

# Unit #9

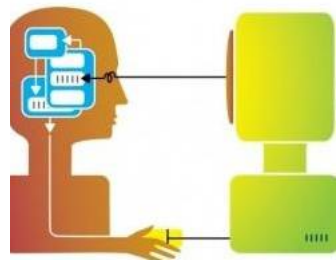
Design – User Experience

MIS5203

# Agenda

- Human-computer interface, usability and ergonomics
- Auditing user interface design of software applications
- In-class exercise
- Criteria for a well-designed user interface
- Team project presentation

# Human-computer interface (HCI)



Programmable, or software, interface which enable an end-user (i.e. the person using the computer) to

- Access and interact with a computer application system
- Make use of the facilities and functions which it provides
- Carry out the tasks for which the system has been designed

# Usability

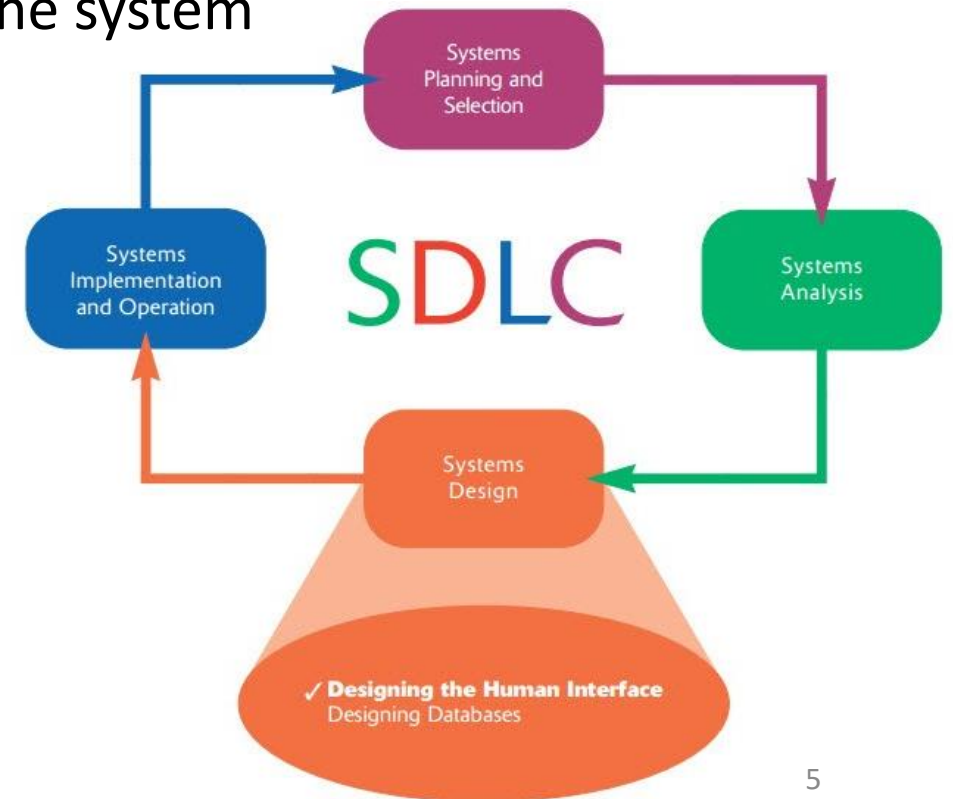
The extent to which an end-user is able to carry out required tasks successfully, and without difficulty using the computer application system



# How does the human-computer interface influence usability?

The 'user interface', or human-computer interface

- Represents the only part of the application system with which the end-user comes into direct contact
- Plays a vital role in enabling the human to "use" the system



