Organizational Aspects

- Need to understand the nature of organizations
- Need to assess the impact of information technology on organizations
- Need to know how to achieve organizational change successfully

The Nature of Organizations

- People - roles, expectations, motivations
- Technology used or created - functions, histories, reliabilities, dependencies
- Work organization - the way the organization is structured, the work is allocated and types of groups
- Organizational culture - "the way we do things" (stories, rituals, way of behaving, codes of practice and ways of talking)

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Understanding the Nature of Organizations

- Metaphorical perspective
  - organization as a machine
  - information processor
  - paperless office
  - automated office

- Participants' perspective - how the members of the organization themselves interpret the structures and processes of the organization

The Impact of Information Technology on Organizations

- Theoretical approaches:
  - Technological determinist - technology is the single most important factor in determining the success of an organization
  - Social action - strategic choices made by management about information technology determine how the organization is structured

- Reality - technological factors as well as management goals cause changes to an organization

Impact of Technology Upon Jobs

- Technical system as control - Information technology take work from people and reduce the remainder to tedious and repetitive work.

- Technical system as tool - The routine and boring jobs are allocated to computers; the computers provide tools to allow people to be creative and more productive.

Methods for Organizational Change

- Scientific management
- Sociotechnical system approach
- Activity theory
- Ethnomethodology
Scientific Management

Work obeys scientific laws and can therefore be analyzed using scientific methods.

Taylor's scientific principles for management
- Separation of planning and working (management plans, workers carry out plans)
- Choose the best person for the job.
- Determine how a task can be performed the most efficiently.
- Train workers to perform the tasks in the manner outlined.
- Determine the best form of reward for the different tasks.
- Monitor worker performance to ensure compliance.


Criticism to Scientific Management
- the best approach to running organizations
- assumes that workers are like machines
- dehumanize and alienate the work force
- inflexible and unable to cope with rapid change, unexpected developments and competition

Sociotechnical System Approach
- Focus on the creation of largely autonomous workgroups, possessing the necessary equipment and computers to allow a work activity to be completed by one group.

Activity Theory
- Identifies and analyzes ‘breakdowns’ and ‘contradictions’ present at the work activity, that prevent the organization from utilizing existing technology effectively.
  - breakdowns - when there is a conflict between what is assumed to happen and what actually happens
  - contradictions - when vicious circles develop that prevent the workers from breaking out of inefficient situations (speedy consultations/quality care)

Ethnomethodology
- Focus on how well new technologies support existing work practices.

The Interaction
- Frameworks
- Ergonomics
  - Styles
  - Context
Norman’s Execution - Evaluation Cycle

- establishing the goals
- forming the intention
- specifying the action sequence
- executing the action
- perceiving the system state
- interpreting the system state
- evaluating the system state with respect to the goals and intentions

Execution-Evaluation Cycle (an example)

- Necesito dibujar un círculo. (establishing the goals)
- Como de una pulgada en el centro de la página. (forming the intention)
- Necesito seleccionar el icon de dibujar círculos, posicionar el cursor en el centro de la pantalla, apretar la tecla de “shift”, apretar el botón del mouse y moverlo hacia el lado derecho. (specifying the action sequence)
- Hago las acciones que acabo de especificar, (executing the action)
- Observo la respuesta del sistema en la pantalla, (perceiving the system state)
- Veo que en efecto se está formando el círculo. (interpreting the system state)
- Todavía no alcanza la pulgada de diámetro. Debo continuar la acción, (evaluating the system state)

Interaction Framework

A framework for Human-Computer Interaction

Interaction Styles

- command line interface
- menus
- natural language
- question/answer and query dialogue
- form-fills and spreadsheets

Such a wonderful interface!

A-->

no problema
intuitivo
bienvenidos los/las
novatos/as
aquí sí podemos explorar
error es natural
**Command Line Interface**

- Boooring! (professor's opinion)
- Provide accelerated access to the system's functionality
- Can be combined to apply a number of tools to the same data
- Provide flexibility through the use of options and parameters
- Require commands to be memorized
- Error-prone

**Menus**

- Rely on recognition rather than recall
- Encourage exploration
- Need to be logically hierarchically grouped
- Naming is critical, specially on menu identifiers (on the menu bar at the top)
- Access to menu entries should be easy and safe (not necessarily like in Macs or Windows 95)

