CS408

Information Technology

HUMAN COMPUTER INTERACTION LECTURE # 01 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Content's of Lecture # 01

- **Riddles for Information Age**
- **Role of HCI (Human Computer Interaction)**

Information Age

- The Information Age is **the idea that access to and the control of information is the defining characteristic of this current era in human civilization**
- **Computers are annoying us**
- **They are infuriating us**
- **They even kill a few of us.**

Riddles for Information Age

- What do you get when you cross a computer with an Airplane?
- **Computer + Airplane = Computer**
- In December 1995, American Airlines Flight 965 departed from Miami on a regularly scheduled trip to Cali, Columbia. On the landing approach, the pilot of the 757 needed to select the next radio navigation fix, named "ROZO". He entered an "R" into his navigation computer. The computer returned a list of nearby navigation fixes starting with "R" and the pilot selected the first of these, whose latitude and longitude appeared to be correct. Unfortunately, instead of "ROZO", the pilot selected "ROMEO", 132 miles to the northeast. The jet was southbound descending into a valley that runs north-south, and any lateral deviation was dangerous. Following indications on the flight computer, the pilots began an easterly turn and slammed into a granite peak at 10,000 feet. One hundred and fifty two passengers and all eight crewmembers aboard perished. Four passengers

What do you get when you cross a computer with a Camera?

- **Computer + Camera = Computer**
- Thirty years ago, a 35mm Pentax Model H, had a small battery in it that powered the light meter. Like a wristwatch battery, I merely swapped in a new one every couple of years. Fifteen years ago, an electronic camera, a 35mm Canon T70, used two AA batteries to power its rather simple exposure computer and its automatic film drive. It had a simple On/Off switch, so that the batteries wouldn't wear down needlessly.
-

What do you get when you cross a computer with a Camera?

- Five years ago, a first-generation digital camera, had a similar On/Off switch, but this time it had the smarts of a rudimentary computer inside it. So if I forgot to turn it off, it automatically shut down after one minute of inactivity.

- One year ago, second-generation digital camera, a Panasonic PalmCam, had an even smarter computer chip inside it. It was so smart that its On/Off switch had evolved into an Off/Rec/Play switch. It now had modes: it had to put into Rec mode to take pictures and Play mode to view them on its small video display.

What do you get when you cross a computer with an alarm clock?

- **Computer + Alarm Clock = Computer**
- I just purchased an expensive new clock-radio for my bedroom, a JVC FS-2000. It has a very sophisticated computer brain, and offers high fidelity, digital sound, and lots of features. It wakes me up at a preset time by playing a compact disc, and it has the delicacy and intelligence to slowly fade up the volume when it begins to play at six o'clock in the morning.

What do you get when you cross a computer with a car?

- **Computer + Car = Computer**
- Porsche's beautiful new high-tech spots car, the Boxster, has seven computers in it to help manage its complex systems. One of them is dedicated to managing the engine. It has special procedures built into it to deal with abnormal situations. Unfortunately, these sometimes backfire. In some early models, if the fuel level in the gas tank got very low---only a gallon or so remaining---the centrifugal force of a sharp turn could cause the fuel to collect in the side of the tank, allowing air to enter the fuel lines.

What do you get when you cross a computer with a warship?

- Computer + Warship = Computer
- In September of 1997 A navy's technician set computers in a warship to load the missiles in water and slowly slowly it was advanced.

Definition of HCI

- "Human-Computer Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them"
- How to design a computer system
- How to evaluate a computer system
- How to implement a computer system

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HUMAN COMPUTER INTERACTION LECTURE # 02 LEARN WITH AHMAD RAZA

Prepared by: Ahmad raza

Content's of lecture # 02

- DEFINITION OF HCI
- REASONS OF NON-BRIGHT ASPECTS
- HUMAN VERSES COMPUTER
- SOFTWARE APARTHEID.

Define HCI

- “Human-Computer Interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them”

Reasons of non-bright Aspects

- **Airplane + Computer**
- In last lecture we were discussing the incident of airplane. Today we will look at the reason of such a fatal incident.
- Q: Who was wrong human or Computers?
- Computers care itself not the others
- Computers gives us information but not inform

Drive Car Device

German Engineering manufacturer Company
In 7th series of BMW they fit a computer called idrive
That handle the whole system of car. It includes
Climate, Entertainment, Navigators and Car Info Etc.
It takes automotive computer power to a whole new
level. Computer systems provide the car with BMW's
most powerful engine, a silky smooth ride

Feature Shock

- Every digital device has more features than its manual counterpart, but manual devices easier to use. Hi-tech companies add more features to improve product. Product becomes complicated Bad process can’t improve product

Human vs Computers

Human

- **Complex**
- **Intelligent**
- **Alive**
- **Ability to take decision**
- **Range of emotions**
- **Mistakes**

Computers

- **Dump**
- **Unintelligent**
- **Don’t have ability to take decision**
- **Don’t have emotions**
- **Only do what they are told to do**
- **They don’t make mistakes**

Software Apartheid

Apartheid

- **a policy or system of segregation or discrimination on grounds of race.**
- **segregation on grounds other than race.**

Software Apartheid

- **Institutionalizing obnoxious behavior and obscure interactions of software-based products**
- **Software divides in classes on the basis of behavior**

Software Engineering and HCI

- Software Engineering focus on internal working of software
- In HCI we concerned with external working of software

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HUMAN COMPUTER INTERACTION LECTURE # 03 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Content's of Lecture # 03

- Bad Tool Effect
- Industry in Denial

Effect of Bad Tools

- A computer system in a cockpit is very difficult to use.
- Not only are computers taking over the cockpit of jet airliners, they are taking over the passenger cabin, too, behaving in that same obstinate, perverse way that is so easy to recognize and so hard to use. Modern jet planes have in-flight entertainment (IFE) systems that deliver movies and music to airline passengers. These IFEs are merely computers connected with local area network, just like in your office. Advanced IFE systems are generally installed only on larger airplanes flying transoceanic routes.

Industry in denial

- People who rush to believe in the benefits of computers in their rush have abdicated their responsibilities to make these products easy to use.
- Computer devices are everywhere to use
- Highly sophisticated
- Powerful
- But
  - Difficult to use

Industry denial-Contrasting view

- Techies
  - Satisfied
  - Belief in technology
  - Power of product
- People
  - Difficult to use
- Reality
  - We are becoming more and more dependent on these people that are building computers

Types of Rages

Rages

- Car Rage
- Trolley Rage
- Air Rage
- Work Rage

Techno Rages

- PC rage

Success Criteria in the New Economy

- Business Success is all about the managing relationship
- Success depends upon the ability of a business to effectively and efficiently meet the customer's needs and goals.
- Business Strategy
- Business plans

Computer + Information

- What do you get when you cross a computer with information?
- In 2000, the Olympic Games were held in Sydney. Before the Olympic games could begin, a lawsuit was filed against the Olympic Committee. The case was called Bruce Lindsay Maguire vs Sydney Organizing Committee for the Olympics Games (SOCOG). On 7 June 1999 the complainant, who is blind, complained to the

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HUMAN COMPUTER INTERACTION LECTURE # 04 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Content's of Lecture # 04

- Describe the goals of HCI
- Define Usability goals
- Define User Experience goals
- Discuss the History and Evolution of HCI

Goals of HCI

- **User Experience**
  - **Good Experience**
    - **Satisfaction**
    - **Happiness**
  - **Bad Experience**
    - **Frustration**
    - **Anger**

Usability

- **Ease of use**
  - **(Could I use it?)**
- **Usefulness**
  - **(Would I use it?)**
- **Ensuring that interactive products are easy to use and learn, effective to user and enjoyable from the user perspective's**

Usability

- Effective to use (effectiveness)
- Efficient to use (efficiency)
- Safe to use(safety)
- Have good utility (utility)
- Easy to learn (learnability)
- Easy to remember how to use (memorability)

- **Effectiveness**
  - **how good a system at doing what it is suppose to do.**
- **Efficiency**
  - **Efficiency is the ability to avoid wasting materials, energy, efforts, money, and time in doing something or in producing a desired result**
- **Safety**
  - **Protecting the user from dangerous condition.**
- **Utility**
  - **System providing the right kind of functionality the user can do what they want**
- **Memorability**
  - **How it is easy to call a function**

User Experience Goals

- Satisfying
- Enjoyable
- Fun
- Entertainment
- Helpful
- Motivating
- Supportive of creativity
- Rewarding
- Emotionally fulfilling

Software Quality

- The extend to which a software product exhibits these characteristics
- Functionality
- Reliability
- Usability
- Efficiency
- Maintainability
- Portability

Evolution of HCI

- Three systems were landmarks in evolution
- Dynabook
  - Color Display, Radio Link, secretary, mailbox, telephone center etc
- The star
  - Desktop size personal work station, mouse created first time in it windows, icons.
- Apple Lisa
  - Make more powerful to star and macintosh developed it cheaper and powerful.
- They all were very easy to use

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HUMAN COMPUTER INTERACTION LECTURE # 05 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Content's of Lecture # 05

- Usability and Quality
- Inter Disciplinary Nature of HCI
- Disciplines Contributing to HCI

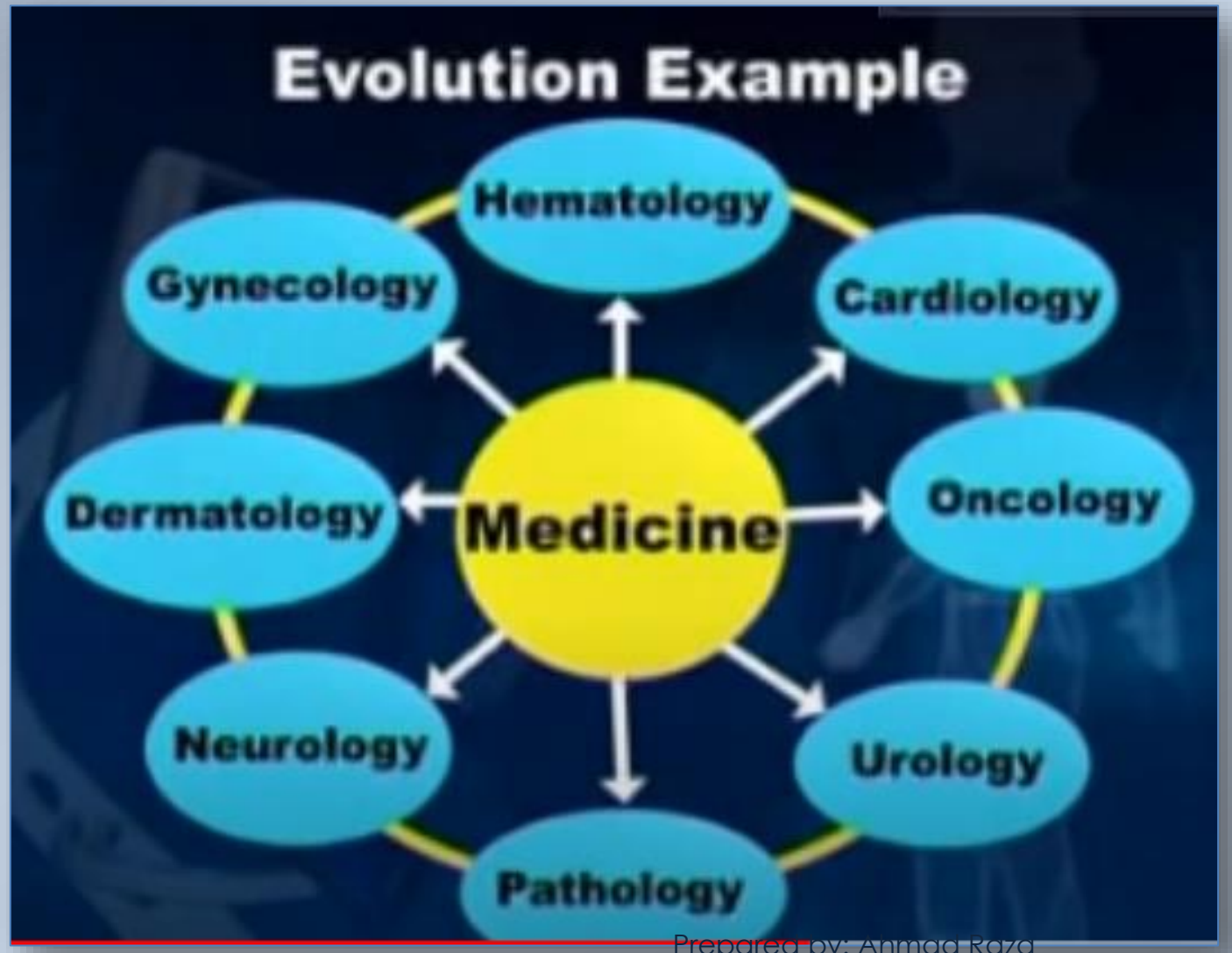
Quality

- According to the American Heritage Dictionary "characteristic or attribute of something."
- Quality is a predictable degree of uniformity and dependability, at low cost and suited to the market", defined by Edward Deming.
- "Quality is the total composite product and service characteristics of marketing, engineering, manufacturing and maintenance through which the product and service in use will meet the expectations by the customer"