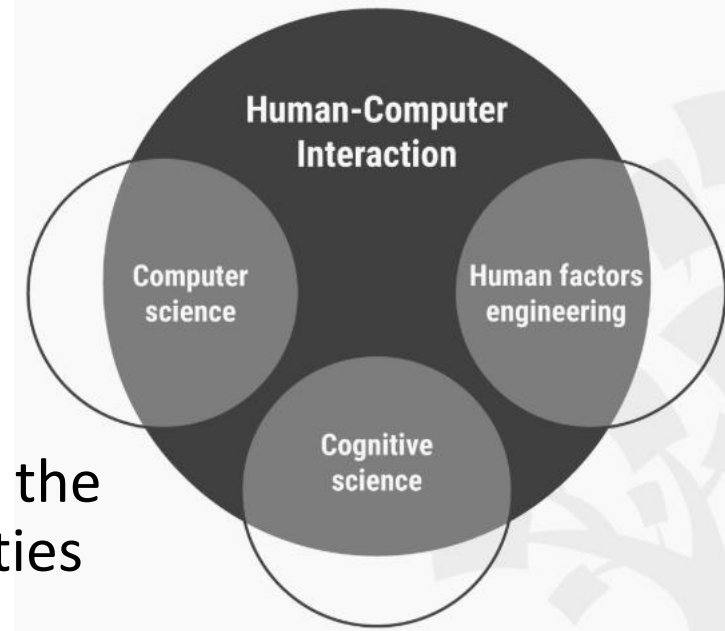
# Contribution of Ergonomics

## Ergonomics

- Is concerned with 'design for human use'
- Aims to maximize safety, efficiency and comfort by matching the requirements of the operator's 'machine' to her/his capabilities

## Software ergonomics

- Is a branch of ergonomics concerned specifically with the human-computer software interface



# Why audit the usability of the user interface design?

If the user interface is poorly designed, it can

- Severely restrict the user's ability to use the system
- Cause confusion and frustration
- Cause difficulty in learning how to use the system
- Cause misunderstanding of what the system is doing and of what the user should do
- Cause errors
- Cause difficulties in using the system to successfully complete tasks



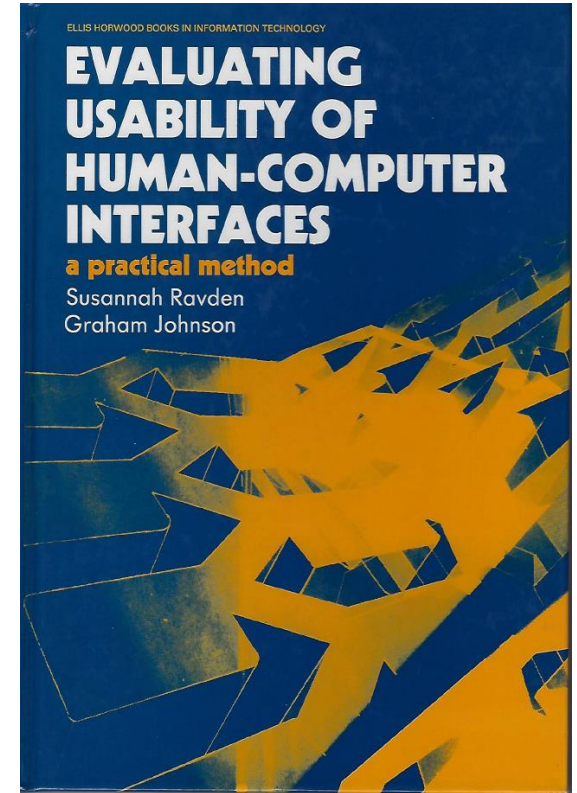
# In-Class Exercise – working as project teams

1. Identify a website that offers important capabilities to business users (e.g. ITACS students seeking job opportunities in IT Audit)  
E.g. job finding website e.g. Monster.com, Dice.com, Indeed.com, ...
2. Examine/use the website,
3. Draft a set of criteria you might use to determine if the user interface is well-designed
4. Present your user interface design audit criteria to the class



# Criteria for a well-design user interface

1. Visual clarity
2. Consistency
3. Compatibility
4. Informative feedback
5. Explicitness
6. Appropriate functionality
7. Flexibility and control
8. Error prevention and correction
9. User guidance and support
10. System usability problems
11. General usability questions



