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# Requirements-Analyse und -Spezifikation

## Assignment I

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## 1. Stakeholders

To gather additional requirements we want to present a list of all stakeholders we were able to identify.

Project manager (this would be our role)

### **Developer domain**

Hardware Developer (mobile technologies etc)

Software Developer (Designer, Analyst, Engineer, Tester)

### **User domain**

System end users

Power users and salespersons/technicians

### **Customer domain**

Marketing/product manager

Management

### **External domain**

Usability engineer

Marketing consultants

Contact persons from Hardware suppliers

External Regulators (FCC, Telekom-Control)

## 2. Methods for gathering requirements

We want to introduce four techniques, suitable to elicit requirements. After shortly explaining the technique we will also give information about the tools/preparation required to carry out the technique. The goal is to get an idea, how much effort/cost the actions will cause.

### 2.1 Interview

The interview is the most obvious way to get information about the requirements. We decided to cover the closed interview. The reason for this decision was that people tend to extravagate when talking about their mobile. Also many things concerning the functionality/usability of mobiles are already known so we want to ask out specific questions. So when doing a closed interview, you prepare a set of questions before. The partner is then confronted with you questions.

The typical cycle when doing a closed interview in our case would be:

#### **Acquire Contacts of typical end-users**

We will collect contact data for our target group from marketing agencies, or from associated telephone companies.

#### **Find a comfortable and nice location**

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## Freud & Leid plc

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It is very important that our interview partners are feeling well when we carry out our interview. So a ugly and cold bureau would be the wrong choice. The right place can be a lounge with comfortable chairs and convenient lighting. A café could also be a good choice. Generally we should also prepare some beverages and snacks.

### **Figure out a question set**

So what do we want to know from our potential users? We figured out the following questions:

- Do some small talk to melt the ice ;-)
- What is your experience with mobile phones?
- Which device do you currently own?
- Which one would you like to have?
- What is the best thing about your mobile?
- What is most annoying thing about your mobile?
- For which purposes do you use your device beside telephony?
- Which features of your device do you consider useless?

### **Send Invitations to the test persons**

Our Invitations will be friendly and polite. As an incentive, we will also give some compensation for the effort to participate in our program. This could be simply money, an invitation to lunch, or coupons for a mobile.

### **Carry out the Interview**

As mentioned above we will provide a nice atmosphere. We are polite and do not try to force our partner to any answer. It is very important that we are not suggestive when asking our questions.

### **Analyze the collected Data**

As we are no great mathematicians our statistics department will analyze the outcome of our interviews. Hopefully the will be some significant results, where we can derive some additional requirements from.

## 2.2 Workshop

This technique is often used to figure out general requirements with the customer. Many of our stakeholders should participate in such a workshop, because it is easier to figure out the customer's wishes. Also a good teamwork for the Project can be established with such an event.

### **Things needed:**

- A seminar room
- Flip charts
- Pin board
- Moderation tools (e.g. pins, sheets markers..)
- Laptop
- Beamer
- Digital camera for documentation
- A dummy of Freud 77
- Several other mobile phones of Freud 77's market segment.

There will be a general agenda for the workshop to assure that no important topics are left out. On the other hand the agenda should leave some space for creative working.

We would like the at least following **stakeholders** to attend our workshop, but it is also important that there are not to many participants because then the workshop would be hard to administrate and coordinate:

- Product manager
- Marketing manager
- Usability Expert
- SW Designer

Our facilitator leads through the whole workshop and takes care that the focus remains on the following **agenda**:

1. Brainstorming: What should the Freud 77 software be capable of?
2. Discussion: What would be useful additional functionalities?
3. Play: Go through prepared use cases. Ex with a paper prototype.
4. Screening: Try out other mobile phones handling/capabilities.
5. Discussion: How do the stakeholders use their own mobile?
6. Define responsibilities / contacts for the further cooperation.

Each of these points is supported by the moderation tools mentioned above. The whole workshop will take about one day, besides the official agenda the communication between the stakeholders is also very important and should be explicitly encouraged. At the end of the workshop the facilitator takes care of the documentation and compiles an summary with the outcome of the workshop, which is sent so every participant.

## 2.3 Scenarios

We figured out the following scenario to reveal existing inconsistencies. Scenarios should be small stories in which multiple use cases are represented. So we can see that a precondition for a scenario is that some use cases are already defined.