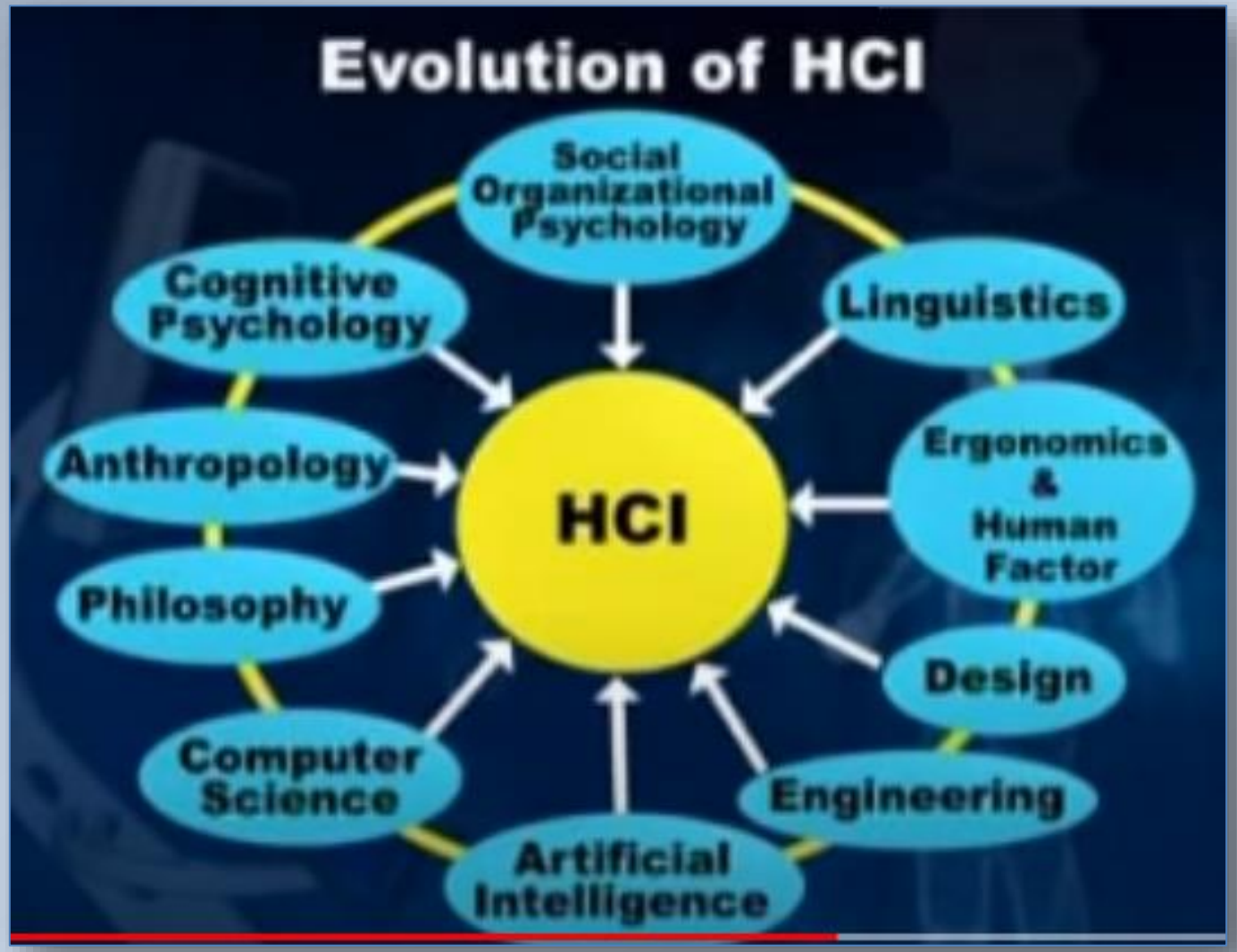
Usability

- To understand the relationship of quality and usability in a software reference, look at the definition of software quality. ”The extent to which a software product exhibits these characteristics”
- ◎Functionality
- ◎Reliability
- ◎Usability ◎
- Efficiency ◎
- Maintainability ◎
- Portability

Inter Disciplinary Nature of HCI



Inter Disciplinary Nature of HCI



Inter Disciplinary Nature of HCI

- Ticketing system

Factors of HCI

Organizational Factors Training, job design, politics, roles Work organization		**Environmental Factors** Noise, heating, ventilation,lighting
Health and Safety Stress, headaches, Muscular-skeleton, disorders	Cognitive processes and capabilities **The User** Motivation, Enjoyment, Satisfaction, Personality Experience level	**Comfort Level** Seating Equipment layout
User Interface Input devices, output displays, dialogue structures, User of colour, icons, commands, graphics, natural language		
Task Factors Easy, complex, novel, Task allocation, repetitive, Monitoring, skills, multi-media		
Constraints		
System Functionality Hardware, software, application		
Productivity Factors Increase output, increase quality, decrease costs, decrease errors, decrease labour requirements, and decrease production time, Increase creative and innovative ideas leading to new products		

- Linguistics – scientific study of languages
- Physiology, sociology, anthropology – ideas about human behavior
- Computer Science
- Artificial Intelligence
- Engineering
  - How technology help us to produce products

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HUMAN COMPUTER INTERACTION LECTURE # 06 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Content's of Lecture # 06

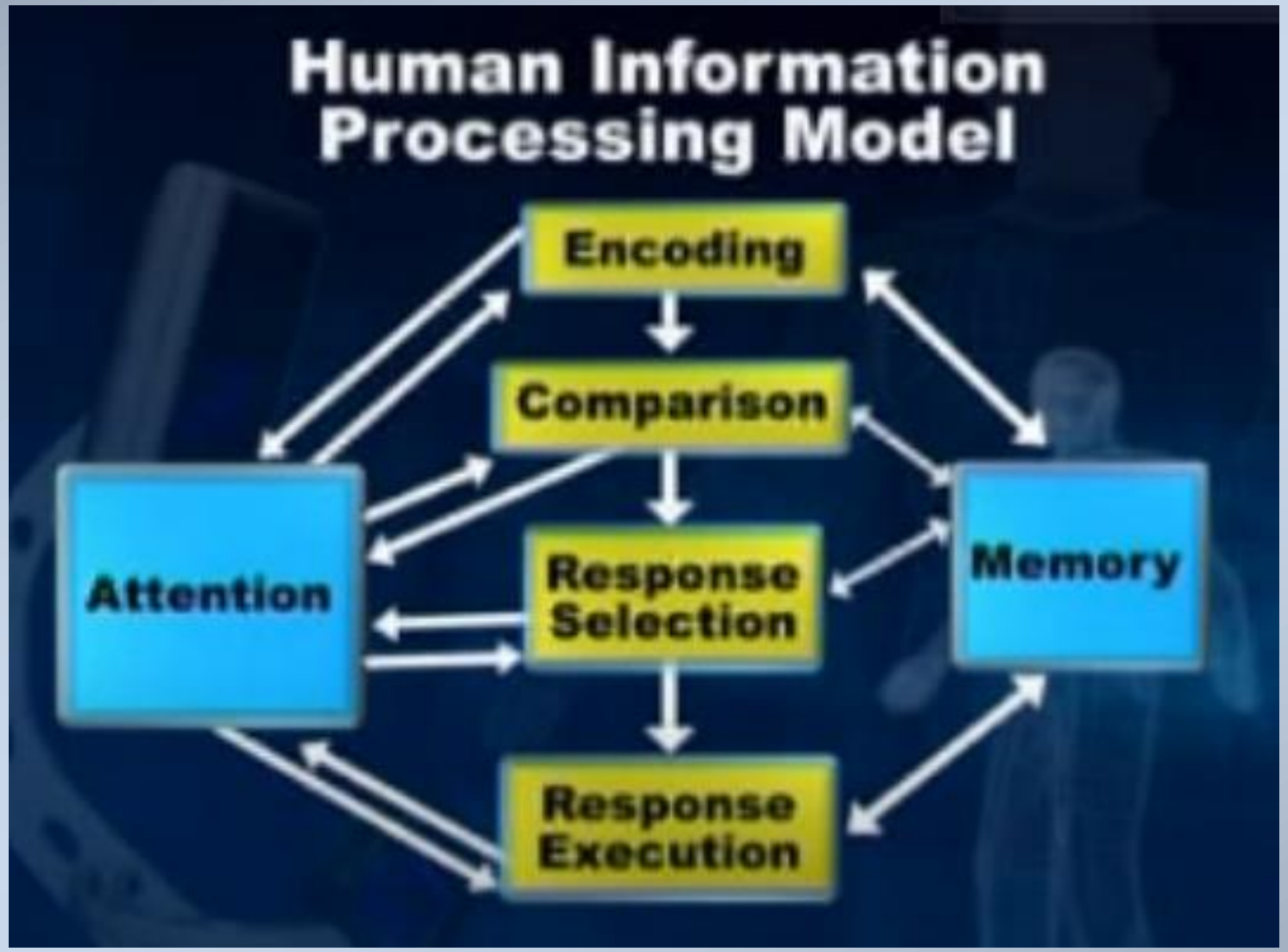
- Cognition
- Framework

How Human Thinks?

Cognition psychology

- Psychology is concerned primarily with understanding human behavior and the mental processes that underlie it. To account for human behavior, cognitive psychology has adopted the notion of information processing. Everything we see, feel, touch, taste, smell and do is couched in terms of information processing.

Cognition psychology



Types of Cognition

- Norman (1993) distinguishes between two general modes: 1.
- Experiential cognition
  - See the act and react
- 2. Reflective cognition
  - Reflective cognition involves thinking, comparing, and decision-making.

GOMS

- Goals
  - (user's goals, what the user want?)
- Operations
  - (basic action that user perform to achieve goals)
- Methods
  - (Goals can be divided into sub groups for making a plan)
- Selection Rules
  - (Selection means of choosing between competing methods)

Types of models

- Conceptual Models
  - Conceptual models are (these are the various ways in which systems are understood by different people) to help designers develop appropriate interfaces.
- Interface Metaphor
  - Interface metaphors are (these are GUIs that consists of electronic counterparts to physical objects in the real world) to match the knowledge requirements of users

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HUMAN COMPUTER INTERACTION LECTURE # 07 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 7

- Human Input Output Channels

Inputs for Human

- Vision
- Visual perception
- Input via sense
- Vision Touch, Smell, Hear, taste etc.

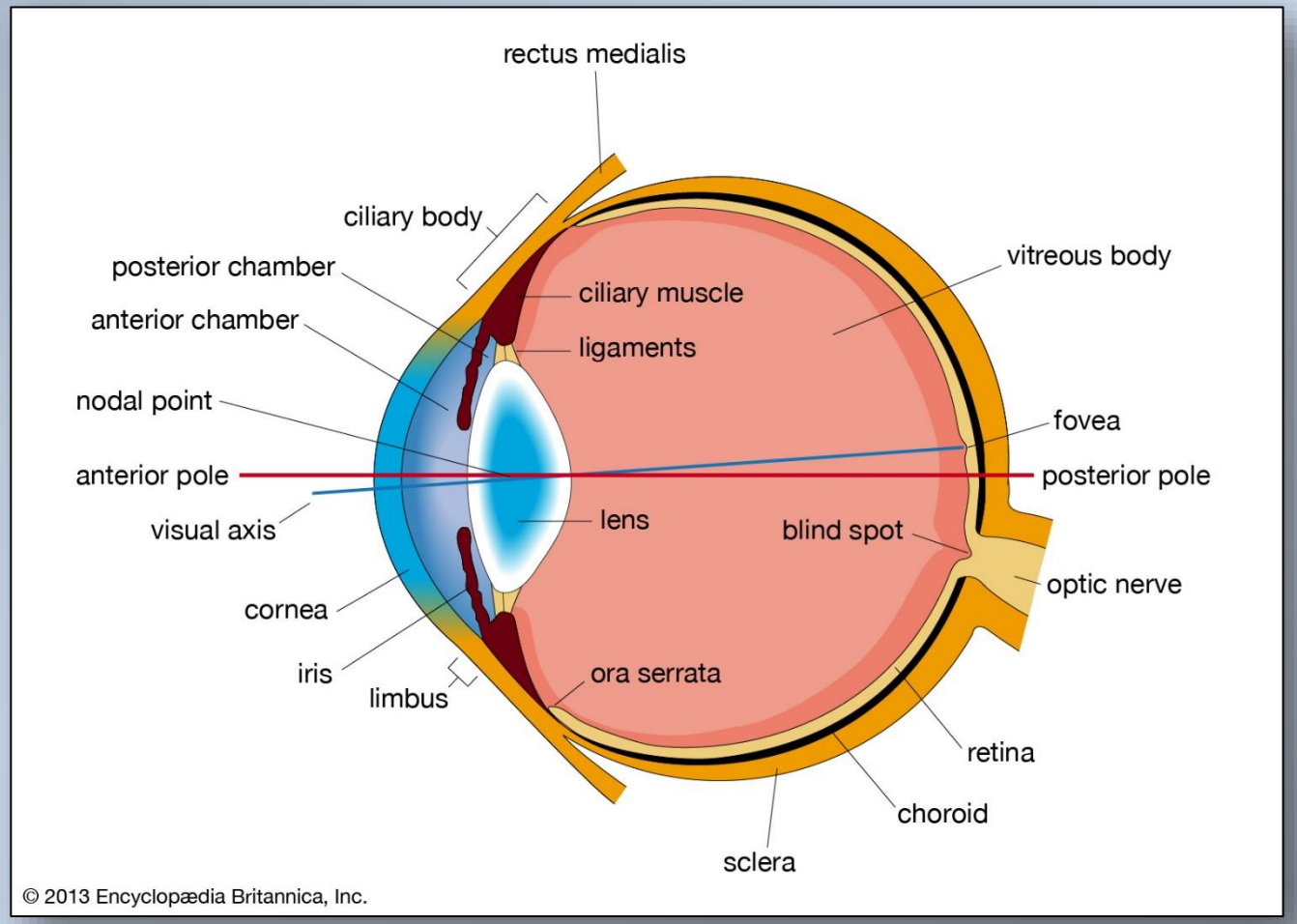
Outputs for Human

- Limbs
- Fingers
- Eyes
- Head
- Vocal System

Vision

- High Complex Activity
- Physical and perceptual limitations
    - Visual Perception
- Size
- Distance