Ravden, S. and Johnson G. (1989) Evaluating Usability of Human-Computer Interfaces – a practical method

# Visual clarity

Information displayed on the screen should be clear, well-organized, unambiguous and easy to read

	Always	Most of the time	Some of the time	Never	Comments
1. Is each screen clearly identified with an informative title or description?					
2. Is important information highlighted on the screen? (e.g. cursor position, instructions, errors)					
3. When the user enters information on the screen, is it clear: (a) where the information should be entered? (b) in what format it should be entered?					
4. Where the user overtypes information on the screen, does the system clear the previous information, so that it does not get confused with the updated input?					
5. Does information appear to be organized logically on the screen? (e.g. menus organized by probable sequence of selection, or alphabetically)					
6. Are different types of information clearly separated from each other on the screen? (e.g. instructions, control options, data displays)					
7. Where a large amount of information is displayed on one screen, is it clearly separated into sections on the screen?					
8. Are columns of information clearly aligned on the screen? (e.g. columns of alphanumerics left-justified, columns of integers right-justified)					
9. Are bright or light colours displayed on a dark background, and vice versa?					
10. Does the use of colour help to make the displays clear?					
11. Where colour is used, will all aspects of the display be easy to see if used on a monochrome or low resolution screen, or if the user is colour-blind?					
12. Is the information on the screen easy to see and read?					

	Always	Most of the time	Some of the time	Never	Comments
13. Do screens appear uncluttered?					
14. Are schematic and pictorial displays (e.g. figures and diagrams) clearly drawn and annotated?					
15. Is it easy to find the required information on a screen?					
16. Are there any comments (good or bad) you wish to add regarding the above issues?					
17. Overall, how would you rate the system in terms of visual clarity? (Please tick appropriate box below.)					

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

Ravden, S. and Johnson G. (1989) Evaluating Usability of Human-Computer Interfaces – a practical method

# Consistency

The way the system looks and works should be consistent at all times

	Always	Most of the time	Some of the time	Never	Comments
1. Are different colours used consistently throughout the system? (e.g. errors always highlighted in the same colour)					
2. Are abbreviations, acronyms, codes and other alphanumeric information used consistently throughout the system?					
3. Are icons, symbols, graphical representations and other pictorial information used consistently throughout the system?					
4. Is the same type of information (e.g. instructions, menus, messages, titles) displayed:					
(a) in the same location on the screen?					
(b) in the same layout?					
5. Does the cursor appear in the same initial position on displays of a similar type?					
6. Is the same item of information displayed in the same format, wherever it appears?					
7. Is the format in which the user should enter particular types of information on the screen consistent throughout the system?					
8. Is the method of entering information consistent throughout the system?					
9. Is the action required to move the cursor around the screen consistent throughout the system?					
10. Is the method of selecting options (e.g. from a menu) consistent throughout the system?					
11. Where a keyboard is used, are the same keys used for the same functions throughout the system?					
12. Are there standard procedures for carrying out similar, related operations? (e.g. updating and deleting information, starting and finishing transactions)					
13. Is the way the system responds to a particular user action consistent at all times?					

14. Are there any comments (good or bad) you wish to add regarding the above issues?

15. Overall, how would you rate the system in terms of consistency? (Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

Ravden, S. and Johnson G. (1989) Evaluating Usability of Human-Computer Interfaces – a practical method

# Compatibility

The way the system looks and works should be compatible with user conventions and expectations

