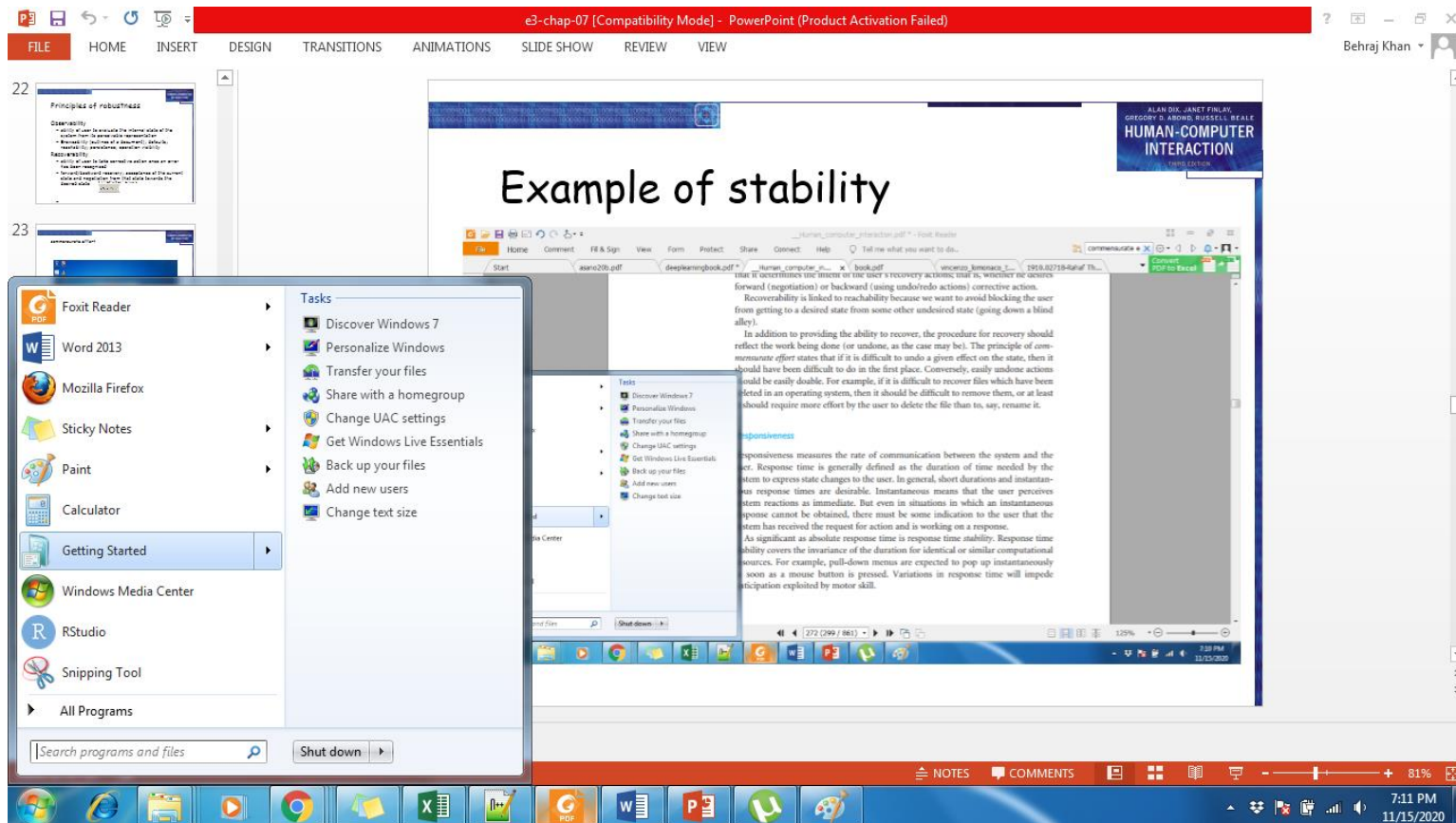
Task conformance