Human Eye


rectus medialis
ciliary body
posterior chamber
anterior chamber
nodal point
anterior pole
visual axis
cornea
iris
limbus
ciliary muscle
ligaments
lens
ora serrata
vitreous body
fovea
posterior pole
blind spot
optic nerve
retina
choroid
sclera
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HUMAN COMPUTER INTERACTION LECTURE # 08 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 8

- Human Input Output Channels-II
  - Visual Perception
  - Color
  - Reading
  - Hearing

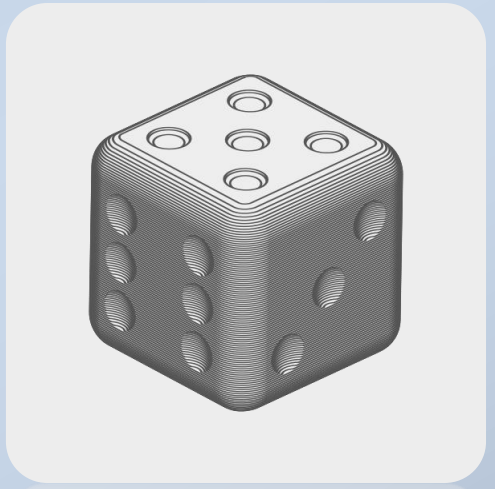
Visual Perception

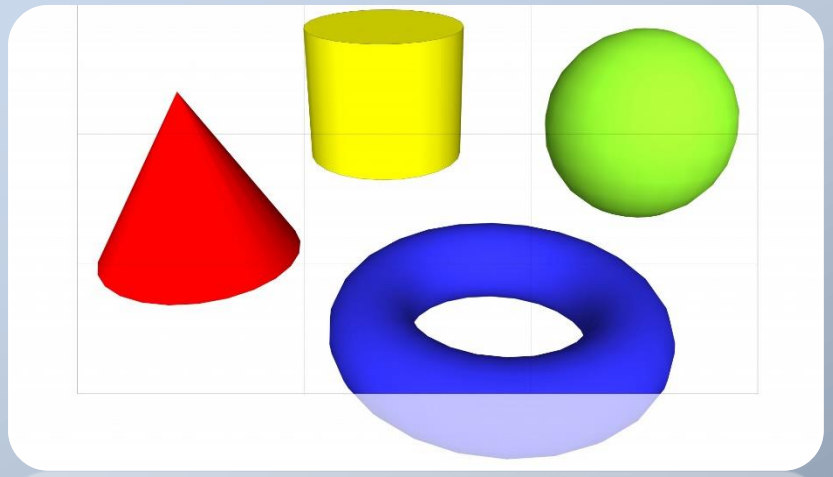
Color

- **Hue**
  - Determined by spectral wavelength
  - Blue Green Red
- **Intensity**
  - Brightness of the color
- **Saturation**
  - Amount of whiteness in the color

Vision

- Color theory
  - Colors detail
- 3D vision
  - 3D images and Objects
- Reading





Vision

- Hearing
  - Human Ear – Processing Sound
- Touch
  - Skin physiology
  - Types of Haptic senses

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HUMAN COMPUTER INTERACTION LECTURE # 09 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 9

Cognitive process

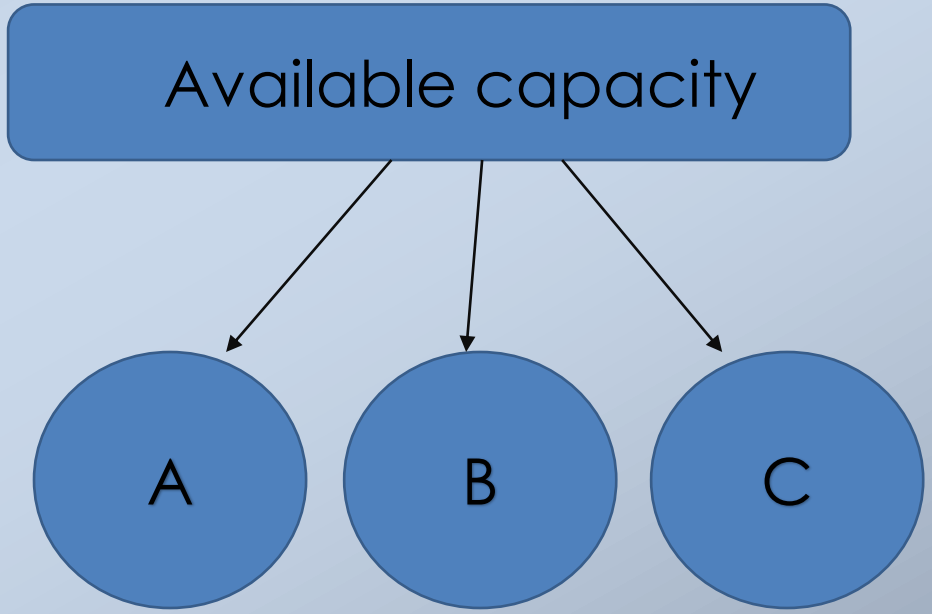
- Attention
- Models of Attention
- Consequences
- Memory
- Models of Memory

Attention

- Ability of mind to focus on one thing at a time
  - Visual Attention
- Based on location and color.
  - Auditory Attention
- Based on pitch, intensity etc.

Models of Attention

- Focused Attention
  - Senses
  - Short term store
  - Processing
- Divided Attention



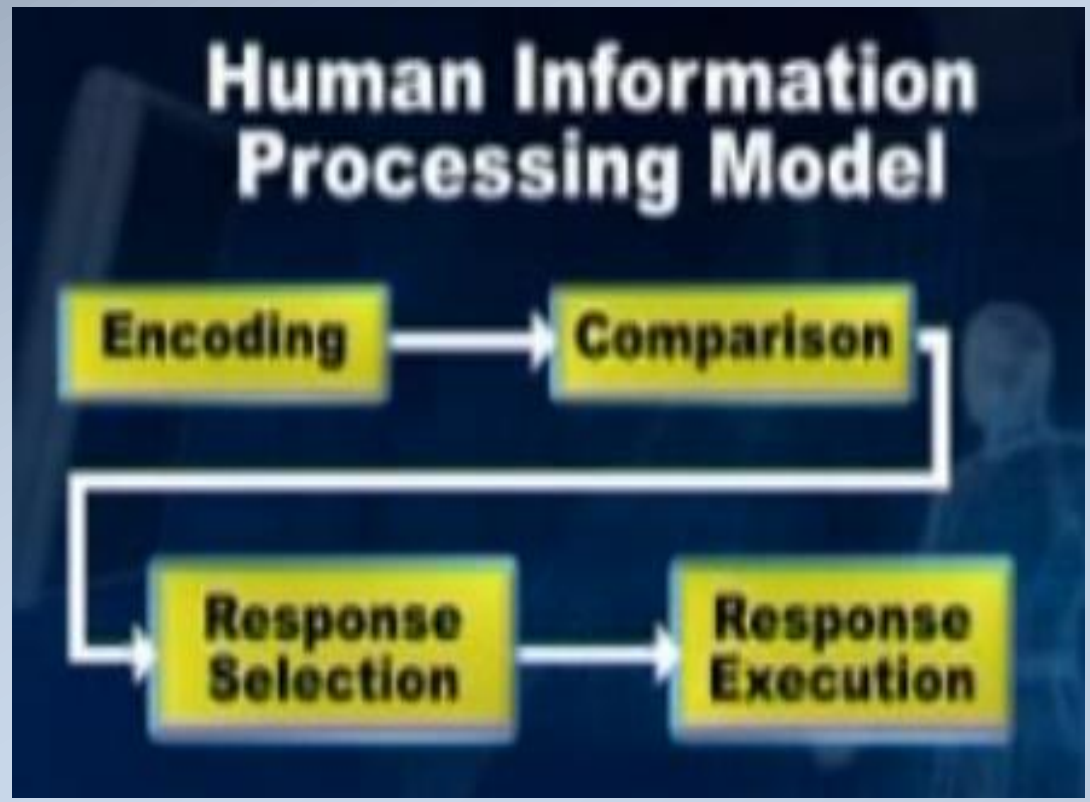
Consequences

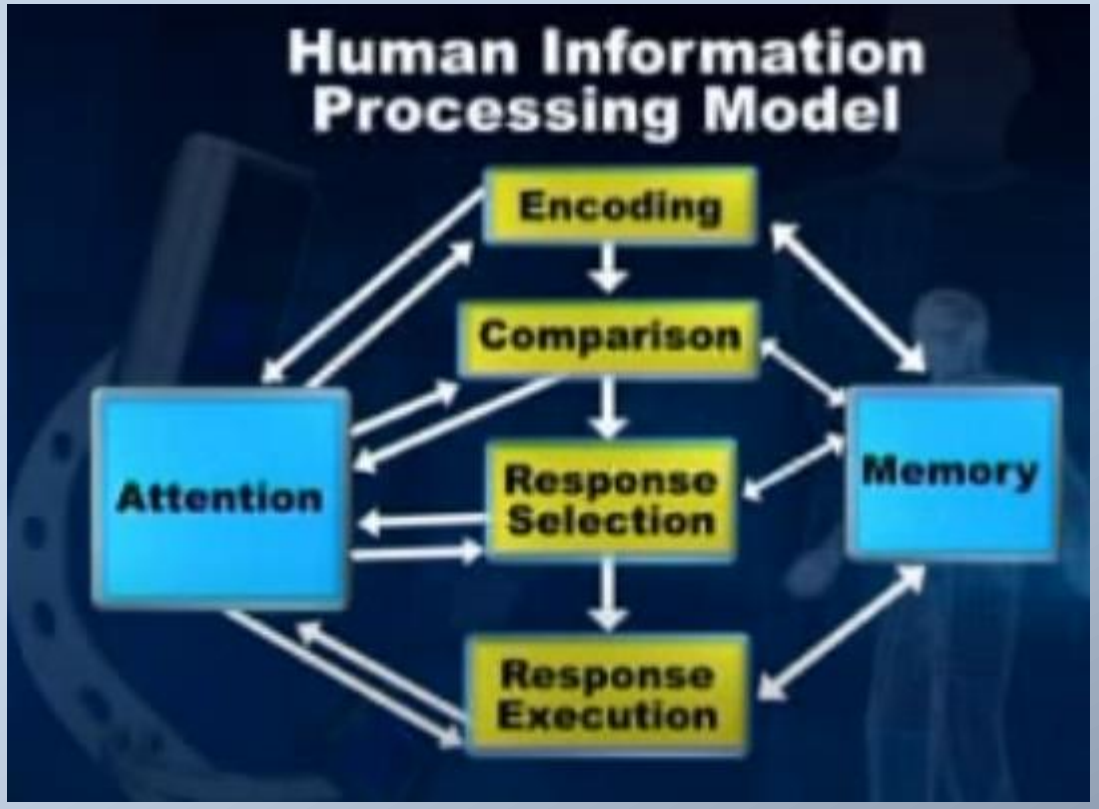
- Design to assists attention focus in the right place
- Help the user to:
  - Attend his/her task
  - Easily decide what to focus on, based on their tasks, interests etc.
    - Attention
  - Use technique that make things stand out like color, ordering, spacing, underlying, sequencing and animation.

Memory

- Things we remember in our life
  - Models of Memory
- Sensory memory
  - Like a RAM
- Short term memory
  - Small notepad
- Long term memory
  - Like a permanent storage

Information processing model





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HUMAN COMPUTER INTERACTION LECTURE # 10 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 10

- Cognitive Process
  - Learning
  - Thinking
    - Reasoning
    - Problem solving
  - Skin Acquisition

Cognitive

- It is a process in which we gain knowledge from the world.
- Understanding of the world and object of the world.

