Learning Objectives

- Know the attributes of organizational tasks pertinent to HCI and how they provide the context of tool-level tasks
- Understand the need for task analysis in HCI
- Understand how the work context affects HCI design and differentiate between structured and non-structured tasks
- Understand how organizational-level tasks are decomposed hierarchically and mapped to tool-level tasks, which are described by the TSSL model
- Understand and apply a method for analyzing HCI requirements for decision support

Scenario – Task – Selecting an office

Figure 9.1 Map of buildings from which to select ideal location (taken from www.tau.ac.il Tel-Aviv University). See also color insert.
Introduction
Task in the organizational context of work

- We have already seen that task is central to HCI.
- The task-semantics-syntax-lexicon (TSSL) model describes HCI by representing the user’s view of the task and its human-computer implementation.
- In contrast, tasks in the organizational context are defined at a higher level of abstraction.
  - Example: Selecting an office location
- They have to do with satisfying some organizational demands.
Introduction
Task in the organizational context of work

- How are tasks defined at the organizational level related to HCI?
- Two main aspects of organizational tasks, important in the development of HCI.
  1. The nature of the individual task, particularly its structure
  2. The interrelations among tasks performed by the same or different users

Introduction
Task in the organizational context of work

- Figure 9.3 depicts the partial hierarchy of tasks
Task analysis

- **A task**, defined at the organizational level, is a worker’s designed effort to accomplish an organizational demand
  - A *structured task* is well defined
    - It has clear and explicit goals
    - Can be accomplished by following predefined procedures.
  - An *unstructured task* is ill-defined
    - ambiguous goals
    - no explicit procedures that can assure successful completion of the task.

In addition to the degree of task structure, tasks are:
- Routine or non-routine (novel)
- Repetitive or occasional, and
- Uniform or diverse.
Table 9.1 summarizes the impact of task characteristics on the focus of HCl design.

<table>
<thead>
<tr>
<th>Type and context of task</th>
<th>Example</th>
<th>Main impacts on design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structured, routine, uniform, repetitive tasks</td>
<td>Intensive data entry</td>
<td>Minimal user effort and maximum speed; minimal learning time; Errors due to inattention and boredom; Frustration with ill-fitted interfaces, e.g., no short cuts; Physiological stress</td>
</tr>
<tr>
<td>Structured to semi-structured, routine but diverse tasks</td>
<td>Word-processing</td>
<td>Minimal user effort and maximum speed for certain operations; Piecemeal but efficient learning; Recall and skill necessary to operate; Errors due to misapplication of rules; Fit to specific tasks and to specific work habits; Limited design and calculations</td>
</tr>
<tr>
<td>Unstructured tasks</td>
<td>Supported decision making</td>
<td>Comprehension; Creativity and flexibility; Complex problem solving and planning; Simulations, calculations and mental models; Errors and biases in judgments; Fit to individual style</td>
</tr>
<tr>
<td>Multiple tasks concurrent</td>
<td>Operating several office systems</td>
<td>Managing attention to several tasks; Controlling states and operations in several systems; Confusion and overload leading to errors and frustration</td>
</tr>
<tr>
<td>Interrelated tasks</td>
<td>Project management</td>
<td>Comprehension; Complex problem solving; Memory; Simulation and planning; Flexibility</td>
</tr>
</tbody>
</table>

Work at the office as context – tasks and their interrelations

- **Characteristics of different types of work**
  - TPS (Transactions Processing Systems)
  - OAS (Office Automation Systems)
  - MIS (Management Information Systems)
  - DSS (Decision Support Systems).
Workers at the office engage in several categories of work:
- Clerical
- Professional
- Managerial

Managerial Work

Managers perform a great quantity of work with little free time. (34 different activities per day, 44 hours per week).

Managerial jobs are characterized by brevity, variety and fragmentation (63% of activities lasted less than 9 minutes, only 5% lasted more than an hour).

Managers favor verbal over written contacts. (Desk work and tours take up only 29% of their time and the rest is for phone calls and meetings).

Scheduled meetings consume more time than any other activity. (Four meetings a day with half involving three people or less).