1. Gary's Freud 77 mobile is currently in the idle state.
2. The phone rings and Linda's number is displayed on the display
3. Gary presses the answer-button puts the devices to his ear and greets Linda.
4. Linda asks Gary for a number stored in his telephone book.
5. Gary says "Just a moment i'll look for it".
6. He takes the mobile of his ear and sees a symbol for the current call with Linda. He presses the Button to get to his address book.
7. After pressing the button he is not sure whether the call with Linda is still up, so hey asks "Are you still here?"
8. She agrees; Gary hears her voice out of the speaker.
9. Within the address book he navigates / scrolls to the number requested by Linda
10. Hey chooses the entry and sees the number.
11. Reading from the display he tells Linda the number and puts his mobile back to his ear to continue the conversation.
12. After finishing the conversation he presses the "hang up" button.

Out of this Scenario we can derive some **additional requirements** for the Freud 77 software.

- If there is an incoming call, and the number of the caller matches an entry in the address book the name and the number should be displayed.
- It must be possible to use speaker and microphone within a distance of a few centimeters.
- If the user presses a button (except the "hang up" button) during an active call there has to be a small

symbol indicating that the call is still up.

## 2.4 Prototyping

The last technique we want to describe is prototyping.

Here we have several possibilities to simulate the behavior and the look and feel of the final product without developing the whole software.

### **Paper prototyping:**

Several sheets of paper with images of the display/interface elements are handed out to the user. Depending on which action he likes to do he gets another sheet with the next state of the system on it.

The advantage of this method is that one can quickly draw/print out the images. Except for some graphics application there is no other technology required and you can fully concentrate on the design. A clear disadvantage is that the usage of the application with paper sheets is not very fluent for the test persons.

### **Online prototyping:**

Instead of printing out the graphics they are implemented as some sort of a webpage where the user interface (also realized as an image) provides links to the other stages of the application (image map). A more fluent use can be guaranteed and the test person has a better feeling for the application.

The last possibility is to develop the application itself within a GUI designer of a modern IDE. For the mobile phone software this will be rather hard so we will leave out this method.

We decided that the best way to simulate the application will be online prototyping because it is rather realistic and cost effective. We will develop the stages of our mobile application and then we will hand out some specific tasks to our users which they should try to complete using our prototype. We have chosen the following five use cases to be tested on the prototype:

1. Search for a phone number in the phonebook
2. Turn mobile phone off
3. Change Pin-Code
4. Take an incoming call
5. Save a phone number

### **For this sort of prototyping we will need:**

- Graphic artist /Illustrator
- Graphic Programs
- Web designer
- GUI Designer / Usability Expert
- Test machine where out test persons can access the prototype
- Person who takes care of logging the users actions
- Test persons out of the target group of end users

## 3. Use Cases (3)

The structure of these use case description has been taken from the following program:  
Rational RequisitePro [3]

### 3.1 Turn mobile phone on

#### 3.1.1 Brief Description

This use case describes how to turn the mobile on.  
Attention, this does not include the event of conveying the mobile phone from stand by to on.

#### 3.1.2 Flow of Events

##### Basic Flow

- a. The user takes the mobile
- b. The user presses the “on” Button for two seconds
- c. The mobile phone starts
- d. The display and the keyboard are enlightened
- e. A short welcome screen is shown for 3 seconds
- f. The “insert pin screen” is shown for interacting

#### 3.1.3 Special Requirements

A special requirement is the time which is necessary to boot the mobile phone, it must be as short as possible.  
Normally the start screen must be shown after an interval of 1.5 seconds, if it's more the user believes that a problem has occurred.

The start screen should be able to deactivate, first by net provider and further by the user

#### 3.1.4 Preconditions

##### The Status of the mobile is off

This use case is only for start status “off”, a possible standby status is an own use case with other requirements

##### Battery status

The battery must be loaded and insert in the right way.

#### 3.1.5 Post Conditions

##### Display output

On the display is shown the invitation for insert pin and the display and the keyboard is enlightened

## Status of mobile phone

The mobile phone is waiting for insert the pin and the algorithm to verify it is loaded.

### 3.1.6 Extension Points

#### Boot problem

- a. The user takes the mobile
- b. The user presses the “on” Button for two seconds
  - a. The mobile has have an boot problem
  - b. There is no reaction by the mobile phone

If it's possible a short error message should appear.

#### Battery empty

- a. The user takes the mobile
- b. The user presses the “on” button for two seconds
  - a. The mobile shows a message “low battery”
- c. The display and the keyboard are enlightened.
- d. A short welcome screen is shown for 3 seconds
- e. The “insert pin screen” is shown for interacting

The battery must have enough power left that a full system start is possible.

## 3.2 Turn mobile phone off

### 3.2.1 Brief Description

This Use case describes how to turn the mobile off.