Learning

- Perceiving
- Thinking
- Remembering
- Learning
- Understanding others
- Thinking without others
- Planning
- Composing and Decision Making

Way to help users to Learn

- Use interactive Technology
- Web
- Multimedia
- Virtual Reality

Thinking

- **Problem Solving**
  - i.e. Drive a bike
  - Involve conscious process
  - Awareness
  - Making Decision
  - Looking at different options
- **Reasoning**
  - Process by which we use knowledge.
  - We possess to draw conclusions

Types of Reasoning

- **Deductive Reasoning**
  - If it is raining then the ground is not dry
  - It is raining
  - Therefore the ground is not dry.
- **Inductive Reasoning**
  - Generalizing from cases we have seen to infer information about cases we have not seen before.
  - Pigeon → Wings
  - All birds → Wings

Types of Reasoning

- **Adductive Reasoning**
  - Reasoning from the fact to the action or state that caused it
  - i.e Accident → Fast Driving

Problem Solving

- It is a process of finding the solution of the problem
- Three ways to solve a problem
  - Use existing knowledge (Gestalt)
  - Initial state → Operator → (Goal State Space Theory)
  - Sub Goals (analogy in problem)

Skill Acquisition

- Examine it with context of problem
  - Space Theory
  - Initial State → Expert Mode

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HUMAN COMPUTER INTERACTION LECTURE # 11 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 11

- Psychology of Action
- Mental Model
- Nature of Goals

Psychology of Action

- Why this action perform?
  - Defining the mental model.
    - Theories people have to explain, what they have observed.
    - Models people have of themselves, others environment and thing they interact with.
    - How do things work?
- Fault Mental Models
  - Valve theory
    - Thermo-star controls how much heat or cold comes from device.
    - Setting
    - Midway: Half cooling All way: Full cooling

Mental Model

- Blander
  - There is a pipeline wire bringing the electricity in device.
  - It can be on /off.
- Car break
  - Mental model
    - Break jam the wheel
  - Actual facts
    - Break are attached with many cylinders and different components of car.

Mental Model

- Computer
  - Mental Model
    - Monitor
  - Actual Facts
    - CPU
- TV
  - Mental Model
    - It can be on or off
  - Actual Facts
    - Engineers think about it very deep.

Mental Model

- Using a Complex system
- 1 user face a problem How I am Stopped?
- Many user face the same problem at a same time.
  - Blaming wrong cause
- When thing go wrong
- Own Misfortune ← blame → Environment
- Others Misfortune ← blame → Personalities.

Mental Model

- When thing go Right
- Own fortune ← Credit → oneself
- Others fortune ← Credit → Environment.

Nature of Goals

- Goals for every day life
- Goals and intentions are well specified
- Types of Goals
  - Opportunistic Goals
  - Planned

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HUMAN COMPUTER INTERACTION LECTURE # 12 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 12

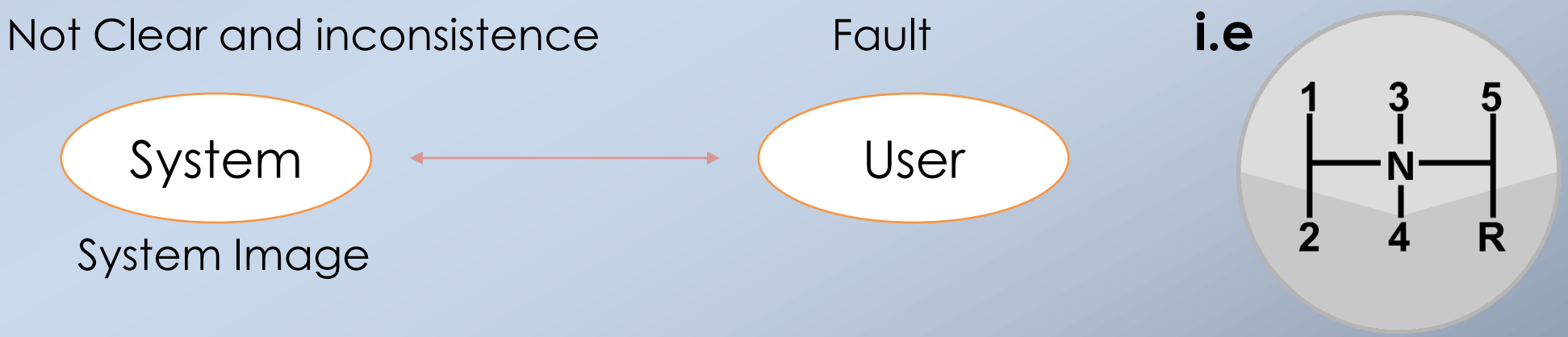
- Design Principle
  - Conceptual Model
  - Visibility
  - Affordable
  - Constraints
  - Mapping
  - Consistency
  - Feedback

Conceptual Model

- A description of proposed system in terms of a set of integral ideas and concept about what to do, behave and look like that will be the understandable by the user in the manner intended.
- The way designers choose to represent the working of the program to user.

Conceptual Model and Designer

- Designer does not talk directly to the user
- Communication via system image
- If System Image does not make design model clear and consistence, then user will have wrong user model.



Gulf of Execution and Evaluation

Difference between Designer and Mental Model

- **Gulf Execution**

- Difference between intention and allowable actions.

- **Gulf Evaluation**

Amount 0of efforts a person must insert to interpret the physical state of the system and determine how well the expectations intensions have been met.

Visibility

- Correct parts must be visible
- More visible functions are more likely user will be able to know what to do next.
- Out of sights function make them different to use and find.
- Make relevant part visible

Affordance

- The presence and the actual properties of a thing.
- These properties determine how the right could be used.
- Attributes of the object that allow people to know how to use it.
- i.e

Constraints

- Restricting the kind of user interaction that can take place at a given moment in time. It decrease the chance of errors.
- There are three types of constraints:
- Physical constraints
  - Refer to the way physical objects restrict the movement of the things. i.e CD
- Logical constraints
  - Using common sense pick the things right. Like usb port and VGA port.
- Cultural constraints
  - It is a sign language like on the road we see sign boards

Mapping

- Relationship between controls and their effect in the world
  - **Consistency**
- Design interfaces to have similar operations and use similar elements for similar tasks
- If you keep things consistence user will develops good mental model.
  - **Feedback**
- Sending information back to the user about what has been done.

Stages of Goals

Sr#	Stage Name	Action
1.	Goal	I want to go grocery shopping.
2.	Plan	Should I drive to the store or take the bus?
3.	Specify	I think I'll drive.
4.	Perform	I'll follow the standard route to the store instead of a new one.
5.	Perceive	The whole thing went efficiently and I've parked at the store.
6.	Interpret	This means I can now go inside and shop.
7.	Compare	I've achieved my goal of going grocery shopping.

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HUMAN COMPUTER INTERACTION LECTURE # 13 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 13

- Text Entry Devices
- Positioning, Pointing and drawing
- Display Devices
- Physical Control

Text Entry Devices

- Keyboards
  - Alphabetic keyboard
    - Keys are arranged in alphabetic order
    - Not faster for the trained typist nor for beginner users
  - Chords keyboard
    - Single hand keyboard

  - Hand writing
    - Text can be input into the computer using a pen and a digital paper.
  - Technical problems:
    - Hand writing Recognize
    - Coping with different styles and hand writing.
    - Use gestures recognize rather than command
    - Draw a line through a word to delete.

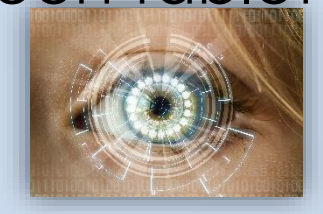
Speech Recognition

- Most Successful when:
  - Single user
  - Limited Vocabulary System
- Problems with:
  - External noise interfering

Positioning, Pointing and Drawing

- Mouse
- Touch Pad
- Trackball
- Joystick

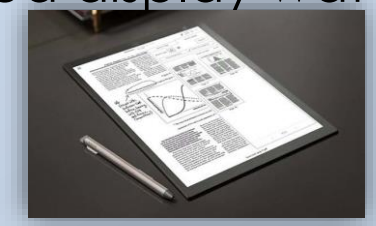
- Touch screen tablet
- Eye gaze



- Courser key

Display Devices

- CRT (Cathode Ray Tube)
  - Streams of emitted from electron gun focused and directed by magnetic field hit phosphor coated screen which glows.
  - Used in Tv's and Monitors
- LCD
  - Smaller lights and no radiation problem
  - Found on PDA's portable notebook and increasingly on desktop and even for home TV also used in dedicated display watches, mobile phones and Hifi controls.
- Digital Paper
  - It is an electronic paper we can write and erase the text on it.



Physical Control

- Special displays and gages
- Sound, feel and touch.

- Environmental and Bio Sensing
  - Sensors all around us in the world
  - Dedicated display
  - Analogue representation, dials gages.
  - Digital Screen(Small Screen, LED lights etc.)
  - Head up display found in aircraft cockpit.

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HUMAN COMPUTER INTERACTION
LECTURE # 14 & 15 & 16
LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 14

- Define Interaction
- Define Interaction Styles
  - Command line interface, Natural Languages
  - WIMP Interface (Windows, Icon, Menus, Pointer)
  - Three Dimensional Interface, Click and pointer
- Gulf of Execution (Difference between User & system actions)
- Gulf of Evaluation (Difference between presentation of User & system)
- Frame work of HCI (use and controls)
- Ergonomics(Physical Characteristics of Interaction Design Control and Environment.

Topics of Lecture # 15

- WIMP Interface
- Keyboard Acceleration
  - It is used selecting the menu items.
- Interaction Paradigms
  - An advance way of thinking about interaction new design.
- Metaphor
  - A description of an object or an event, real or imaginary using concepts.

Topics of Lecture # 16

- Understand the need of new software development model
- Software Requirements
  - Functionality (calculation, data manipulation)
- Reliability (user friendly)
- Reusability
- Efficiency Correctness)
- Maintainability
- Portability (is a measure of how easily an application can be transferred from one computer environment to another.)

- **Definition interaction design**
- Interaction design is the definition and design of the behavior of artifacts, environment, and systems, as well as the formal elements that communicate that behavior

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HUMAN COMPUTER INTERACTION LECTURE # 17 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 17

- Software development Life Cycle
  - The lifecycle model is **a flexible approach that can be used in a variety of software investigation tasks**. For example: Issues: As developers work on issues their state changes
- Requirements, analysis, Design, Code, Test, Maintenance
- Flaws of Waterfall Model
  - **No working software is produced until late during the life cycle**. High amounts of risk and uncertainty. Not a good model for complex and object-oriented projects. Poor model for long and ongoing projects.
- **The spiral lifecycle model**
  - The spiral model is used by software engineers and is favored for large, expensive and complicated projects.

- **The Star Lifecycle model**
  - **The Star Life Cycle** Design Approach is centered around evaluation and does not specify any order to the activities surrounding this evaluation
- **The Usability engineering lifecycle**
  - The Usability Engineering Lifecycle (Mayhew, 1999) **documents a structured and systematic approach to addressing usability within the product development process**.

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HUMAN COMPUTER INTERACTION LECTURE # 23 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 23

- Narrative as design
- Scenario
- Design based scenario
- Defining requirements
- Problem statement

Narrative as design

- When we talk another or give any explanation this is called narratives.
- It is a simple story telling.
- It consist of simple text.
- Good for representing interaction concept

Scenario

- An informal narrative description
- Describe human activities or tasks in a story
- Describe about a story in a scenario
  - **Scenario Based Design**
- Different task based scenario are used.
  - **Persona Based Scenario**
- Types of persona based scenario
- Context scenario
- Key path scenario
- Validation scenario

Defining Requirements

- Determine the “What” of design
- Creating problem and vision statement.
- Brain storming
- Identifying persona expectations
- Constructing the context scenario
- Identifying needs.

Problem Statement

- Define objective of design
- Connect business issues to usability issues

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HUMAN COMPUTER INTERACTION LECTURE # 24 LEARN WITH AHMAD RAZA

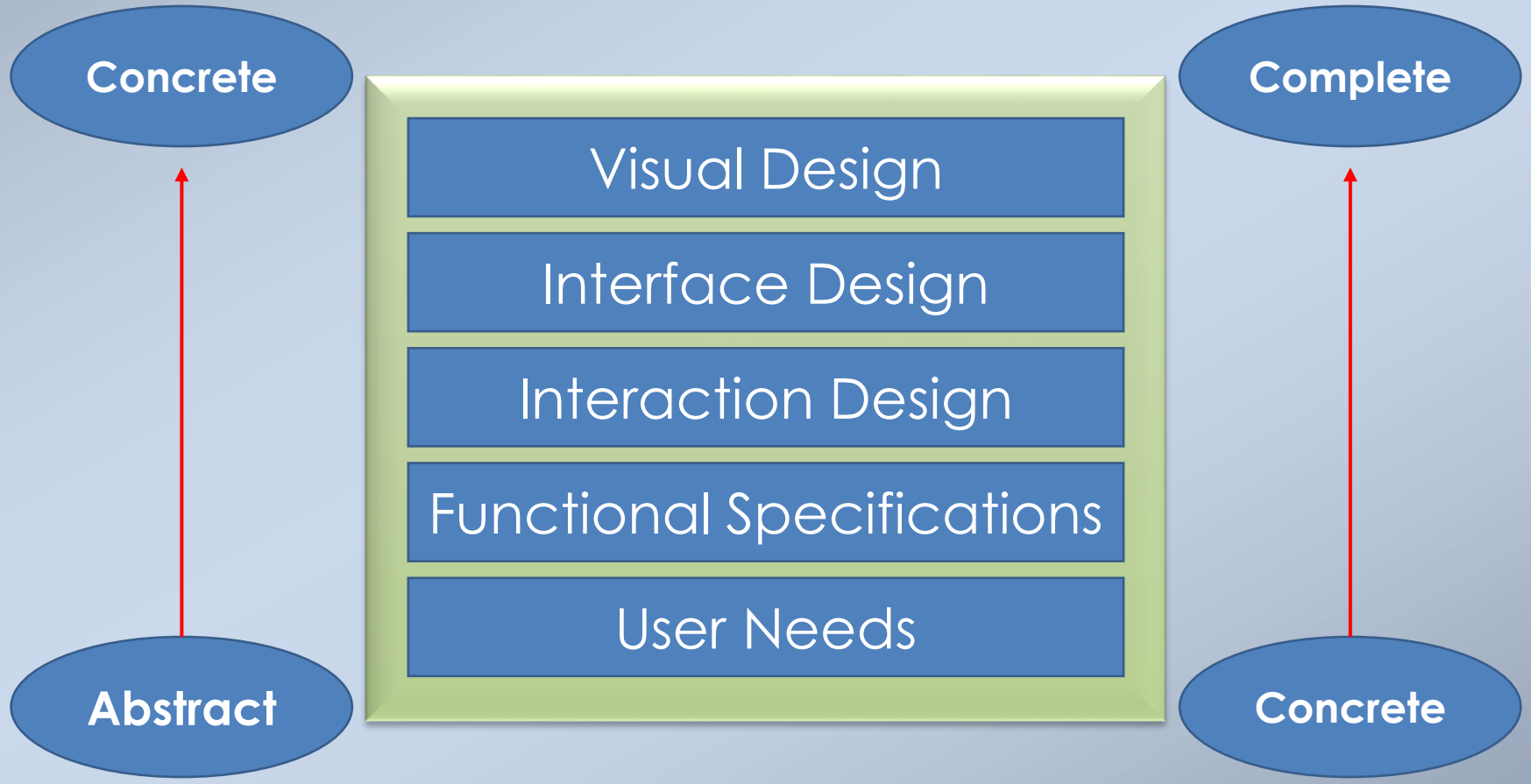
Prepared by: Ahmad Raza

Topics of Lecture # 24

- Interaction Framework
- Step to make Framework design

Interaction Framework

- Interaction framework defines the design structure and the flow of computer based product.