Managers link their organization with outsiders in a variety of ways. (External contacts took 52% of verbal contacts, internal contacts over a third).
Information processing functions supported by HCI

- The typical manager is likely to suffer from information overload.
- The cognitive limitations on memory and processing become a critical threshold.
- Support is needed in both reducing the amount and complexity of information processing and increasing the understanding.
- Attention needs support.

Table 9.3 Managerial and clerical work with corresponding user limitations

<table>
<thead>
<tr>
<th>Characteristics of managerial work</th>
<th>Characteristics of clerical support work</th>
<th>User limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information overload</td>
<td>Information overload</td>
<td>Memory, attention, cognitive processing</td>
</tr>
<tr>
<td>Concurrent tasks overload</td>
<td>Concurrent tasks overload</td>
<td>Cognitive management</td>
</tr>
<tr>
<td>Complex problem solving</td>
<td>Repetition</td>
<td>Memory, cognitive processing (managers)</td>
</tr>
<tr>
<td>Use of multiple media for communication</td>
<td>Sequential use of media</td>
<td>Perceptual processing (managers)</td>
</tr>
</tbody>
</table>
Contextual Design

- Contextual Design is based on an understanding of how users (workers or customers) work.
- It relies on interviews and observations.
- Contextual Design has seven parts:
  - Contextual inquiry
  - Work modeling
  - Consolidation
  - Work redesign
  - User environment design
  - Test
  - Implementation

Here we are interested only in the first three parts, which overlap our general characterization of work:

1. Contextual Inquiry: determines the stake holders and attempts to model how they work in practice
2. Work Modeling: represents the tasks performed by individual workers and interacting workers.
3. Consolidation: is needed when (and this is assumed in contextual design) the design is done in teams.
Decision-making biases

- Information acquisition, both from external and internal (memory) sources, is subject to several biases. Consider the following three biases:
  - Availability
  - Confirming information
  - Selective perceptions

- Biases and limitations are prevalent in the stage of structuring and clarifying information too.
  - Anchoring (and anchoring and adjustment)
    - E.g., write SS # and ask if you’d bid that much, then ask for bid
  - Base rate fallacy (detect problem 99% of the time; non-problems are 99.9% of the instances; what is probability of a flagged problem being a problem?)
  - Regression effects (extreme measures will not be repeated) See Youtube
  - Gamblers fallacy (lots of heads? Then tails “due” to win)
  - Illusion of correlation (people read too much into happenstance)
Table 9.4: Common needs of decision makers (Silver, 1991)

- Fuller exploration of alternatives
- Earlier detection of problems
- Coping with multiple objectives
- Treat risk
- Reduce cognitive biases
- Creativity
- Communication
- Structure decision making process
- Learning

Levels of interaction in decision making

Selecting an office

View two sites

Select two sites to view

Define view attributes

Organizational level task

Tool level task

Computer displays list of sites and user selects two sites. Each site is identified by name and picture. Users can select or deselect a site. User points at a name or picture and then selects an unselected or deselects a selected. Sites are ordered by name. Sites are displayed in a checkbox list and users point or tab to a checkbox and either click or press any key on the keyboard.
Levels of interaction in decision making

Figure 9.5 Hierarchical task decomposition, where upper levels represent the decision task and the lower (tool) level represents how to operate the computer.

Figure 9.6 Different feedback messages are designed for distinct levels of task. The specificity of the feedback should match the task level.
A method for task analysis and decision support

An overview of the method

1) Use of internal representations
2) Pursuit of goals
3) Chunking of information

Limitations:

1) Working memory.
2) Cognitive processing.
3) Retrieval from long-term memory.
4) Numerical operations.
5) Projection in time and space.

1. SITUATIONAL AND FUNCTIONAL ANALYSIS
(organizational context, work style, task attributes, objective and perceived effectiveness, task dynamics, decision process, data and knowledge resources, problem representation, required judgments, errors)
2. CONSTRAINT ANALYSIS
(human limitations & biases, data constraints, communication failures, stress)
3. PROPOSE NEW FUNCTIONALITY
(redefine elements of the decision process and the allocation of tasks to human and computer)
4. DESIGN HCI, MODELS, DATA AND CONTROL
(design detailed human computer interfaces, computerized decision techniques, data management, and control over the system operation throughout the human-computer interaction; develop prototype)
5. REANALYZE WORK WITH NEW DSS AND MODIFY
(for objective and perceived effectiveness and for new constraints)
Situational and functional analysis

