LECTURER: JOHN DOE

SPECIFICATION

SPECIFICATION
TOPIC OUTLINE

UNIT 2

SPECIFICATION OF USER INTERFACES (GUIS)

STUDY GOALS

- Describe the elements of a GUI specification that need to be considered.
- Explain what information needs to be specified for validation rules.
- State what dialog flows look like with UML state diagrams.

EXPLAIN SIMPLY

1. Name the typical elements of a GUI specification.
2. What characterizes atomic GUI elements?
3. Explain what role do constraints in the GUI specification play in the subsequent development of a software system?

ELEMENTS OF A GUI SPECIFICATION

- **User Interface**: Graphical user interface, which is the system interface used to communicate with users.
- **Operational systems**: Industrial information systems that support business processes. In the center of such systems the technical process, the representation, as well as change of technical objects are located.
- **Business objects** can be, for example: Entering travel data when booking a trip; displaying and changing customer data in an online store; recording application data for a new insurance policy.
- An **on-screen dialog** and **dialog masks** provide the opportunity to interact with the system and guide the user through the system.
- **Validation** ensures that when the user edits specialized data, the input is validated both technically and functionally.

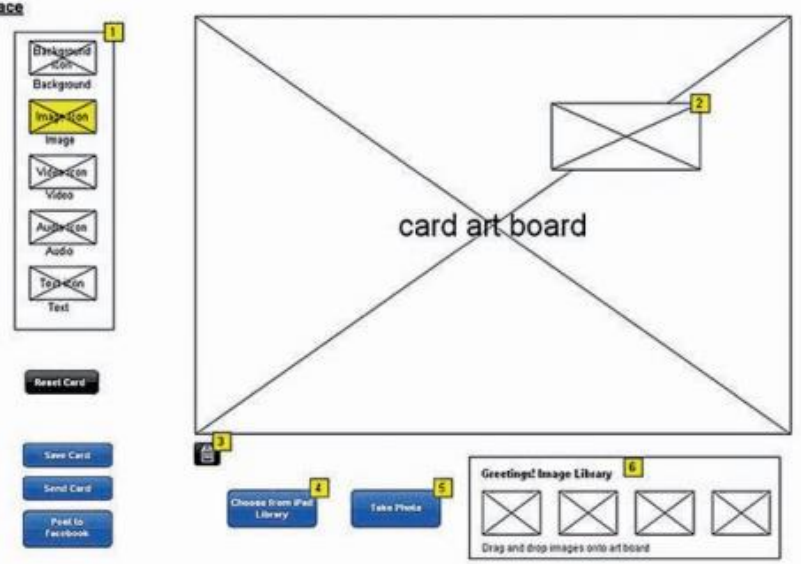
- A **complete GUI specification** includes: Each mask used in the workflow; the definition of the sequence of the masks; manual navigation options between masks; dialog flow conditions to control the flow; conversions; functional and technical validations.

ELEMENTS OF A GUI SPECIFICATION

Example of a GUI Prototype for a Tablet Application

1.3.2.2. Image

User Interface



Object Table

Footnote	Label	Description
1	Toolbar	If user taps image, s/he can add images from the Greetings! Image stock library, upload an image from his/her iPad Library or take a picture with the iPad camera.
2	image	Images can be pinched in and out to change the size. They can also be rotated by touching the image and angling their hand left and right.
3	trash can	To delete the image, user must drag and drop the image on the art board into the trash can.
4	Choose from iPad library button	user can select an image from his/her iPad Library
5	Take Photo button	utilizes the iPad 2 camera
6	Greetings! Stock Library	Images are dynamic with the selected category (e.g., displays birthday cards if user selected a birthday card).