6 Steps for Interaction Framework

- **Defining the Interaction Design**
- **Defining the Views**
- **Functions And Data Elements**
- **Determining Functional groups and hierarchy**
- **Sketching the Framework**
- **Key path Scenario**

1. Defining the Interaction Design

- Defining the form factors (Basic Structure)
- Define input methods
- Define output method.
- About the desktop and controls
- Use of Metaphor
  - Can relate more easy with the computer based products

2. Defining Views

- Goals
- Screen views
- Conceptual Model

3. Functions And Data Elements

- Panels, Frames and other data on the screen
- Physical Controls
- Individual Buttons
- Physical affordance on a device
- Data Objects (icons, img, files)

4. Determining Functional groups and hierarchy

- Once we have a list of Top-Level functional and data elements.
- We can group into functional units.
- And determine their hierarchy.
- i.e (40 features).

5. Sketching the Framework

- Sketching the framework design
- Prototyping

6. Key path Scenario

- Steps to use the Software
- Use case scenario of computer based product.
- Context of the product.
- Whole explanation about any link or page

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HUMAN COMPUTER INTERACTION LECTURE # 25 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 25

- Guidance for design
- Guidance types
  - Principles
  - Guidelines
  - Rules
  - Standards
  - Patterns

Design Principles

- It can be defined as a statement based on the research of how people learn and how people work.
- It make the design useful and usable form and behavior.
- They highlights the important characteristics.

Benefits of Guidance design

- It minimize the user work
- Logical work
  - Comprehension of the text and the Organizational structure.
- Perceptual work
  - Decoding the visual layouts and semantics of shapes, size and presentation.
- Mnemonic Work
  - Recall the passwords, command vectors names and locations of data objects and other relationships of object
- Physical/Motor work
  - Number keys, degree of mouse movements, input modes and navigation systems.

Principles and Level of operations

- Conceptual Level
  - Define what is the product and how it is used
- Interaction level
  - Define a product should behave in general and in specific situation.
- Interface Level
  - Defines the look and feel of interfaces.

Documentation Design

- Ask relevant question when planning
- Learn about your audience
- Understand how people use manually
- Organized that people find relevant information very quickly.
- Use users wording
- Be consistence

Guidance for documentation

- More specific Goals
- It can be differ for specific combination of user environment and technology.

Rules

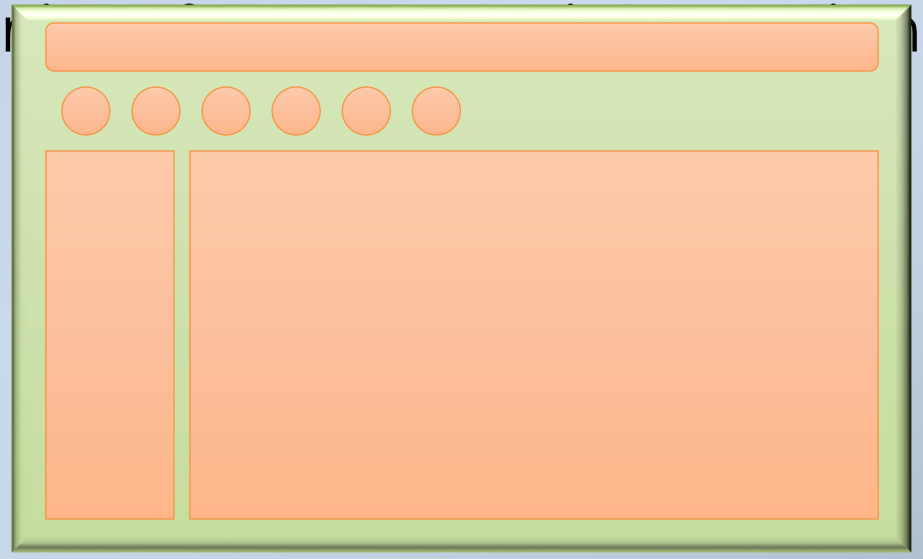
- Low Level Design
- First heading is only for Chapter Name
- They are in bold face.

Interface Standard

- Company tells the features and quality of the product.
- This is a standard

Patterns

- Generalizable solution of specific class of design problem.
- Structural pattern
  - Divide your [illegible]s.



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HUMAN COMPUTER INTERACTION LECTURE # 26 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 26

- Software Posture
- Desktop Postures

Software Posture

- The manner in which program present itself to the user.
- The presentation of the program affects the way the user relates to it. And this relationship strongly influences the usability of product.

Desktop Postures

- **There are four types of postures:**
- Sovereign posture
- Transient Posture
- Daemonic Posture
- Auxiliary Posture

Sovereign Posture

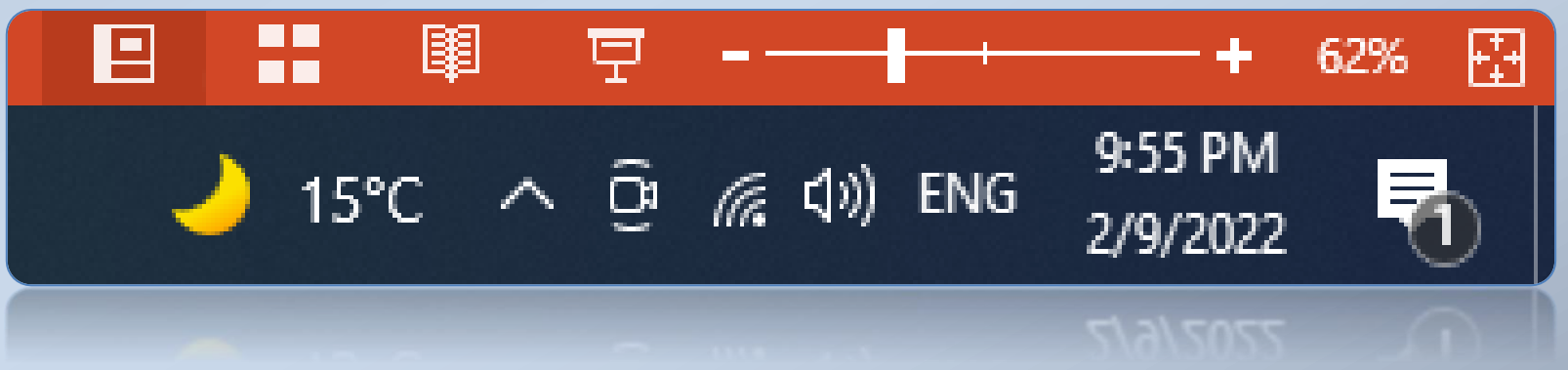
- Program that are best used full screen
- It offers large set of related functions and features.
- i.e
  - Word process, Spread sheets and e-mail applications
- Color and texture of the visual representation
- User can look at small images.

Transient Posture

- Perform highly relief function with a tightly restricted set of accompanying controls.
- Can be called within sovereign applications.
- Interface is presented more boldly in more detail
- As compared to sovereign posture application.
- i.e
  - File explorer in word
- All information and facilities should be on the interface of single window
- Application should be movable.

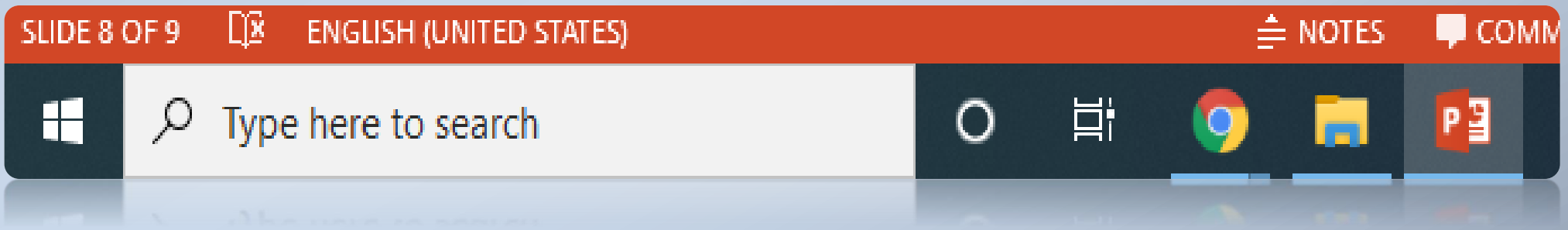
Daemonic Posture

- Programmer give daemonic programs same treatment (full screen control panel) that are better suited to sovereign program
- These posture does not have the interface to the user and keep performing their functions in backgrounds
  - (in the right bottom corner (volume button).



Auxiliary Posture

- Program that blend the characteristics of sovereign and transient program.
- It is continuously present like a sovereign program. But it perform only a supporting role.
- Task bar of the screen.



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HUMAN COMPUTER INTERACTION LECTURE # 27 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 27

- Postures
- Flow and transparency
- Software Application

Postures

- **Kiosks**

- It laid in banks.
- It have transient features.

- **Hand held Devices**

- Hand held have transient postures. Like mobile phones.

- **Appliance**

- It have transient postures. Like microwave own.

Flow and Transparency

- What is flow?
- Ans: when people can concentrate whole heartedly on our activity it is known as flow.
- Software transparency is increasing by increasing the flow of software.

Software Application

- Make the flow better
  - Drive a car
  - Don’t make the software complex.
- Word Process
  - Word Counting

Orchestration

- Designer should be invisible
- All elements must work together towards a single goal for a good orchestration.
  - **Simplicity**
- Make our things perfect
  - **Adding Finesse**
- Probability
- Providing comparison (Volume of Had drive)

Using Graphical Input

- Reflecting program status
- Avoiding unnecessary reporting
- Avoiding blank states.

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HUMAN COMPUTER INTERACTION LECTURE # 28 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 28

- Excise
- Navigation
  - Significance of Navigation
  - Types of Navigation
  - Improving Navigation
  - Avoid Hierarchy

Excise

- Unnecessary work
- It is the extra task that satisfies either the needs of our tools as we try to achieve the objectives.
- i.e. Drive a car.

Navigation

- Any action that takes the user to a new part of the interface is called navigation
- Or
- Which requires him to locate
  - Objects
  - Tools
  - And data etc.

Significance of Navigation

- Navigation is common to all types of interface products.
- User needs to navigate to find tools information and various functions within the application.

Types of Navigation

- Navigation between multiple windows or pages
- Navigation between pans
  - Pane is separate area of an interface
- Navigation between tools and menus
- Navigation of Information
  - Scrolling
  - Linking
  - Zooming

Improving Navigation

- Reduce the number of places to go
- Provide signposts
- Provide overviews
- Provide mapping of controls and functions
- Your interface must match to the user needs

Avoid hierarchy

- Minimize Scrolling
- Reduce number of controls and functions
- Minimize number of web pages

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HUMAN COMPUTER INTERACTION LECTURE # 29 LEARN WITH AHMAD RAZA

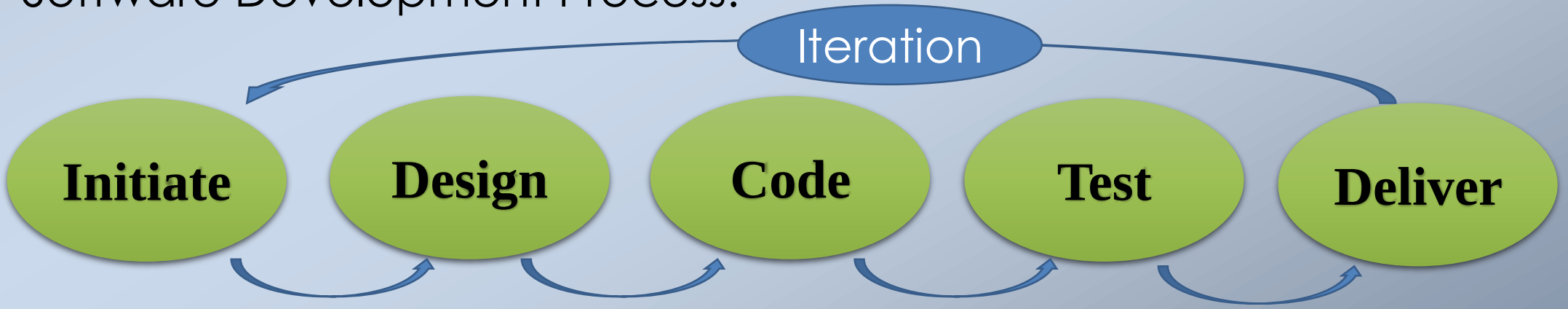
Prepared by: Ahmad Raza

Topics of Lecture # 29

- Evaluation
  - Significance of evaluation
  - Techniques and paradigms
  - Types of Evaluation

Evaluation

- Analyzing any thing at anytime is called evaluation.
- The process of systematically collection of data that informs us about what it is like for a particular group of users to use a product for a particular task.
- i.e
- Software Development Process.