- Goal decomposition should
  - concentrate on concrete goals, and
  - work top-down from more general to more specific goals

Figure 9.8: STAR steps for supporting decisions

Decision situation
1. Task dynamics
2. Situational objective
3. Value criteria
4. Underlying process
5. Information environment
   a. Inputs
   b. Outputs
   c. Parameters
6. Intermediate reasoning/analysis steps
7. Representation
Constraint analysis

- This second stage identifies the decision-making needs that arise from the constraints.
- The general direction is to refer to common biases in decision making.

---

Inability to predict processes - it is difficult to project processes, particularly, uncertain processes. Due to limitations on working memory, attention to detail and numeric processing. Possible outcomes are projecting with errors, relying on sub-optimal techniques and ignoring information.

Difficulty in combining attributes and objectives that are competing - it is difficult to combine ill-defined objectives or conflicting objectives. Due to limitations on working memory and numeric processing. Possible outcomes are incorrect integrated criteria and omission of important attributes or objectives.

Inability to manage information - Due to limitations on working memory and long term memory and also limited attention. Possible outcomes are errors in using the information and ignoring information intentionally and unintentionally.

Difficulty in analyzing and reasoning - limitations on knowledge, time and effort make it difficult to formulate an effective decision strategy or to carry it out correctly.

Difficulties in visualizing - it is difficult to visualize abstract manipulations and semantic data. It is easier to visualize concrete situations but difficult to manipulate them, due to limitations on working memory and cognitive processing. A major outcome is limiting the ability to manipulate information and therefore produce less effective solutions.
A demonstration of the method for task analysis

- e-Gourmet running case
  - e-Gourmet has decided to explore various suppliers of Cajun food and to choose a new supplier for this line of product

The managers first select from a database all Cajun food suppliers authorized by the health department and have narrowed down to 3 the suppliers who are located in Louisiana.

The three alternatives are:
- Supplier 1 is Bon Temps Rouler.
- Supplier 2 is Cajun Cabin.
- Supplier 3 is Red Hot Cuisine.
STAR for e-Gourmet supplier selection

1. **Decision situation** Select food supplier – Cajun food
2. **Task dynamics** are simple. Once the information is gathered, the choice of supplier can be made in a single session.
3. **Situational objective** The manager’s highest-level goals are to choose the best-known supplier according to the information available
4. **Value criteria** Prices are the most important criterion, the less the better.

---

STAR Analysis for e’Gourmet

- **Outputs**
  - For each supplier, 5 prices for selected products.
  - For each supplier, location, product type and (unstructured) information about delivery practices.
- **Inputs – parameters**
- Weights on criteria.
- **Intermediate reasoning/analysis steps:**
  - Translate the information about tardiness and delivery time into one estimated delivery time.
- **Representation**
  - The managers want to view a matrix of alternatives and attributes before any analysis is made.
    - See Table 6.
    - While they would like to employ analytical tools, they feel it is important to see the overall information so that they may choose immediately without resorting to any calculations.
### Supplier Attribute

<table>
<thead>
<tr>
<th>Supplier</th>
<th>I Bon Temps Rouler</th>
<th>II Cajun Cabin</th>
<th>III Red hot Cuisine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product type</td>
<td>Regular High Quality</td>
<td>Common products</td>
<td>Common products</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>20 days</td>
<td>20 days</td>
<td>5 days</td>
</tr>
<tr>
<td>Relative prices</td>
<td>High</td>
<td>Medium</td>
<td>Low-medium</td>
</tr>
<tr>
<td>Location</td>
<td>New Orleans, LA</td>
<td>Baton Rouge, LA</td>
<td>Monroe, LA</td>
</tr>
</tbody>
</table>

### E’Gourmet analysis

**Information about alternative**

Name: Bon Temps Rouler  
Location: New Orleans

Contact: Joan 310-293-7564.

Product type: High quality regular Cajun.

Responsiveness and service:


Comment 2: Customer says they can usually meet the 3 week delivery. Date: Oct 20 2005.