	Always	Most of the time	Some of the time	Never	Comments
1. Are colours assigned according to conventional associations where these are important? (e.g. red = alarm, stop)					
2. Where abbreviations, acronyms, codes and other alphanumeric information are displayed: (a) are they easy to recognize and understand?  (b) do they follow conventions where these exist?					
3. Where icons, symbols, graphical representations and other pictorial information are displayed: (a) are they easy to recognize and understand?  (b) do they follow conventions where these exist?					
4. Where jargon and terminology is used within the system, is it familiar to the user?					
5. Are established conventions followed for the format in which particular types of information are displayed? (e.g. layout of dates and telephone numbers)					
6. Is information presented and analysed in the units with which the users normally work? (e.g. batches, kilos, dollars)					
7. Is the format of displayed information compatible with the form in which it is entered into the system?					
8. Is the format and sequence in which information is printed compatible with the way it is displayed on the screen?					
9. Where the user makes an input movement in a particular direction (e.g. using a direction key, mouse, or joystick), is the corresponding movement on the screen in the same direction?					
10. Are control actions compatible with those used in other systems with which the user may need to interact?					

	Always	Most of the time	Some of the time	Never	Comments
11. Is information presented in a way which fits the user's view of the task?					
12. Are graphical displays compatible with the user's view of what they are representing?					
13. Does the organization and structure of the system fit the user's perception of the task?					
14. Does the sequence of activities required to complete a task follow what the user would expect?					
15. Does the system work in the way the user thinks it should work?					

16. Are there any comments (good or bad) you wish to add regarding the above issues?

17. Overall, how would you rate the system in terms of compatibility?  
(Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

Ravden, S. and Johnson G. (1989) Evaluating Usability of Human-Computer Interfaces – a practical method

# Information Feedback

Users should be given clear, informative feedback on where they are in the system, what actions they have taken, whether these actions have been successful and what actions should be taken next

	Always	Most of the time	Some of the time	Never	Comments
1. Are instructions and messages displayed by the system concise and positive?					
2. Are messages displayed by the system relevant?					
3. Do instructions and prompts clearly indicate what to do?					
4. Is it clear what actions the user can take at any stage?					
5. Is it clear what the user needs to do in order to take a particular action? (e.g. which options to select, which keys to press)					
6. When the user enters information on the screen, is it made clear what this information should be?					
7. Is it made clear what shortcuts, if any, are possible? (e.g. abbreviations, hidden commands, type-ahead)					
8. Is it made clear what changes occur on the screen as a result of a user input or action?					
9. Is there always an appropriate system response to a user input or action?					
10. Are status messages (e.g. indicating what the system is doing, or has just done): (a) informative?					
(b) accurate?					
11. Does the system clearly inform the user when it completes a requested action (successfully or unsuccessfully)?					
12. Does the system promptly inform the user of any delay, making it clear that the user's input or request is being processed?					
13. Do error messages explain clearly: (a) where the errors are?					
(b) what the errors are?					
(c) why they have occurred?					
14. Is it clear to the user what should be done to correct an error?					
15. Where there are several modes of operation, does the system clearly indicate which mode the user is currently in? (e.g. update, enquiry, simulation)					

16. Are there any comments (good or bad) you wish to add regarding the above issues?

17. Overall, how would you rate the system in terms of informative feedback?  
(Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

# Explicitness

The way the system works and is structured should be clear to the user

	Always	Most of the time	Some of the time	Never	Comments
1. Is it clear what stage the system has reached in a task?					
2. Is it clear what the user needs to do in order to complete a task?					
3. Where the user is presented with a list of options (e.g. in a menu), is it clear what each option means?					
4. Is it clear what part of the system the user is in?					
5. Is it clear what the different parts of the system do?					
6. Is it clear how, where and why changes in one part of the system affect other parts of the system?					
7. Is it clear why the system is organized and structured as it is?					
8. Is it clear why a series of screens are sequenced as they are?					
9. Is the structure of the system obvious to the user?					
10. Is the system well-organized from the user's point of view?					
11. Where an interface metaphor is used (e.g. the desk-top metaphor in office applications), is this made explicit?					
12. Where a metaphor is employed, and is only applicable to certain parts of the system, is this made explicit?					
13. In general, is it clear what the system is doing?					