Benefits

- By Adopting Evaluation in Software Development Process:
  - You can save time and money
  - Problems are fixed before the product is shipped
  - The team can concentrate on real problem not the imaginary part.
  - Engineers code instead of debating
  - Time to market is sharply reduced

Evaluation Paradigms and Techniques

- 4 core Evaluation Paradigms
- Types
- 1. Quick and Dirty
  - Designer get feedback from the users in informal way
- 2. Usability Testing
  - Formal Techniques for evaluation
- Field Studies
  - Observes a user to use a product
- Expert Views
  - Check the web pages for idea it is also names as Creative View.

Techniques

- There are many techniques and they are categories in many ways:
- Observing User
- Asking User their opinion about product
- Asking Expert their opinion about product
- Testing users performance

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HUMAN COMPUTER INTERACTION LECTURE # 30 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 30

- Evaluation
  - Framework to Design Evaluation
  - Evaluation Unique phases
  - Usability Testing
    - Plan and prepare for test

Evaluation

- Analyzing any thing at anytime is called evaluation.
- The process of systematically collection of data that informs us about what it is like for a particular group of users to use a product for a particular task.
- How people observe your product?
- How they perform on it?
- What they have problems?

Framework to Guide Evaluation

- Decide Framework
- 6 Unique Phases
  - Determine the overall goals that evaluate address (purpose to check)
  - Explore the specific questions to be answer.
  - Chose the evaluation Paradigm and technique
  - Identify the practical issues.
  - Decide how to deal with ethical problems (awareness of anything)
  - Evaluate, Interpret and present the data
    - Reliability Validity Bioses (It occurs when the results are disorted)

Usability Testing

- It involves three or more users
- If you test only one user this is not a usability testing
- You have to test minimum two or more users
- Find errors in functionally point of view
- Problem from the user
- Requirements Specification

Plan and Prepare for test

- Planning the usability test
- Defining goals and concerns
- Deciding Participants
- Selecting and organizing tasks to test
- Decide how to measure usability
- Preparing test material

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HUMAN COMPUTER INTERACTION LECTURE # 31 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 31

- Evaluation Part III
  - Usability Testing paradigm
  - Methods
  - Co-Discovering

Purpose of Evaluation

- How we make evaluation?
  - See and imagine
  - Think about the features
  - Advantages and disadvantages
- Why do you make this evaluation?
  - For saving time and money
  - Think about the real problems and solve them
  - Make product complete and consistence

Co-Discovering

- Many people come together to test a product
- They work together, They test together
- And many problems can be identifying observe and record when participant do and say
- Analyze the problem
- Diagnose the real problem and recommend changes to fix the problem

Advantages of Evaluation

- Results are used to change the product and process
- Usability testing is not successful if it is used only for works on a development schedule, It is successful only if it helps to improve the product that was testing and processing by which it was developed.
  - Testing all types of interface
  - Testing all types of products
  - Installing Hardware
  - Navigation through menus
  - Recovering from errors
  - Testing different aspects of Documentation
  - Tell with different Techniques.

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HUMAN COMPUTER INTERACTION LECTURE # 32 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 32

- Evaluation Part IV
  - Predictive Evaluation
  - (Heuristic Evaluation, Expert Views)

Predictive Evaluation

- Make a Website
  - Simple, Consistence, Navigation
    - Scene from a shopping mall
- It's a holiday
- Social Psychology
- By looking at a various sign you can identify the items you are looking for.
- You see the tools
- You buy and exit.

- **Digitally buy a product**

- Q: What can we do to improve the scene of location.
- Ans: Bookmarks
  - Stored personal information
- Home Page
- Back Button

Convention for Navigation the physical World

- Cities and Buildings
  - We use street and signs
- Books and Magazines
  - Page Number Chapter Title

Global Navigation

- Site ID
  - Logo
- Sections
- Utility
  - Facilities
- Home Page
- search

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HUMAN COMPUTER INTERACTION LECTURE # 33 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

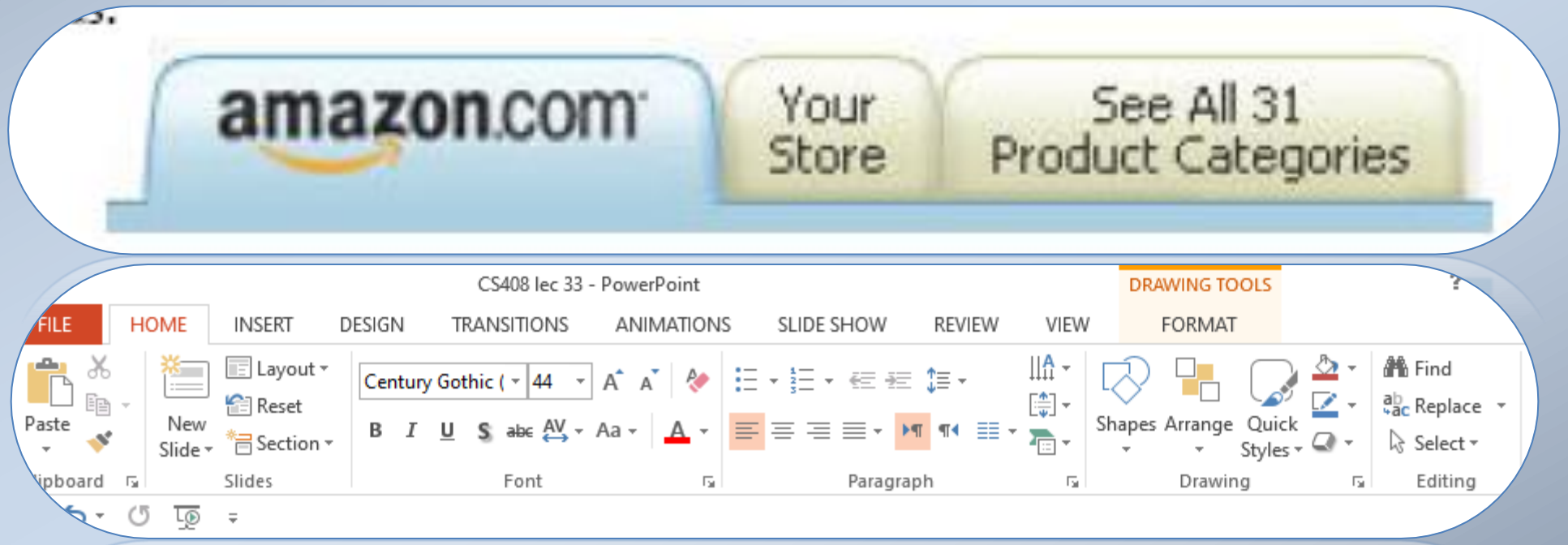
Topics of Lecture # 33 & 34

- Evaluation Part V
  - Try the trunk test
  - Navigation system
- Evaluation part VI
  - Font of the page

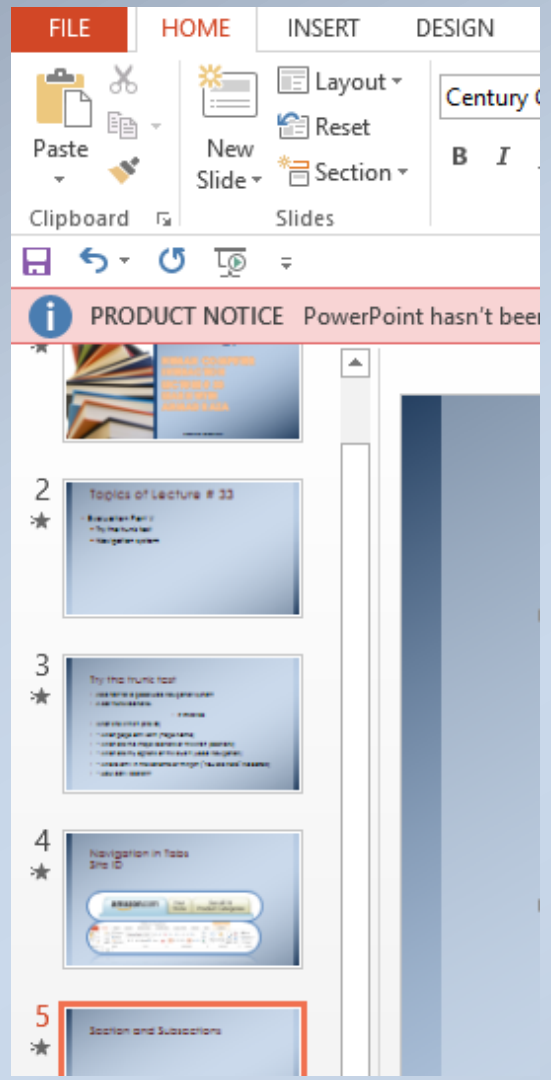
Try the trunk test

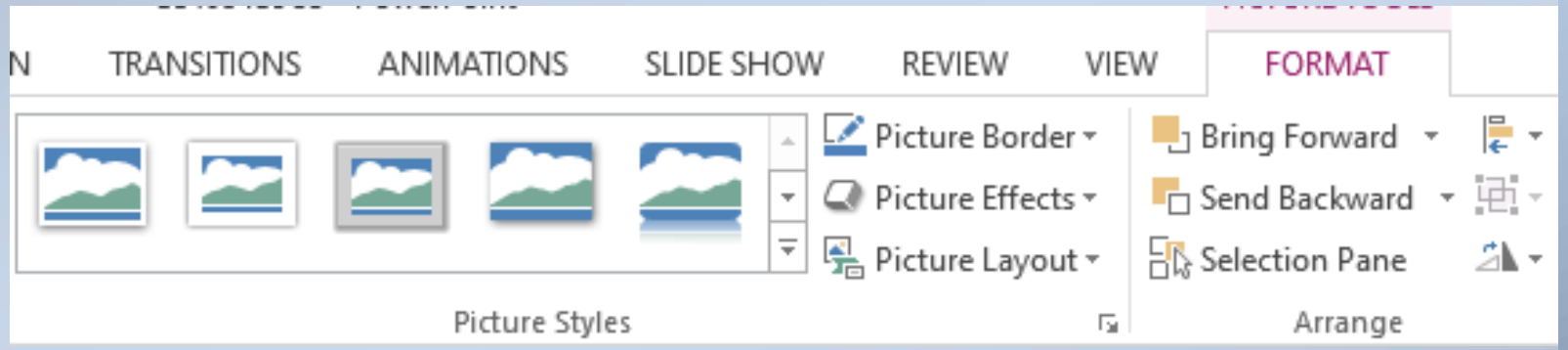
- Acid test for a good web navigation system
- A car trunk scenario.
- **It Involves**
- What site is this? (Site ID)
- • What page am I on? (Page name)
- • What are the major sections of this site? (Sections)
- • What are my options at this level? (Local navigation)
- • Where am I in the scheme of things? ("You are here" indicators)
- • How can I search?