**Prices**

<table>
<thead>
<tr>
<th>Product</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Red beans</td>
<td>White rice</td>
<td>Crawfish</td>
<td>Yellow rice</td>
<td>Shoji</td>
</tr>
<tr>
<td>Price per lb</td>
<td>10</td>
<td>9</td>
<td>25</td>
<td>11</td>
<td>22</td>
</tr>
</tbody>
</table>

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Chapter 10
Componential Design

Learning Objectives

- Know some of the popular HCI components
- Understand how to select and design components
- Learn how to apply HCI design guidelines to the design of HCI components.
- Learn how to apply the TSSL model to any HCI component.
Roadmap

Context
1 Introduction
2 Org & Business Context

Foundation
3 Interactive Technologies
4 Physical Engineering
5 Cognitive Engineering
6 Affective Engineering

Application
7 Evaluation
8 Principles & Guidelines
9 Organizational Tasks
10 Componential Design

Additional Context
11 Methodology
12 Relationship, Collaboration, & Organization
13 Social & Global Issues
14 Changing Needs of IT Development & Use

Componential Design and HCI development

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Introduction

Most designers build human-computer interfaces by assembling ready-made components.

The components are assembled into an input-output design that serves some function such as presenting information to the user, enabling navigation, and accepting information from the user who is engaged in performing a task.

We use the four-layer TSSL (task, semantics, syntax and lexicon) model of interaction that translates the abstract function to the physical building blocks.

However, to avoid confusion, the term ‘task’ is reserved for describing the task as the user sees it and the term ‘function’ (or functionality) will be used to describe the designer’s description of what the component does.
Introduction

- **Components** are the building blocks with which we construct the human-computer interface.
- **Functions** (functionality) are the component’s services to the user.

Table 10.1.a: Low level components – the infrastructure

<table>
<thead>
<tr>
<th>Component</th>
<th>Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Differentiate data items, group elements, signal order and meaning, impact mood</td>
</tr>
<tr>
<td>Voice</td>
<td>Convey meaning and emotion, signal importance, instruct tools</td>
</tr>
<tr>
<td>Text</td>
<td>Convey meaning and emotion</td>
</tr>
<tr>
<td>Video</td>
<td>Convey meaning and emotion; display dynamic behavior; <strong>Example: iPhone 4</strong></td>
</tr>
</tbody>
</table>
### Table 10.1.b: Medium level components

<table>
<thead>
<tr>
<th>General function</th>
<th>Description of function</th>
<th>Specific interface objects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data input &amp; feedback</td>
<td>Input data by selecting from predefined values or generating new values</td>
<td>Selection: Radio button; check box, list box. Generation: textbox, message box for feedback, specific dialog boxes</td>
</tr>
<tr>
<td>Navigation controls &amp; feedback</td>
<td>Control the inter-system and intra-system flow and user navigation</td>
<td>Menu, command buttons, dialog box</td>
</tr>
<tr>
<td>Quantitative graphics</td>
<td>Output quantitative information</td>
<td>Graphics (bar-charts etc.), tables</td>
</tr>
</tbody>
</table>

### Table 10.1.c: High level components – assembling lower-level components

<table>
<thead>
<tr>
<th>Function</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input information about some entity</td>
<td>Form fill-in</td>
</tr>
<tr>
<td>Output information about some entity</td>
<td>Output screen</td>
</tr>
<tr>
<td>Search and browsing</td>
<td>Query screen</td>
</tr>
<tr>
<td>Decision making</td>
<td>What-if screen</td>
</tr>
<tr>
<td>Navigation and control within some website; introduce a site</td>
<td>Homepage (also menu); Multiple windows</td>
</tr>
</tbody>
</table>
Low-level components (infrastructure)

Color

- Is used extensively.
- Calls attention
- Helps comprehension
- Adds cues
- Is appealing
- Facilitates recognition, attention, memory, comprehension and positive affect.

Figure 10.2: Dialog box to define color
Guidelines for use of Color

- Two general design guidelines
  - First, allow for redundancy so that differentiation by color is also accompanied by differentiation by shape or size.
  - Secondly, whenever possible, empower the user to adapt colors to fit their preferences and their culture.