**Natural Language**

- Attractive (speech and written input)
- Language is ambiguous
- Computers systems need to restrict
- Users need to be aware of restrictions for the specific domain
- The ‘natural language’ is lost with too much restriction

**Question/Answer and Query Dialogue**

- Q/A interfaces
  - are easy to learn
  - have limited functionality
  - are good for novice or casual users
- Query languages
  - use natural language style phrases
  - requires knowledge of the domain
  - users need to have experience

**The "ATH" Machine**

- Instructions in English
- Instructions in Spanish
- Cuenta corriente
- Cuenta de ahorro

**Form-fills and Spreadsheets**

- Form-fills
  - useful for data entry
  - good for novice users
- Spreadsheets
  - users are free to manipulate values at will
  - distinction between input and output is blurred
Hyperlinking

- Hypernodes - multimedia documents (text, audio, video, animation)
- Hyperlinks - interconnections of related or unrelated documents
- Browsing - looking for something, but you don't know what
- Navigation - following links for browsing
- Surfing - a water sport

Direct Manipulation

- Visibility of the objects of interest
- Incremental action at the interface with rapid feedback on all actions
- Reversibility of all actions, so that users are encouraged to explore without severe penalties
- Syntactic correctness of all actions, so that every user action is a legal operation
- Replacement of complex command languages with actions to manipulate directly the visible objects

Design Principles Related to Direct Manipulation

- Aftordance: what sort of operations and manipulations can be done to a particular object
- Constraints: limits of what can be done with an object
  - limits of a scroll bar movement
  - menu entries are fixed in most cases
- Mappings: should appear natural and intuitive to the users
  - wastebasket (good for throwing away files, bad for ejecting disks
- Feedback: need no introduction (back channels)

WIMP Interface

- Windows
- Icons
- Menus
- Pointers
- Buttons
- Palettes
- Dialogue boxes

WIMP Issues

- Pointers - object manipulators
  - mouse driven actions (point, click, double click, shift click, press, drag)
  - shapes
- Icons - objects that attempt to suggest their function through an image
  - images, buttons
- Menus - list of actions that can be performed
  - lists of phrases, palettes
- Windows - defined areas for interaction
  - sizing, moving, scrolling, focus

Useful WIMP Stuff

- copy-paste, cut-paste, drag & drop
- clipboard
- dialogue boxes
  - undo, cancel
- trash can
- on-line help
- print preview
- desktop
- defaults
Task Analysis
A process that identifies and analyzes tasks performed by humans as they interact with a system
• the things they do
• the things they act on
• the things that they need to know

The Task Analysis Process
• Information and data collection
• Data analysis
  • Task description

Data and Information Collection
• Documentation
  • manuals
  • instruction booklets
  • training materials
  • job descriptions
  • rule books
• Observation
  • informal
  • think aloud
  • walkthrough
• Interviews
• Questionnaires

Documentation
• Indicate how people are supposed to perform tasks
  • manuals
  • instruction booklets
  • training materials
  • job descriptions
  • rule books
• Are useful to identify things that people do that they are not supposed to (the why? could be revealed with an interview).

Observation Techniques
• Reveal information that cannot be acquired in any other way.
  • detailed physical task performance data
  • social interactions
  • behavior patterns
  • environmental influences (noise, light, interruptions)
• Before conducting sessions:
  • try to predict the information that will be extracted from the data
  • conduct a pilot session

Observation Aspects to be Considered
• Intrusion
  • observer unobserved
  • observer observed
  • observer participant
• Recording methods
  • paper and pencil
  • audio/video recording
  • computer logging
  • user notebook
**Post Observation Analysis**

- Identify and categorized the observed events.
- Count the events.
- Relate the events to the task and the system state at the time.
- Produce a transcript of the audible content.

**Think Aloud**

- The users verbalize:
  - what they believe is happening
  - why they take an action
  - what they are trying to do
- The information provided is often subjective and may be selective.
- Being observed and having to describe what's being done could change how people normally do things.

**Walkthroughs**

- The subject performs some sort of demonstration of a task without necessarily undertaking the task.
- The subject is asked to comment or is questioned on a replay of his/her recorded actions while performing a task.
  - It helps to explain the actions of the subjects.
  - The experimenter needs very little specialist training.
  - The subject need to be skilled in the domain.

**Interviews**

- Unstructured - good for early stages of data collection
- Structured - for general collection of task-based information
  - The interviewer need to have interviewing skills
  - The interviewee should be an expert of the domain.
  - The purpose of the interview should be made clear to the interviewee.