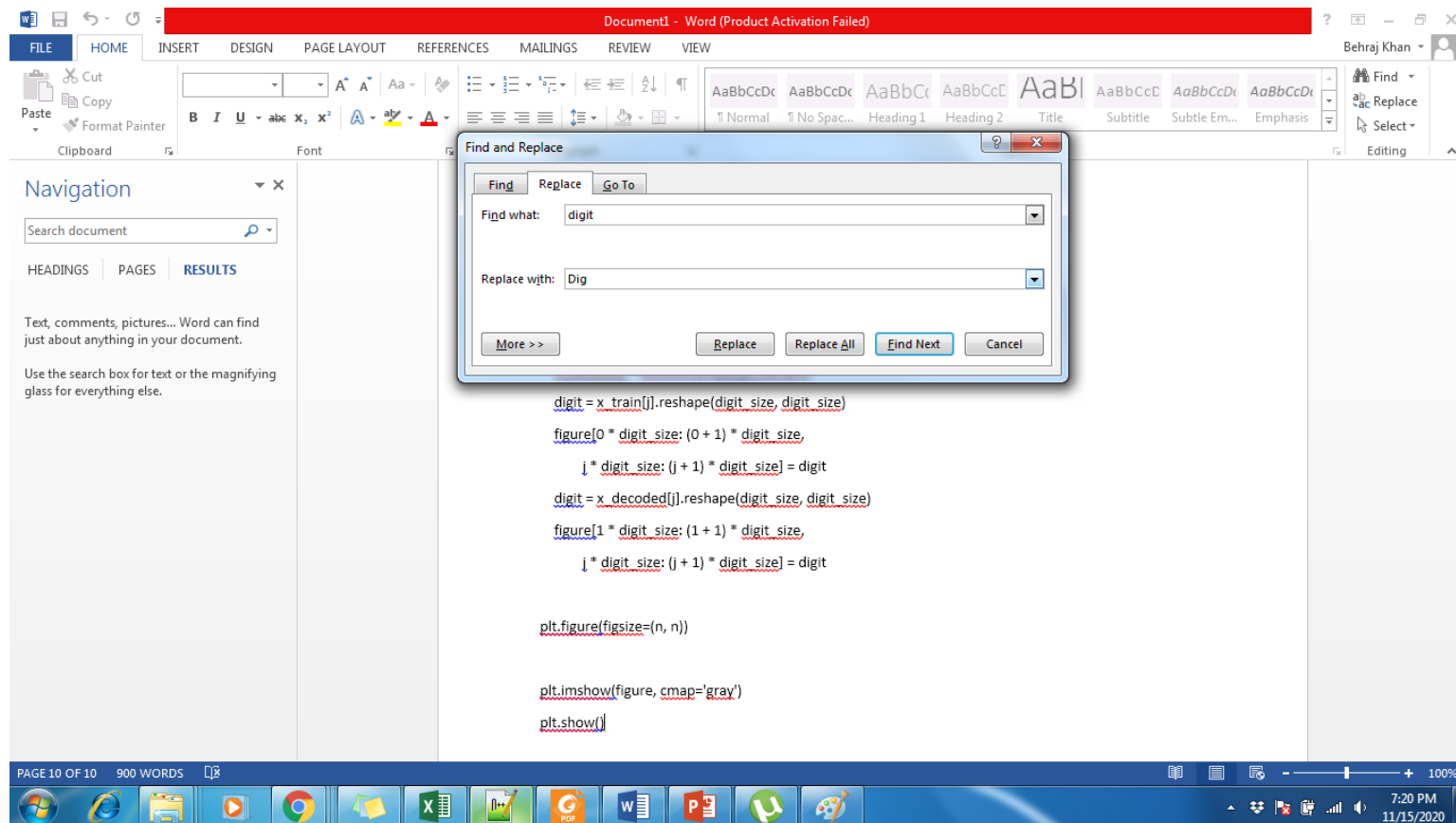
Using design rules