Navigation in Tabs
Site ID

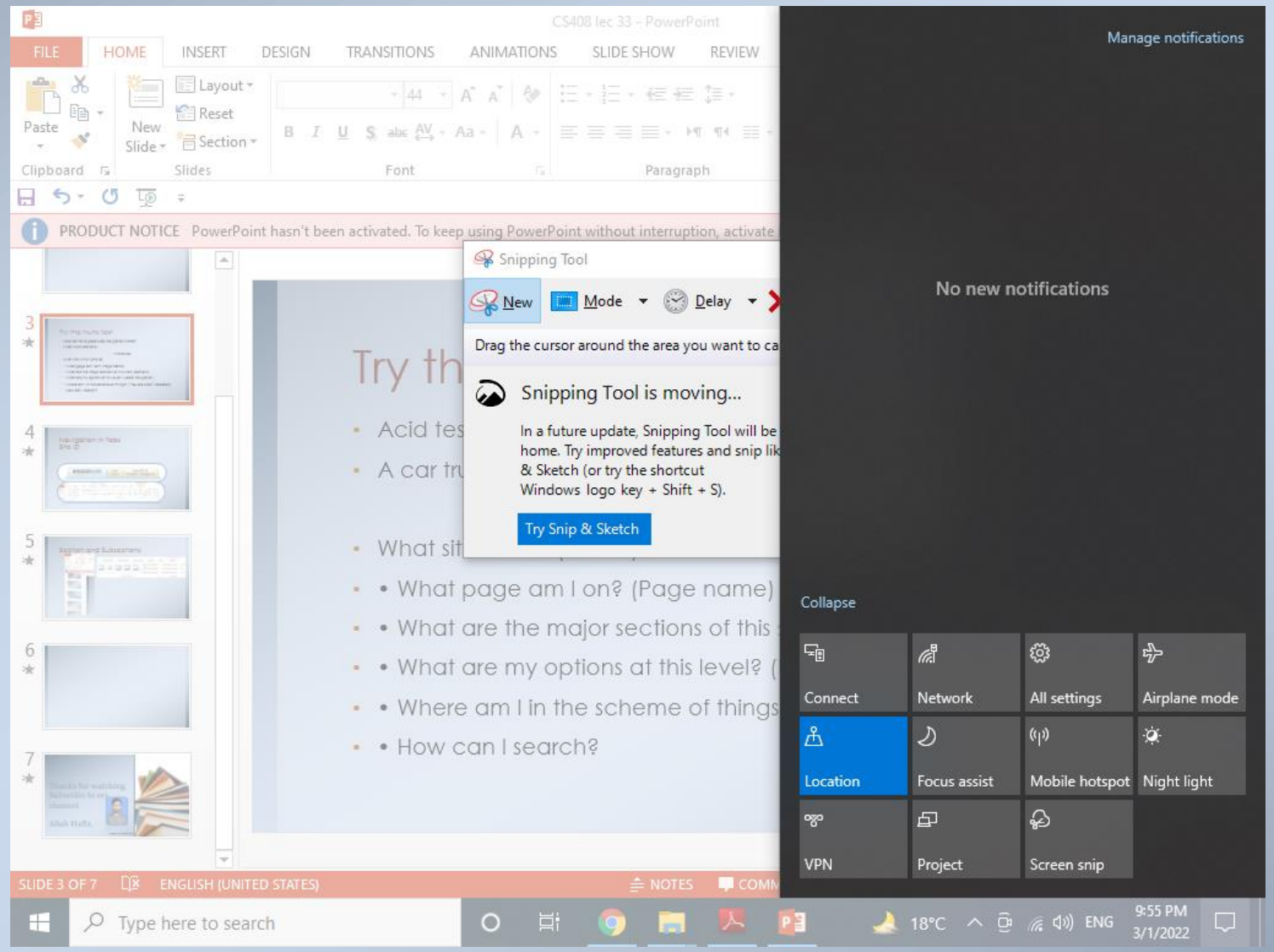


Section and Subsections

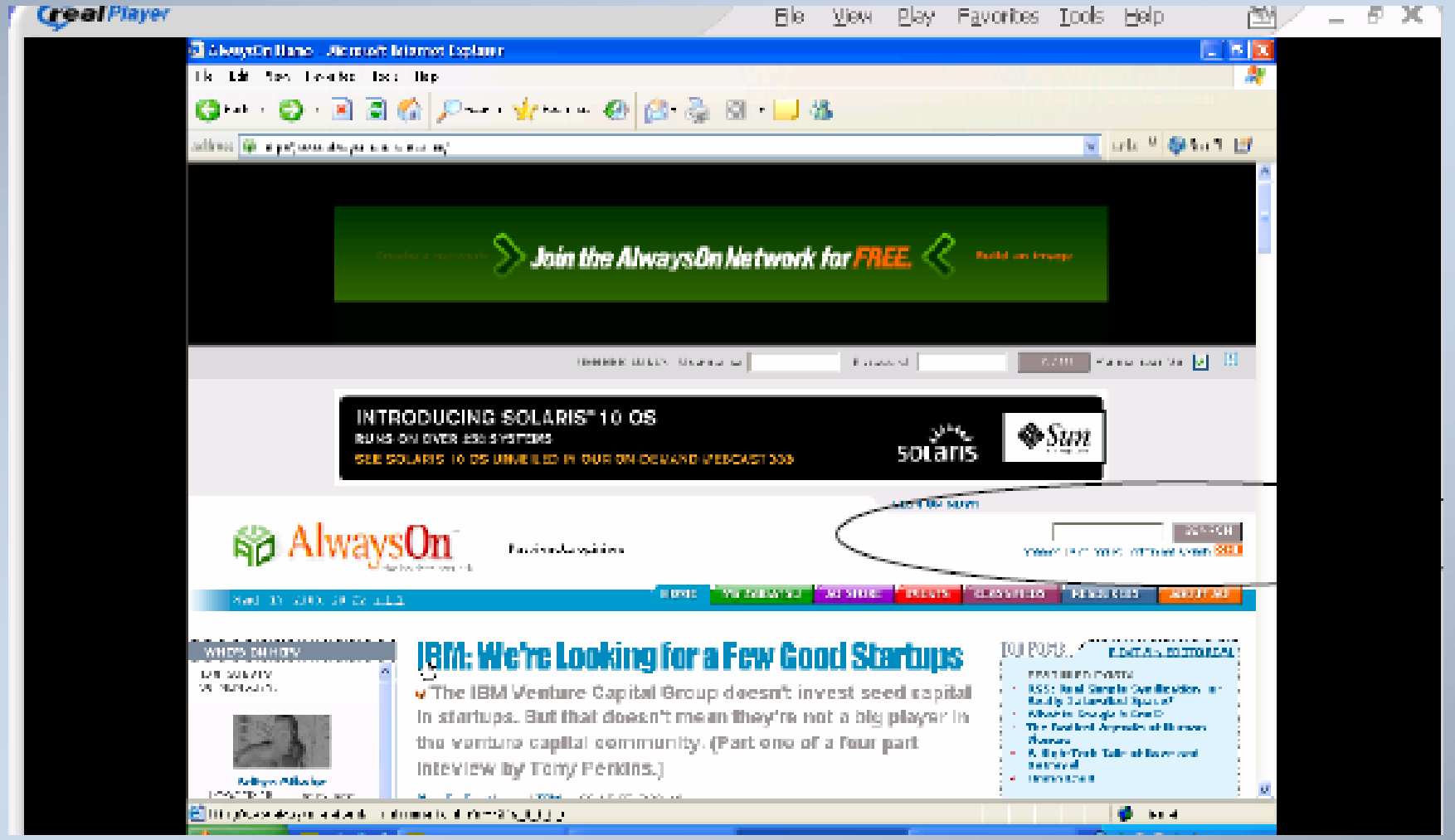




Local Navigation



Search


RealPlayer
File View Play Favorites Tools Help
Join the AlwaysOn Network for FREE
INTRODUCING SOLARIS™ 10 OS
RUNS ON OVER 650 SYSTEMS
SEE SOLARIS 10 OS UNVEILED IN OUR ON DEMAND WEBCAST >>>
solaris
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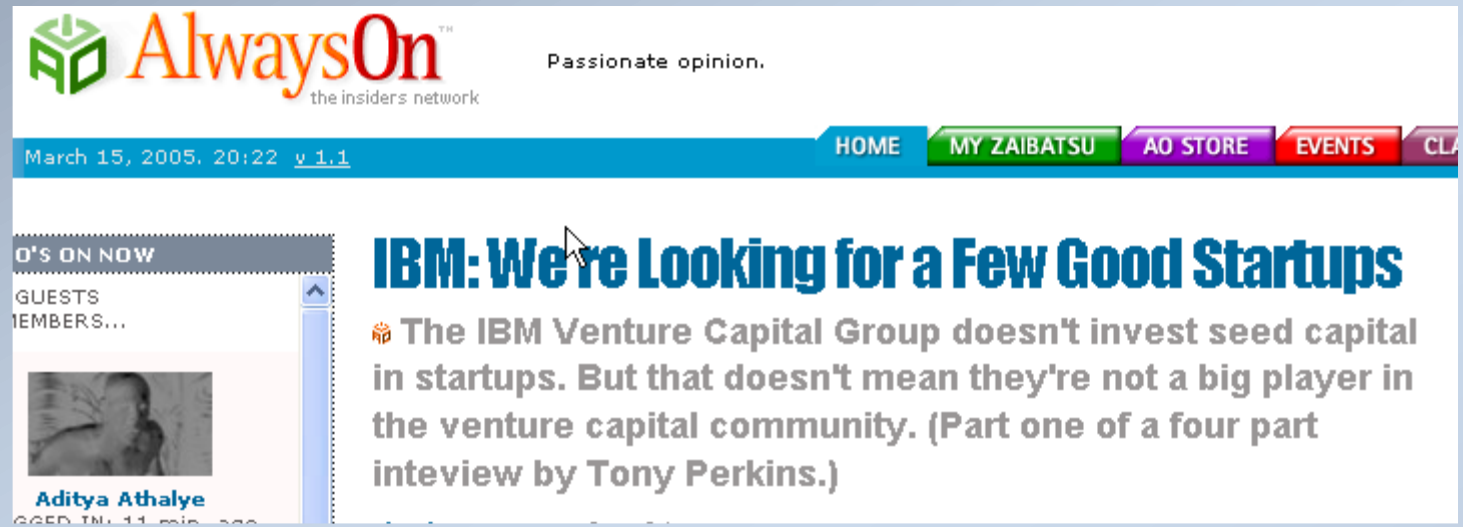
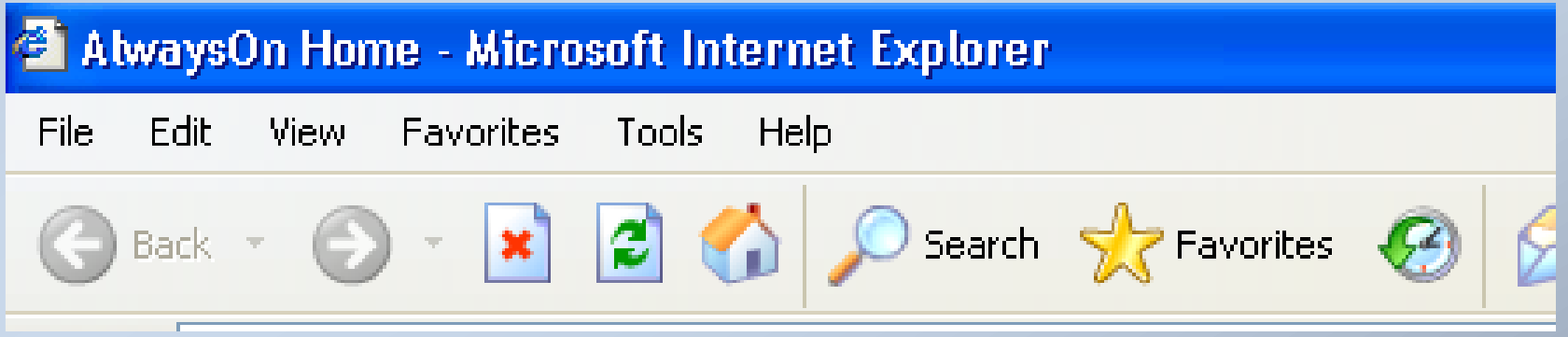
IBM: We're Looking for a Few Good Startups
The IBM Venture Capital Group doesn't invest seed capital in startups. But that doesn't mean they're not a big player in the venture capital community. (Part one of a four part interview by Tony Perkins.)

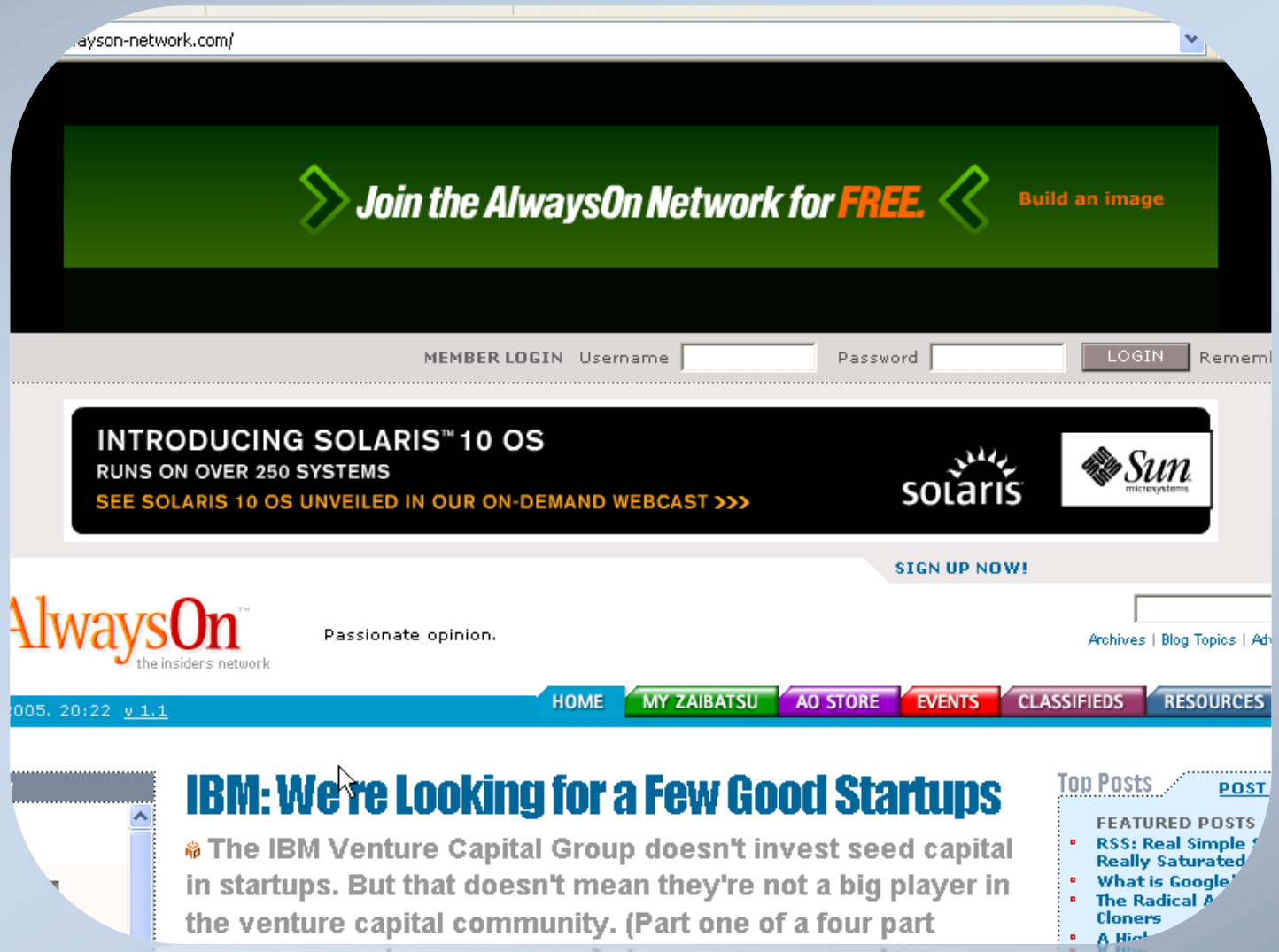
- **Learning Goals**
- The purpose of this lecture is to learn how to perform heuristic
- evaluations. This lecture involves looking at a web site to
- identify any usability issues.
- Clear and readable fonts not being used

What is a Font?