14. Are there any comments (good or bad) you wish to add regarding the above issues?

15. Overall, how would you rate the system in terms of explicitness?  
(Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

# Appropriate Functionality

The system should meet the needs and requirements of users when carrying out tasks

	Always	Most of the time	Some of the time	Never	Comments
1. Is the input device available to the user (e.g. pointing device, keyboard, joystick) appropriate for the tasks to be carried out?					
2. Is the way in which information is presented appropriate for the tasks?					
3. Does each screen contain all the information which the user feels is relevant to the task?					
4. Are users provided with all the options which they feel are necessary at any particular stage in a task?					
5. Can users access all the information which they feel they need for their current task?					
6. Does the system allow users to do what they feel is necessary in order to carry out a task?					
7. Is system feedback appropriate for the task?					
8. Do the contents of help and tutorial facilities make use of realistic task data and problems?					
9. Is task-specific jargon and terminology defined at an early stage in the task?					
10. Where interface metaphors are used, are they relevant to the tasks carried out using the system?					
11. Where task sequences are particularly long, are they broken into appropriate subsequences? (e.g. separating a lengthy editing procedure into its constituent parts)					

12. Are there any comments (good or bad) you wish to add regarding the above issues?

13. Overall, how would you rate the system in terms of appropriate functionality? (Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

# Flexibility and Control

The interface should be sufficiently flexible in structure, in the way information is presented and in terms of what the user can do, to suit the needs and requirements of all users, and to allow them to feel in control of the system

	Always	Most of the time	Some of the time	Never	Comments
1. Is there an easy way for the user to 'undo' an action, and step back to a previous stage or screen? (e.g. if the user makes a wrong choice, or does something unintended)					
2. Where the user can 'undo', is it possible to 'redo' (i.e. to reverse this action)?					
3. Are shortcuts available when required? (e.g. to bypass a sequence of activities or screens)					
4. Do users have control over the order in which they request information, or carry out a series of activities?					
5. Can the user look through a sequence of screens in either direction?					
6. Can the user access a particular screen in a sequence of screens directly? (e.g. where a list or table covers several screens)					
7. In menu-based systems, is it easy to return to the main menu from any part of the system?					
8. Can the user move to different parts of the system as required?					
9. Is the user able to finish entering information (e.g. when typing in a list or table of information) before the system responds? (e.g. by updating the screen)					
10. Does the system prefill repeated information on the screen, where possible? (e.g. to save the user having to enter the same information several times)					
11. Can the user choose whether to enter information manually or to let the computer generate information automatically? (e.g. where there are defaults)					
12. Can the user override computer-generated (e.g. default) information, if appropriate?					
13. Can the user choose the rate at which information is presented?					
14. Can the user choose how to name and organize information which may need to be recalled at a later stage? (e.g. files, directories)					
15. Can users tailor certain aspects of the interface to their own preferences or needs? (e.g. colours, parameters)					

16. Are there any comments (good or bad) you wish to add regarding the above issues?
17. Overall, how would you rate the system in terms of flexibility and control? (Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory



# Error Prevention and Correction

The system should be designed to minimize the possibility of user error, with inbuilt facilities for detecting and handling those which do occur; users should be able to check their inputs and to correct errors, or potential error situations before the input is processed

	Always	Most of the time	Some of the time	Never	Comments
1. Does the system validate user inputs before processing, wherever possible?					
2. Does the system clearly and promptly inform the user when it detects an error?					
3. Does the system inform the user when the amount of information entered exceeds the available space? (e.g. trying to key five digits into a four-digit field)					
4. Are users able to check what they have entered before it is processed?					
5. Is there some form of cancel (or 'undo') key for the user to reverse an error situation?					
6. Is it easy for the user to correct errors?					
7. Does the system ensure that the user corrects all detected errors before the input is processed?					
8. Can the user try out possible actions (e.g. using a simulation facility) without the system processing the input and causing problems?					
9. Is the system protected against common trivial errors?					
10. Does the system ensure that the user double-checks any requested actions which may be catastrophic if requested unintentionally? (e.g. large-scale deletion)					
11. Is the system protected against possible knock-on effects of changes in one part of the system?					
12. Does the system prevent users from taking actions which they are not authorized to take? (e.g. by requiring passwords)					
13. In general, is the system free from errors and malfunctions?					
14. When system errors occur, can the user access all necessary diagnostic information to resolve the problem (e.g. where and what the fault is, what is required to resolve it)					