**Before the Interview**

- Make an appropriate selection of questions.
- Determine an optimum sequence of questions.
- Select an appropriate place for the interview so that interviewee is at ease (at the workplace or near it).
- If the interview will be video/audio tapped, get interviewee consent before you get to the place of the interview.

**Don’t use Interviews to Find Out:**

- If people would use a new feature
- What features people would like
- How much people like/want one option
- How to design a user interface
- Any design issues
- Anything that makes interviewee imagine hypothetical situations
Use Interviews to:

- focus goals of products
- determine functionality
- evaluate priorities
- develop user model
- identify biggest problems
- determine priorities for next release

Asking the right questions

- Start with general questions (demographics, high-level tasks, organization practices)
- Move on to common tasks and procedures
- Eventually focus on more specialized tasks
- Avoid providing details of your proposed plans
- Avoid leading the interviewee with possible answers
- Avoid giving your opinions

Interviewing Tips

- The interview is about them, not you!
- Ask open, unbiased questions
- Don't use the news reporter approach
- Ask the questions and let them answer
- Follow up
- Adjust your questions to their previous answer
- Ask questions in a language they understood
- Be flexible
- Listen to their complaints, but look for other problems

Algunos Ejemplos

- P: ¿Has confrontado algún problema con este programa?
  R: Si, cuando le da la gana se tranca y me sale una bombita.
  P: Si no molestara eso, yo me prendo cada vez que eso me pasa.
- P: ¿Usted no cree que Víctor Fajardo al querer implantar la enseñanza en el idioma inglés demuestra que no ha tomado cursos de pedagogía?
  R: ¿No le parece que el “tochpad” es más difícil de usar que el “mouse”?
  P: ¿Por qué?
  R: El mouse.
- P: ¿Qué te es más fácil de utilizar, el “tochpad” o el “mouse”?

Sorting and Classification

- Make a list of task objects.
- Write each one on a card or a piece of paper.
- Ask an expert (in the domain) to sort them in piles of similar objects.
- Depending of the sizes of the groups the expert could be asked to sub-divide the groups or create larger groups.
- The expert could be asked to explain why he/she came up with a particular arrangement.

The Hierarchical Task Analysis (HTA) Method

Is a task decomposition method that produces a hierarchy of tasks and sub-tasks and plans which are needed to accomplish a system's goal.

- goal - the desired state of the system
- tasks - the different things that people must do within a system
- plans - state the conditions which specify when each of a set of sub-tasks should be carried out.
Practical Considerations in the Realization of a HTA

- Establish the purpose of the analysis and the rules to be used for deciding where the analysis should stop.
- State the main goal.
- When the tasks are complex get the help of a person that knows the tasks well.
- Use different sources of information

Dialogue

Structure of the conversation between the user and the computer system

Levels of computer language

- **lexical** - the shapes of icons on the screen and the actual keys pressed
- **syntactic** - the order and structure of inputs and outputs
- **semantic** - the meaning of the conversation in terms of its effect on the computer’s internal data structure and/or the external world

Hierarchical STN

Concurrency on STN

State Transition Networks (STN)
**Modified Hierarchical STN**

- **Main Menu**
  - Select graphics
  - Pop-up graphics sub-menu
  - Pop-up text sub-menu
  - Pop-up paint sub-menu

- **Graphics Sub-menu**
  - ESC

- **Text Sub-menu**
  - ESC

- **Paint Sub-menu**
  - ESC

**Textual Dialogue Notation:**

**Production Rules**

- **Select_line Menu** ➔ **Line_1 highlight line**
- **Click_on_point Line_1** ➔ **Line_2 rubber band on**
- **Click_on_point Line_2** ➔ **Line_2 draw line**
- **Double_click Line_2** ➔ **Finish draw line rubber band off**

**User actions:** Select_line, Click_on_point, Double_click

**Dialogue states:** Menu, Line_1, Line_2, Finish

**System responses:** highlight line, rubber band on, rubber band off, draw line

**Polyline drawing**

**Things to Check for in Dialogues**

- **Completeness** - look for forgotten actions while in a state (do nothing is the safe solution)
- **Determinism** - look for situations where identical actions executed on a state get the dialogue to different states
- **Reachability** - check if the dialogue is fully connected
- **Reversibility** - is it possible to get back to the previous state?