Design rules
- suggest how to increase usability
- differ in generality and authority

increasing generality

Guidelines

Standards

increasing authority
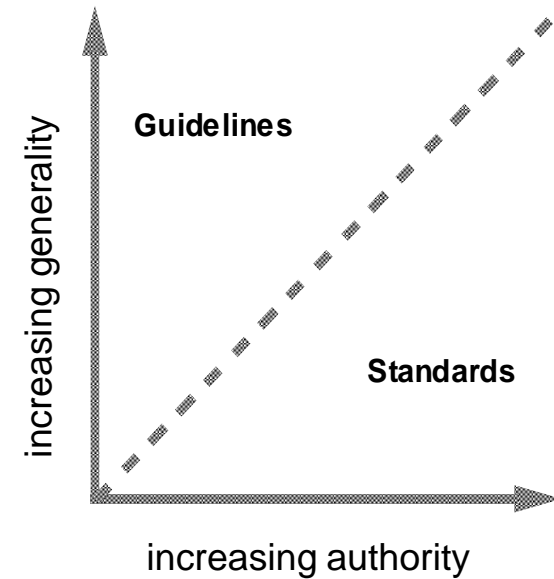
Standards

- set by national or international bodies to ensure compliance by a large community of designers standards require sound underlying theory and slowly changing technology

- hardware standards more common than software high authority and low level of detail

- ISO 9241 defines usability as effectiveness, efficiency and satisfaction with which users accomplish tasks

Guidelines

- more suggestive and general
- many textbooks and reports full of guidelines
- abstract guidelines (principles) applicable during early life cycle activities
- detailed guidelines (style guides) applicable during later life cycle activities
- understanding justification for guidelines aids in resolving conflicts

Golden rules and heuristics

- "Broad brush" design rules
- Useful check list for good design
- Better design using these than using nothing!
- Different collections e.g.
  - Nielsen's 10 Heuristics (see Chapter 9)
  - Shneiderman's 8 Golden Rules
  - Norman's 7 Principles

- Look at some of the principles outlined in this section, and use one or two to provide a usability specification for an electronic meetings diary or calendar. First identify some of the tasks that would be performed by a user trying to keep track of future meetings, and then complete the usability specification assuming that the electronic system will be replacing a paper-based system. What assumptions do you have to make about the user and the electronic diary in order to create a reasonable usability specification?