Medium level components

Data input

- The main design objectives of data input are to ensure correct input with minimal user effort.
- There are two general methods of inputting data:
  - User generation of data values
  - User selection of data values
Data input - the building blocks

- The common building blocks (widgets) for selecting symbolic values include:
  - radio buttons
  - check boxes
  - list boxes

**Figure 10.3**: Screen with check box, radio buttons, command buttons, text boxes and list box.
The syntactic and semantic levels of Data Input components

<table>
<thead>
<tr>
<th>Widget</th>
<th>Function</th>
<th>Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formatted (coded) fields</td>
<td>Enhance clarity of what is expected; prevent errors and guide specification of input; ease input</td>
<td>Use meaningful labels adjacent to the data entry field; the data entry field should be clearly visible and match the expected value in format and size; recognizable but restrictive formats when possible; provide explanations near the data entry field; provide constructive feedback upon incorrect input; use defaults when possible (e.g., common or personalized value)</td>
</tr>
<tr>
<td>List box</td>
<td>Display values and help select</td>
<td>Order values in obvious sequence (e.g., alphabetical but often violated – USA first); provide explanation of the list values or categories</td>
</tr>
<tr>
<td>Radio buttons</td>
<td>Display values to enable holistic view and easy choice</td>
<td>Organize values to enable parallel view of all options (e.g., order categories in increasing ascending value); provide explanation of the values or categories</td>
</tr>
</tbody>
</table>

The Task level – data input and choice

<table>
<thead>
<tr>
<th>Input circumstances</th>
<th>Main concerns</th>
<th>Widgets recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible values known; several values allowed.</td>
<td>Recall and specification is difficult and accuracy of input is crucial (e.g., areas of interest for marketing purposes).</td>
<td>Check box for limited number of values.</td>
</tr>
<tr>
<td>Possible values known; one value allowed.</td>
<td>Free form specification may be ambiguous and accuracy of input is crucial (e.g., spelling of country name).</td>
<td>Radio buttons for few possible values. List box for multiple values (ordered if possible).</td>
</tr>
<tr>
<td>Possible values known; one value allowed.</td>
<td>Choice of value depends on comparison with other options (e.g., exact marital status on tax form).</td>
<td>Radio buttons to display simultaneously the possible values.</td>
</tr>
<tr>
<td>Possible values unknown; free form alphanumeric input expected.</td>
<td>In some cases, specification of input is difficult.</td>
<td>Text box with short labels when specification is straightforward and additional constant labels or popup message boxes to help with ambiguous or difficult specification.</td>
</tr>
<tr>
<td>Possible values unknown; some predefined restrictions.</td>
<td>Free form specification may be ambiguous and accuracy of input is crucial (e.g., phone number with area code and country code).</td>
<td>Formatted input box with message box as feedback to validate input.</td>
</tr>
</tbody>
</table>
Navigation and flow control

- Navigation mechanisms
  - Menus
  - Command controls
  - Dialog controls

Figure 10.4: A control panel consisting of a horizontal menu and two rows of icon-based command controls.
Navigation and flow control

Figure 10.5: Navigation in an e-book uses a clickable image-based menu and a corresponding vertical menu.

Navigation and flow control

- Figure 10.6 shows two overlapping dialog boxes.
Menus and navigation - the syntactic and semantic levels

- In tree structured menus the main design issues are:
  - Breadth-depth tradeoff
  - Organization of menu items
  - Sequence of menu items and
  - Graphic layout.

- Effective choice of semantics is crucial for correctly and efficiently locating an item.
- Familiar and unambiguous terms are key to recognizing and interpreting the labels of the menu items.
- The main application text-based menu is commonly positioned at the top of the screen horizontally.
- By convention, more specific menus are positioned vertically on the left hand side.
- Icon-based menus are arranged in a two-dimensional space to be read left-to-right and top-down by infrequent users.
Menus and navigation - the syntactic and semantic levels

- Figure 10.7 is a typical youngster’s self constructed icon-based menu.

Menus and navigation - the task level

- Menus support several types of user tasks, all related to navigation and control.
- Once an intention has been formed, the user has a search target in mind.
Menus and navigation - the task level

- There are three types of searches in menus:
  - Matching the search target with an identical menu-item label
  - Locating the category that includes the search target
  - Finding a label that is equivalent (but not identical) to the search target

Quantitative graphics

- In recent years, graphics have played an increasingly important role in managerial work, primarily in decision-making and communication.
- The increasing importance of graphics is, at least in part, due to the amazing graphical power that is found in today's graphical packages and the affordability of high quality screens, printers and plotters.
Why use computer graphics?