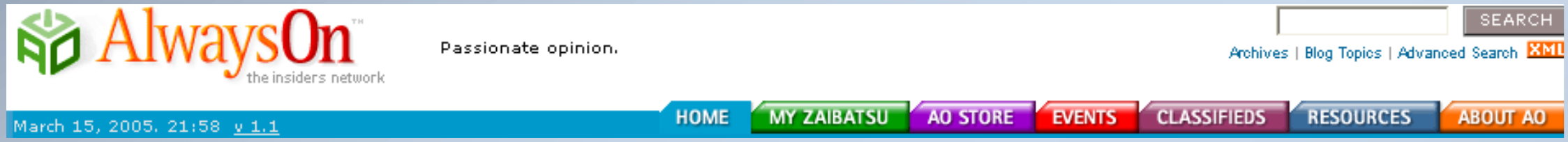




Banner ads take up too much space



Use of highlighted tabs in global navigation bar shows this is the ‘Home’ page



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HUMAN COMPUTER INTERACTION LECTURE # 35 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 35

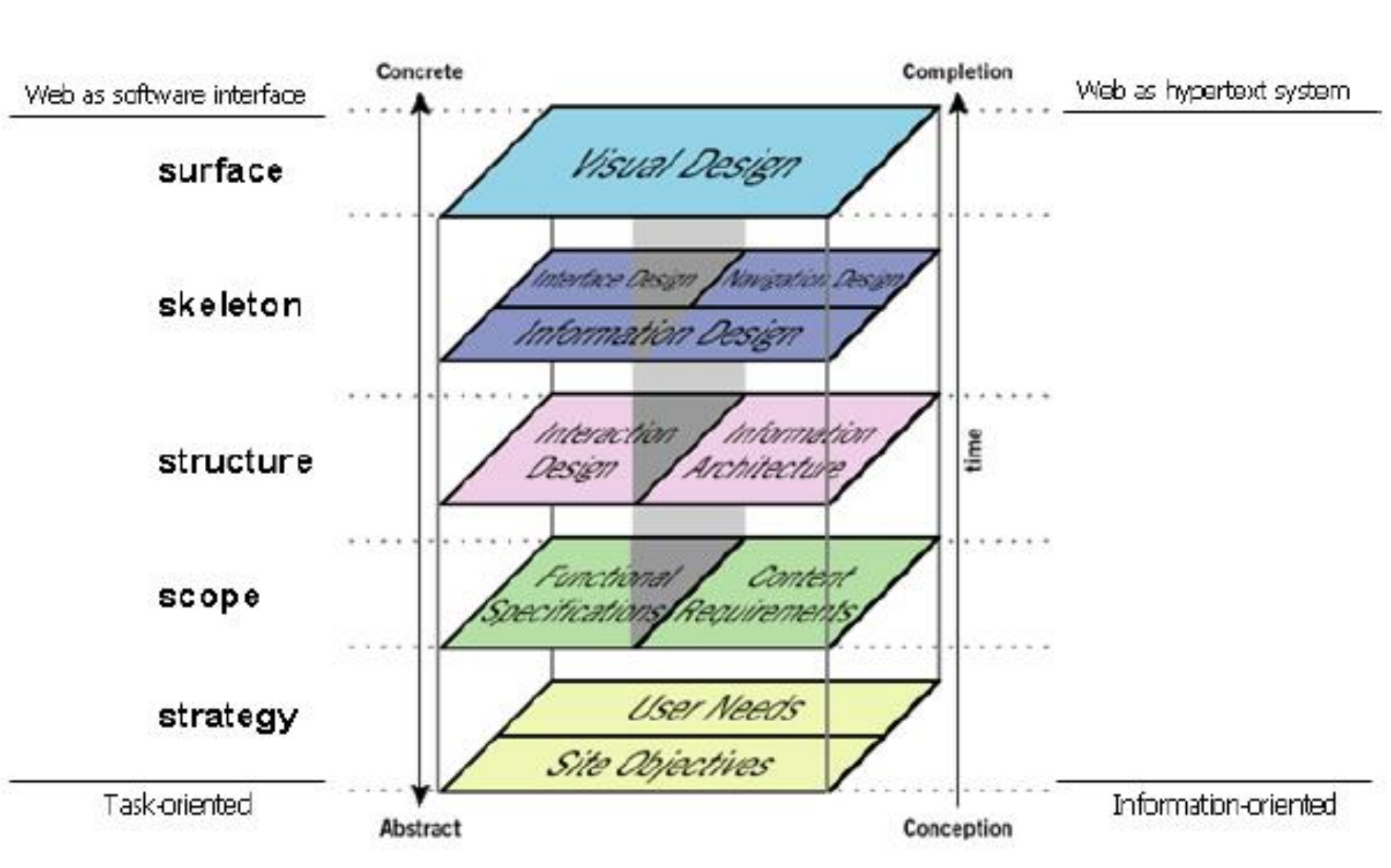
- Evaluation Part VII
- **The relationship between evaluation and usability?**

The relationship between evaluation and usability?

- With the help of evaluation we can uncover problems in the interface that will help to
- improve the usability of the product.
- **Questions to ask**
- • Do you understand the users?
- • Do you understand the medium?
- • Do you understand the technologies?
- • Do you have commitment?

- ***Technologies***
- • What can we implement using current technologies
- • Building a good system requires a good understanding of technology constraints and potentials
- ***Users***
- • Do you know your users? What are their goals and behaviors?
- • • How can they be satisfied? • Use goals and personas
- ***Commitment***
- • Building usable systems requires commitment?
- • Do you have commitment at every level in your organization?
- ***Medium***
- • You must understand the medium that you are working in to build a good usable
- system

Concept for developing user experience



- **The Surface Plane**
- On the surface you see a series of Web pages, made up of images and text
- **The Skeleton Plane**
- Beneath that surface is the skeleton of the site: the placement of buttons, tabs, photos, and blocks of text.
- **The Structure Plane**
- The skeleton is a concrete expression of the more abstract structure of the site. The skeleton might define the placement of the interface elements on our checkout page
- **The Scope Plane**
- The structure defines the way in which the various features and functions of the site fit together.

- **The Strategy Plane**
- The scope is fundamentally determined by the strategy of the site. (user needs).
- **Building from Bottom to Top**
- These five planes-strategy, scope, structure, skeleton, and surface provide a conceptual framework for talking about user experience problems and the tools we use to solve them.

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HUMAN COMPUTER INTERACTION LECTURE # 40 & 41 LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Topics of Lecture # 40

- Observing Users
  - What and when to observe
  - How to Observe
  - Data Collection
  - Indirect Observation: Tracking User Activity
  - Analyzing and Presenting the Data

What and When to Observe

- Observing is useful at any time during product development. Early in design, observation helps designers understand users' needs. Other types of observation are done later to examine whether the developing prototype meets users' needs.

- **How to Observe**

- The same basic data-collection tools are used for laboratory and field studies (i.e., direct observation, taking notes, collecting video, etc.) and the focus is on how people interact with each other, the technology, and their environment

Data Collection

- Data collection techniques (i.e., taking notes, audio recording, and video recording) are used individually or in combination and are often supplemented with photos from a still camera. When different kinds of data are collected, evaluators have to coordinate them; this requires additional effort but has the advantage of providing more information and different perspectives.

Indirect observation: tracking users' activities

- Sometimes direct observation is not possible because it is obtrusive or evaluators cannot be present over the duration of the study, and so users' activities are tracked indirectly. Diaries and interaction logs are two techniques for doing this. From the records collected evaluators reconstruct what happened and look for usability and user experience problems

Analyzing, interpreting, and presenting the data

- Most observational evaluations generate a lot of data in the form of notes, sketches, photographs, audio and video records of interviews and events, various artifacts, diaries, and logs. Most observational data is qualitative and analysis often involves interpreting what users were doing or saying by looking for patterns in the data. Sometimes qualitative data is categorized so that it can be quantified and in some studies events are counted.

Topics of Lecture # 41

- Asking Users
  - ASKING USERS: INTERVIEWS
  - ASKING USERS: QUESTIONNAIRES
  - ASKING EXPERTS: WALKTHROUGHS

Asking users: interviews

- Interviews can be thought of as a "conversation with a purpose" How like an ordinary conversation the interview is depends on the " questions to be answered and the type of interview method used. There are four main types of interviews: *open-ended or unstructured*, *structured*, *semi-structured*, and *group* interviews. The first three types are named according to how much control the interviewer imposes on the conversation by following a *predetermined set of questions.* The fourth involves a small group guided by an interviewer who facilitates discussion of a specified set of topics

Developing questions and planning an interview

- Avoid long questions
- Avoid compound sentences
- Avoid using jargon and language that the interviewee may not understand

Unstructured interviews

- Open-ended or unstructured interviews are at one end of a spectrum of how much
- control the interviewer has on the process. They are more like conversations that focus
- on a particular topic and may often go into considerable depth

Structured interviews

- Structured interviews are useful when the study's goals arc clearly understood and specific questions can he identified.
  - **Semi-structured interviews**
- Semi-structured interviews combine features of structured and unstructured inter views and use both closed and open questions. For consistency the interviewer has a basic script for guidance, so that the same topics arc covered with each interviewee.

Group interviews

- One form of group interview is the focus group that is frequently used in marketing, political campaigning, and social sciences research. Normally three to 10 people are involved. Participants are selected to provide a representative sample of typical users; they normally share certain characteristics.

Asking users: questionnaires

- Questionnaires are a well-established technique for collecting demographic data and users' opinions. They are similar to interviews and can have *closed* or *open* questions.
- Many questionnaires start by asking for basic demographic information (e.g.. gender. age) and details of user experience (e.g., the time or number of years spent using computers, level of expertise, etc.).

Asking experts: walkthroughs

- Walkthroughs are an alternative approach to heuristic evaluation for predicting users' problems without doing user testing.
- walkthroughs involve simulating a user's problem-solving process at each step in the human-computer dialog, checking to see if the user's goals and memory for actions can be assumed to lead to the next correct action

CS408

Information Technology

HUMAN COMPUTER INTERACTION
LECTURE # 42 & 43 & 44 & 45
LEARN WITH AHMAD RAZA

Prepared by: Ahmad Raza

Lecture # 42

- **How to communicate with the users**

- Communicate directly with users
- Communicate Indirectly with the users
- By taking feedback

- **How to Eliminate with the errors**

- Why we have so many errors.
  - By having low technology
  - By using old version of computers
  - By following old techniques of working.

- **What's wrong with the error messages**
  - Is it developer mistake?
  - Is it user mistake?
  - Is the file missing in the segment?
  - People hate error message?
- Making errors impossible
- Positive feedback

Lecture # 43

- **Various methods of audio feedback.**

- Negative
  - Unpleasant Noise
- Positive
  - Pressing a button

- **Ways in which software application communicate and conveys information to the user.**
  - By using Alert or dialogue box.
  - By Icons

- **Information retrieval in Desktop environment**

- Program Name (In start and Taskbar also)
- Ancillary Application
  - These windows are really not a part of the application functionally.
  - Available on request
  - E.g. About window.

- **Splash Screen**

  - That on the front of the software
  - It gives information to the new users for the first time guidance

- **Shareware Splash Screen**

- These software allow the user to use software for a certain time and then pay for the users.

Lecture # 44 & 45

- Security System
  - How can we search for a car?
  - User A search “Auto”
  - User B search “Automobile”
  - User C search “vehicle”

- **Web Accessibility**

  - Every Human has equal rights
  - Use HTML property
  - Webpages are made by HTML
  - It allows alternate users to present data in different ways that are optimized for abilities of individual users

- **Localization**
  - Localization refers to the adaptation of a product, application or document content to meet the language, cultural and other requirements of a specific target
- **Web Localization**
  - It refers to meet the environment of Web Application

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May These lectures helpful for you in Examination
Prey for me, Remember me in your prayers
Allah Hafiz

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