Shneiderman's 8 Golden Rules

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

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

Edit menu showing: Undo Drag ⌘Z, Redo Edit Track Name ⇧⌘Z, Undo History... ⌥⌘Z, Delete Undo History, Cut ⌘X, Copy ⌘C
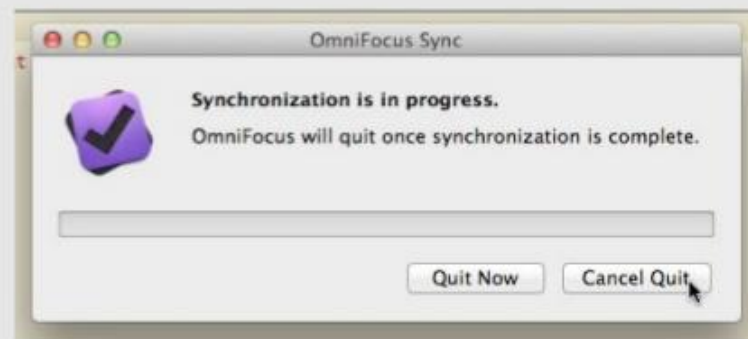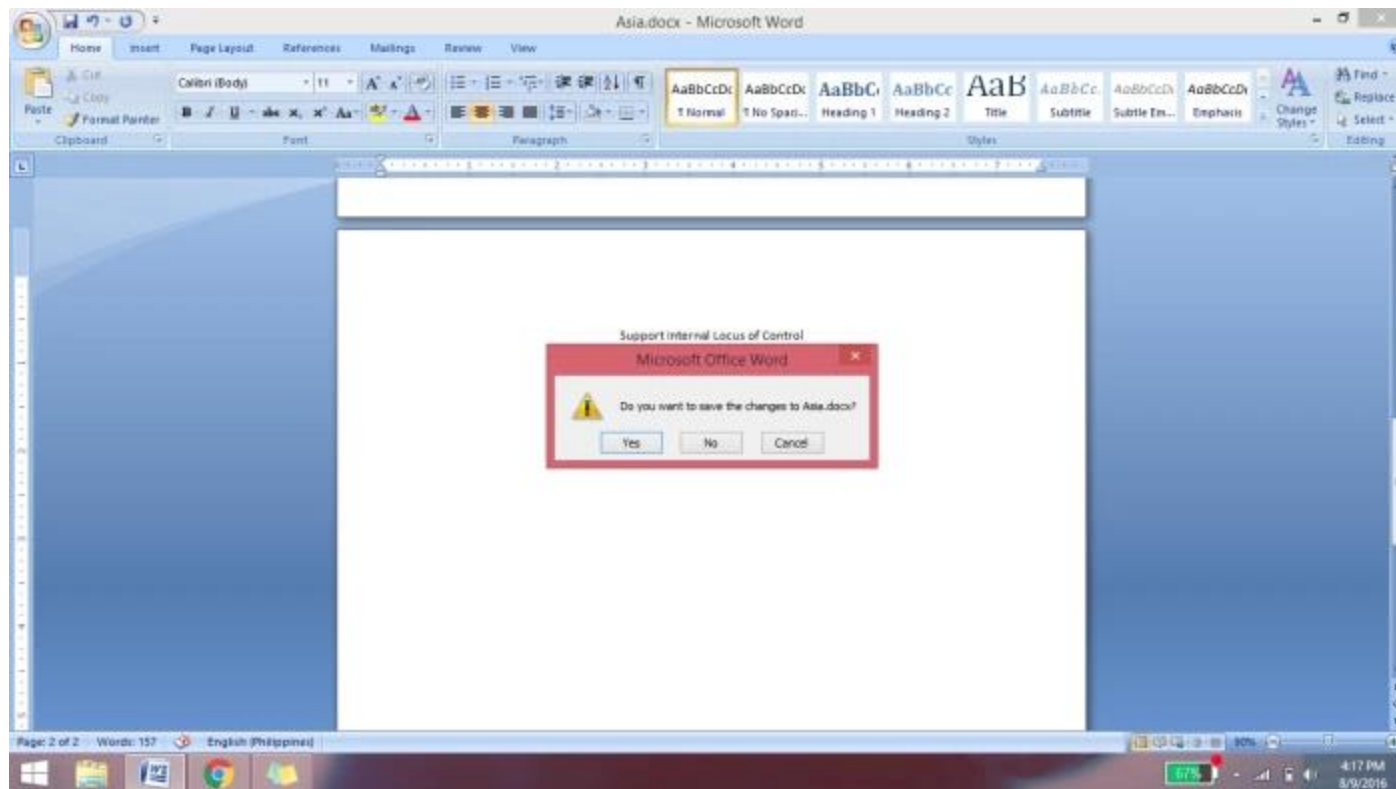
7. Support internal locus of control

7. Support internal locus of control

Norman's 7 Principles

1. Use both knowledge in the world and knowledge in the head.
2. Simplify the structure of tasks.
3. Make things visible: bridge the gulfs of Execution and Evaluation.
4. Get the mappings right.
5. Exploit the power of constraints, both natural and artificial.
6. Design for error.
7. When all else fails, standardize.

HCI design patterns

- An approach to reusing knowledge about successful design solutions

- Originated in architecture: Alexander

- A pattern is an invariant solution to a recurrent problem within a specific context.

- Examples
  - Light on Two Sides of Every Room (architecture)
  - Go back to a safe place (HCI)

- Patterns do not exist in isolation but are linked to other patterns in *languages* which enable complete designs to be generated

HCI design patterns (cont.)

- Characteristics of patterns
  - capture design practice not theory
  - capture the essential common properties of good examples of design
  - represent design knowledge at varying levels: social, organisational, conceptual, detailed
  - embody values and can express what is humane in interface design
  - are intuitive and readable and can therefore be used for communication between all stakeholders
  - a pattern language should be generative and assist in the development of complete designs.

Summary

Principles for usability

- – repeatable design for usability relies on maximizing benefit of one good design by abstracting out the general properties which can direct purposeful design
- – The success of designing for usability requires both creative insight (new paradigms) and purposeful principled practice

Using design rules

- – standards and guidelines to direct design activity