15. Are there any comments (good or bad) you wish to add regarding the above issues?

16. Overall, how would you rate the system in terms of error prevention and correction?

(Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

# User Guidance and Support

Informative, easy-to-use and relevant guidance and support should be provided, both on the computer (via the on-line help facility) and in hard-copy document form, to help the user understand the use of the system

	Always	Most of the time	Some of the time	Never	Comments
1. If there is some form of help facility (or guidance) on the computer to help the user when using the system then: (a) Can the user request this easily from any point in the system?					
(b) Is it clear how to get in and out of the help facility?					
(c) Is the help information presented clearly, without interfering with the user's current activity?					
(d) When the user requests help, does the system clearly explain the possible actions which can be taken, in the context of what the user is currently doing?					
(e) When using the help facility, can the user find relevant information directly, without having to look through unnecessary information?					
(f) Does the help facility allow the user to browse through information about other parts of the system?					
2. If there is some form of hard-copy guide to the system (e.g. user guide or manual) then: (a) Does this provide an in-depth, comprehensive description, covering all aspects of the system?					
(b) Is it easy to find the required section in the hard-copy documentation?					
3. Is the organization of all forms of user guidance and support related to the tasks which the user can carry out?					
4. Do user guidance and support facilities adequately explain both user and system errors, and how these should be corrected?					
5. Are all forms of user guidance and support maintained up-to-date?					

6. Are there any comments (good or bad) you wish to add regarding the above issues?

7. Overall, how would you rate the system in terms of user guidance and support?  
(Please tick appropriate box below.)

Very satisfactory	Moderately satisfactory	Neutral	Moderately unsatisfactory	Very unsatisfactory

# System Usability Problems

When using the system, did you experience problems with any of the following:

	No problems	Minor problems	Major problems	Comments
1. Working out how to use the system				
2. Lack of guidance on how to use the system				
3. Poor system documentation				
4. Understanding how to carry out the tasks				
5. Knowing what to do next				
6. Understanding how the information on the screen relates to what you are doing				
7. Finding the information you want				
8. Information which is difficult to read clearly				
9. Too many colours on the screen				
10. Colours which are difficult to look at for any length of time				
11. An inflexible, rigid system structure				
12. An inflexible HELP (guidance) facility				
13. Losing track of where you are in the system or of what you are doing or have done				
14. Having to remember too much information while carrying out a task				
15. System response times that are too quick for you to understand what is going on				
16. Information which does not stay on the screen long enough for you to read it				

	No problems	Minor problems	Major problems	Comments
17. System response times that are too slow				
18. Unexpected actions by the system				
19. An input device which is difficult or awkward to use				
20. Knowing where or how to input information				
21. Having to spend too much time inputting information				
22. Having to be very careful in order to avoid errors				
23. Working out how to correct errors				
24. Having to spend too much time correcting errors				
25. Having to carry out the same type of activity in different ways				

# General Questions on System Usability

1. What are the best aspects of the system for the user?
2. What are the worst aspects of the system for the user?
3. Are there any parts of the system which you found confusing or difficult to understand?
4. Where there any aspects of the system which you found particularly irritating although they did not cause major problems?
5. What were the most common mistakes you made when using the system?
6. What changes would you make to the system to make it better from the user's point of view?
7. Is there anything else about the system you would like to add?