Example of a Detailed GUI Prototype

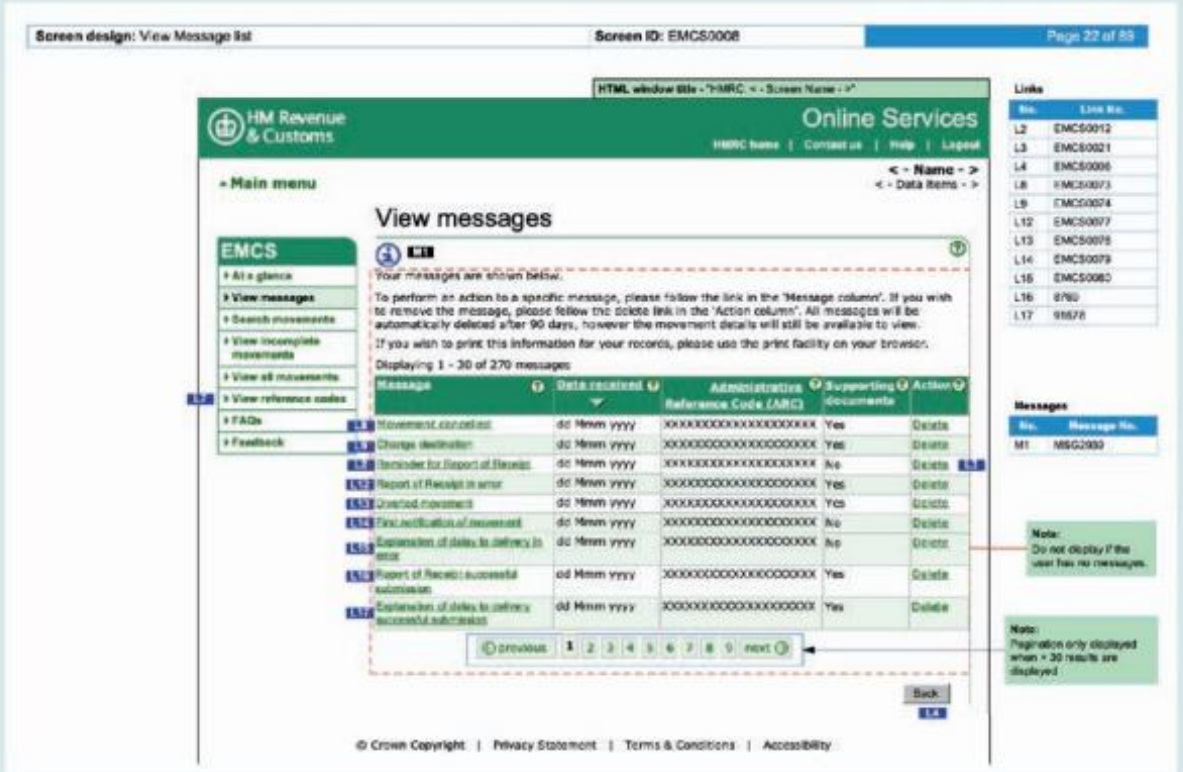


Image source: Coursebook.

ELEMENTS OF A GUI SPECIFICATION

Atomic GUI elements:

- Simple elements for displaying or editing individual values.
- Not to be further divided into individual elements.

Important atomic GUI elements:

- Label
- Text field
- Checkbox
- Drop-down field
- Multiline text field
- Button
- Link
- Image, Icon

Image source: Coursebook.

ELEMENTS OF A GUI SPECIFICATION

Composite elements:

- Elements that are composed of several atomic GUI elements.
- Serve to structure and clarify the user interface.

Examples of composite elements:

- Radio buttons
- Table
- Grouping

Image source: Coursebook.

ELEMENTS OF A GUI SPECIFICATION

Complex GUI elements:

- Elements for displaying and editing composite values or complex data structures.
- Display and validation logic is usually already implemented in the element.

Examples of atomic GUI elements:

- Calendar
- Tree menu
- Editor

Examples of a Complex GUI Component

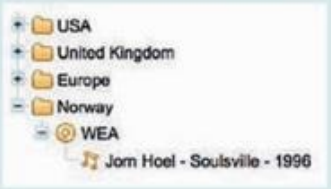
Title	Description	Example
Calendar	1. Intuitive input of date values ensures that only valid data are entered 2. Suitable for the input of dates	
Tree menu	1. Intuitive navigation through complex data structures 2. Suitable for navigating through data records or selectively accessing specific dialogs	
Editor	1. Complex component for entering formatted text including images and links 2. Suitable for editors of websites and other electronic documents	

Image source: Coursebook.