- Graphics are effective communicators for most types of quantitative information.
- Computer generated graphics are low cost alternatives to manual charts
  - Think how easy it is to construct a high quality chart in most commercial spreadsheets
- Computer generated graphics readily access corporate databases.
- Computer generated graphics help interactive decision-making.

Table 10.5: Graphics versus text

<table>
<thead>
<tr>
<th>Lexicon</th>
<th>Syntax</th>
<th>Semantics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text composed of words in clauses within paragraphs.</td>
<td>Procedural – processed as a sequence of elements.</td>
<td>Functional, logical and abstract relations.</td>
</tr>
<tr>
<td>Images composed of shapes.</td>
<td>Holistic – processed as a unit with parallel relations.</td>
<td>Spatial built on proximity, ordering and direction.</td>
</tr>
</tbody>
</table>
Graphics - the building blocks

The building blocks for representing quantitative data (the graphic’s lexicon) include labels and numeric data represented by spatial elements such as lines, angles, circles, boxes etc.

![3D bar chart](image)

Figure 10.8: A 3D bar chart, representing quantitative data with a title, grid, legend and labels.

Table 10.6: Resources needed in decision-making that graphics support

<table>
<thead>
<tr>
<th>Decision-making aspect</th>
<th>Psychological resources supported by graphs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem finding</td>
<td>Detection, attention</td>
</tr>
<tr>
<td>Information analysis</td>
<td>Comprehension, memory</td>
</tr>
<tr>
<td>Performance review</td>
<td>Detection, attention, comprehension, affect</td>
</tr>
<tr>
<td>Forecasting</td>
<td>Detection, comprehension</td>
</tr>
<tr>
<td>Exception reporting</td>
<td>Detection, attention</td>
</tr>
<tr>
<td>Planning</td>
<td>Memory, comprehension, attention</td>
</tr>
<tr>
<td>Exploratory analysis</td>
<td>Detection, attention, comprehension</td>
</tr>
<tr>
<td>Simulation</td>
<td>Memory, comprehension, attention, affect</td>
</tr>
</tbody>
</table>
Five basic graphs for business presentations:
- pie chart
- bar chart
- column chart (vertical bar charts)
- line chart
- dot chart

A three-step strategy for chart selection:
1. Determine your message - a single point to be made,
2. Identify the comparison (out the five types), and
3. Select the type of chart.
Form Design

- One common design technique is to build a form that includes all the relevant information about a particular entity (like an order or a person) – this is called a form fill in.

- Its main advantages lay precisely in the full view of the relevant information to be entered into the computer system.
Form Design

Figure 10.13: Initial design of patient form fillin

Form fill in - the building blocks

- Form fill ins are high-level components that are in fact assemblies of lower-level components.
- The main building blocks of the form fill in include:
  - components for accepting and selecting data
  - feedback
  - organizers
Form fillin - the syntactic and semantic levels

Figure 10.14: Redesigned patient registration form for better balance.

Form fill in - the task level

- The task supported by a form fill in is simply feeding data into the system.

- A person requesting a service or product can either fill in a form directly or indirectly through an operator.
Form fillin - the task level

- The cost of erroneous data in the system is high for both the individual and the company.
- Detecting and correcting errors that have entered the system is extremely costly.
- Good HCI designs of form fill ins are those that above all reduce error and minimize effort.

Summary

- We have enumerated several HCI components but many others exist
- We looked at low-level components such as color and higher-level components such as menus and form fillins
- In all cases, we examined each component through the TSSL model (task, semantic, syntactic and lexical levels).
  - This model helps to relate the user's task to its implementation in human-computer interaction.
  - It lays the basis for examining the impact of a component on the user's cognitive and affective processes, and, thereby, on overt behavior.
Summary

We also applied some of the HCI guidelines elaborated in the previous chapter to the design of specific components.

The most important message however throughout the chapter is the strive to fit the component to the task at hand.