# Analyzing Results of Evaluation – “Ideal”

1. Visual clarity
2. Consistency
3. Compatibility
4. Informative feedback
5. Explicitness
6. Appropriate functionality
7. Flexibility and control
8. Error prevention and correction
9. User guidance and support
10. System usability problems
11. General usability questions

## “Ideal” completed Checklist

- Sections 1-9:
  - Every question answered ‘always’
  - Every satisfaction scale rated ‘very satisfactory’
- Section 10: all answers ‘no problems’
- Section 11: no problems or criticisms
- Comments: all are complimentary

*An unlikely audit outcome*

# Analyzing Results of Evaluation – “Most unacceptable”

1. Visual clarity
2. Consistency
3. Compatibility
4. Informative feedback
5. Explicitness
6. Appropriate functionality
7. Flexibility and control
8. Error prevention and correction
9. User guidance and support
10. System usability problems
11. General usability questions

## Most unacceptable completed Checklist

- Sections 1-9:
  - Every question answered ‘never’
  - Every satisfaction scale rated ‘very unsatisfactory’
- Section 10: all answers ‘major problems’
- Section 11: major problems, difficulties and criticisms throughout
- Comments: all voice criticism indicating problems

*An unlikely audit outcome*

# Analyzing Results of Evaluation – “Relatively unfavorable checklist result”

1. Visual clarity
2. Consistency
3. Compatibility
4. Informative feedback
5. Explicitness
6. Appropriate functionality
7. Flexibility and control
8. Error prevention and correction
9. User guidance and support
10. System usability problems
11. General usability questions

- Sections 1-9:
  - Most questions answered ‘some of the time’ or ‘never’
  - Most satisfaction scales rated ‘very satisfactory’ or ‘moderately satisfactory’
- Section 10: no answers indicating ‘major problems’ and most answers indicating ‘no problems’
- Section 11: no major problems, difficulties or criticisms and a few minor problems indicated
- Comments: most comments would be complimentary, with only a few minor criticisms

*A likely/possible audit outcome*

# Analyzing Results of Evaluation – “Most unacceptable”

1. Visual clarity
2. Consistency
3. Compatibility
4. Informative feedback
5. Explicitness
6. Appropriate functionality
7. Flexibility and control
8. Error prevention and correction
9. User guidance and support
10. System usability problems
11. General usability questions

## Most unacceptable completed Checklist

- Sections 1-9:
  - Every question answered ‘never’
  - Every satisfaction scales rated ‘moderately unsatisfactory’ or ‘very unsatisfactory’
- Section 10: most answers indicating ‘minor problems or ‘major problems’
- Section 11: a number of major problems, difficulties and criticisms indicated
- Comments: most comments are critical, indicating problems

*A likely/positive audit outcome*



# Team Project Presentation

1. Identify a website that offers important capabilities to business users (e.g. ITACS students seeking job opportunities in IT Audit)
  - E.g. job finding website e.g. Monster.com, Dice.com, Indeed.com, ...
2. Register as a user of the website
3. Use the website and
  - i. Conduct an audit of the website's user interface using Ravden and Johnson's criteria for a well-design user interface
  - ii. Create a functional specification for the website
  - iii. Create a database design model for the website

Unit #	Topics	Date
1	Introduction	1/15
2	Information System Development Life Cycle (SDLC)	1/22
3	Case Study 1 - "Teradata Data Mart Consolidation Return on Investment at GST" Project Initiation and Selection	1/29
4	Project Planning and Management	2/5
5	Requirements Analysis - Processes	2/12
6	Requirements Analysis - Data	2/19
7	<b>Midterm Exam</b>	2/26
8	Case Study 2 - "Mudra Communications" Design - Database	3/12
9	Design - User Experience	3/19
10	Development	3/26
11	Implementation and Testing	4/2
12	Post-Implementation	4/9
13	Maintenance Project Presentations	4/16
14	Review Project Presentations	4/23
	<b>Final Exam</b>	5/7

# Agenda

- Human-computer interface, usability and ergonomics
- Auditing user interface design of software applications
- In-class exercise
- Criteria for a well-designed user interface
- Team project presentation