ELEMENTS OF A GUI SPECIFICATION

Mapping data types to input elements:

Data Types and Input Elements		
Data type	Description	Data input element
String: up to 1,000 characters	Short strings of characters	Text box or multi-line text box
Text (string): 1,000+ characters	Long strings of characters	Multi-line text box
Whole numbers (integer, long)	Values representing whole numbers. The only permitted characters are 0—9 and signs (where applicable).	Text box
Numbers (float, double)	Values representing numbers with a floating decimal point. The only permitted characters are 0—9, ".", and signs (where applicable).	Text box
Monetary amounts	Monetary amounts, typically with two places after the decimal point	Text box
Date	Date values, typically given as day, month, and year; plus the precise time, where applicable	Text box Calendar

Data type	Description	Data input element
Logical value (3-state Boolean)	Logical values (yes/no). The system also records whether this value was consciously entered by the user	Checkbox (yes/no only) Dropdown list (for 3-state Boolean) Option button
1-of-n selection: enumeration types (strings or numbers)	Select precisely one value from a list of predefined values.	Dropdown list Option button Multiple checkboxes
m-of-n selection: enumeration types (strings or numbers)	Select multiple values from a list of predefined values. Note: Often implemented with multiple individual selections.	Multiple checkboxes

Image source: Coursebook.

ELEMENTS OF A GUI SPECIFICATION

Mapping input elements to a possible read-only view:

Suggested Read-Only View for Input Elements	
Data input element	Data output elements
Text box	Simple text, automatically scaled down Empty text represented as "---"
Multi-line text box	Simple text, automatically scaled down, allowing for line breaks Empty text represented as "---"
Calendar and date input	Simple text, formatted, date format typically depends on the user's localization Empty date represented as "---"
Dropdown list	Simple text No selection represented as "---"
Option button and checkbox	Pre-defined labels or icons for each selected option

Image source: Coursebook.

VALIDATIONS

- A constraint, a validation rule, refers to the actual rule or conditions that will be evaluated by the system.
- Since a constraint should be unambiguously true or false, constraints are often formulated in the form of a Boolean expression.

The following validation types can be distinguished:

- Mandatory field validation: Checks whether a value has actually been entered.
- Conversion check: Checks whether the format of the user input is correct.
- Plausibility check: Checks whether the entries of individual fields violate technical conditions.

Image source: Coursebook.

NAVIGATION BETWEEN DIALOG BOXES

- Goal: Precise, unambiguous and human-readable description of all processes by the dialog.
- UML state diagrams are suitable for this purpose.

Elements of the UML state diagram:

- Start state
- Dialog mask (e.g., item page)
- Navigation (e.g., arrows)
- Trigger/triggered function (e.g., search button)
- Decision (e.g., order data successfully checked)
- Merge
- Final state

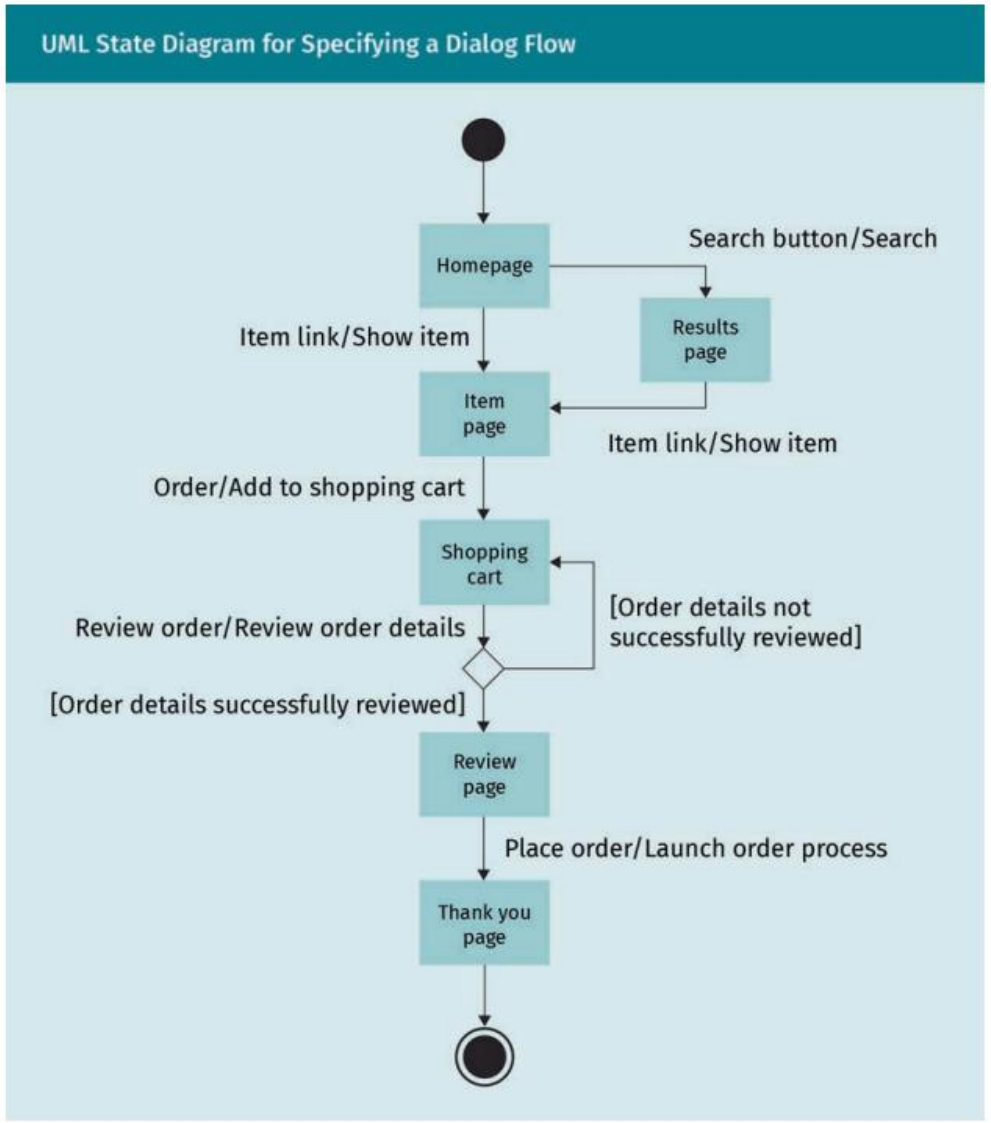


Image source: Coursebook.

REVIEW STUDY GOALS

- Describe the elements of a GUI specification that need to be considered.
- Explain what information needs to be specified for validation rules.
- State what dialog flows look like with UML state diagrams.

SESSION 2

TRANSFER TASK

Open the Deutsche Bank Travel Planning page:
https://reiseauskunft.bahn.de/bin/query.exe

1. For each element, specify whether it is atomic, composite, or complex.
2. Assign appropriate data types to the elements.
3. Represent the search and order process as a UML state diagram (final state: Login with customer account).

TRANSFER TASK
PRESENTATION OF THE RESULTS

Please present your results.

The results will be discussed in plenary.

1. A dialog flow ...
   a) … includes the dialog flow control as well as the dialog masks, depending on the functional status of the modeled business object.
   b) … includes dialog flow conditions that automatically control the sequence of dialog masks.
   c) … should not include the specification of manual navigation options except in exceptional cases.
   d) … can be specified using GUI prototypes and UML use case diagrams.

1. Which of the following statements is correct?
   a) GUI elements can be classified into different categories depending on the size or complexity of the individual elements.
   b) Atomic GUI elements cannot be broken down any further unless they are combined to form complex GUI elements.
   c) Composite elements can only be made up of other composite elements.
   d) Elements for inputting and outputting complex data structures are known as complex GUI elements. They do not generally contain any validation logic.

3. When specifying dialog flows, ...
   a) … it is important to ensure an appropriate documentation format for the current project situation. For example, GUI prototypes may only be used to illustrate complex GUI dialogs.
   b) … it is important to provide a precise, clear, machine-readable description of all potential operations through the dialog.
   c) … you can reduce the modeling complexity of state diagrams by generalizing standard navigations.
   d) … automatically activated navigations should only be considered in exceptional cases.

LIST OF SOURCES