### 3.2.2 Flow of Events

#### Basic Flow

- a. The user presses the “off” button
- b. The keyboard and the display are enlightened
- c. A stop screen is shown for 2 seconds
- d. The mobile phone initiates the shutdown process

### 3.2.3 Special Requirements

A special non functional requirement is the same then by starting the mobile phone, the time frame must be as short as possible, because users tend to be impatient. When shutting down the system the duration is not so important because the users mostly do not wait until the device is shut down but simply put it away.

### 3.2.4 Preconditions

#### **The Status of the mobile is on**

The mobile phone must be turned on.

#### **Status of the phone**

Currently there are no running calls and the user does not use the menu.

### 3.2.5 Post Conditions

#### **The mobile phone is off**

The mobile phone is fully shut down

### 3.2.6 Extension Points

#### **No light**

- a. The user presses the “off” button
  - a. The keyboard and the display are not enlightened
  - b. The system continues
- b. A Stop screen is shown for 2 seconds
  - a. The start screen is broken
- c. The mobile phone shuts down

If it's possible a short error message should be shown

#### **Shut down problem**

- a. The user presses the “off” button
- b. The keyboard and the display are enlightened
- c. A Stop screen is shown for 2 seconds
  - a. The mobile phone does not shut down
  - b. The user does a hard shut down by removing the battery

## **3.3 Enter Pin code**

### 3.3.1 Brief Description

To start the phone in a normal way (menu settings) the input of the pin is required to identify the user. Personal Identification Number

## 3.3.2 Flow of Events

### Basic Flow

- a. The user inserts four digits with the keyboard
- b. By pressing the first button the screen and the keyboard are enlightened
- c. By each digit insertion a "\*" is shown on the display
- d. After the fourth the mobile phone compares the inserted PIN to the PIN saved on the SIM card
- e. The phone checks activation for the common carrier on this specific phone
- f. If the PIN is okay, an okay-message is shown on the display
- g. The standard display screen is shown
- h. The mobile phone is ready for use

## 3.3.3 Special Requirements

For this use case are no non-functional requirements necessary.

## 3.3.4 Preconditions

### The mobile phone has correctly booted

The mobile phone must be correctly started, see also use case "Tune on the mobile phone". This is the rights status for the phone

### The SIM Card is insert

The SIM Card must insert in the card slot.

### The SIM Card is allowed on this phone

The SIM card must be activated from the common carrier and also the phone must be unlocked for this common carrier

## 3.3.5 Post Conditions

### The mobile phone is correctly logged in

The mobile phone is allowed to connect and ready for communication

### The mobile phone is ready for use

The mobile is ready for use and the display shows this status

## 3.3.6 Extension Points

## No clearance for this number from the common carrier

- a. The user inserts four digits with the keyboard
- b. By pressing the first button the screen and the keyboard enlightened
- c. By each digit insertion a “\*” is shown on the display
- d. After the fourth the mobile phone compares the inserted PIN to the PIN saved on the SIM card
- e. The phone checks activation for the common carrier on this specific phone
  - a. The number is locked, there is no activation allowed
  - b. Error message: please call your common carrier
  - c. The mobile phone is waiting

## No clearance from the mobile to this special common carrier

- a. The user inserts four digits with the keyboard
- b. By pressing the first button the screen and the keyboard enlightened
- c. By each digit insertion a “\*” is shown on the display
- d. After the fourth the mobile phone compares the inserted PIN to the PIN saved on the SIM card
- e. The phone checks activation for the common carrier on this specific phone
  - a. There is no clearance for this common carrier
  - b. The mobile phone is waiting

## 3.4 Change Pin-Code

### 3.4.1 Brief Description

Some time it's necessary to change the PIN code, maybe another number is easier to remember. It's important that only a person with the right permission can change this code

### 3.4.2 Flow of Events

#### Basic Flow

- a. The user presses the menu button
- b. The user navigates to the security menu
- c. The user searches for the menu entry “change PIN” an presses the “choose” button
- d. The mobile shows “please insert your old pin” on the display
- e. The user inserts it in the right way
- f. The mobile checks it
- g. The mobile shows “please insert your new pin please” on the display.
- h. The user inserts his desired new PIN
- i. The mobile shows “reinsert your new pin please” on the display.
- j. The user reinserts his pin.
- k. The mobile checks matching
- l. The mobile shows “your pin is successfully changed” on the display,
- m. The mobile returns to the standard screen and waits for interaction

### 3.4.3 Special Requirements

For this use case it's necessary that the mobile phone escorts the user very well during this scenario, specially it's very important that the user is informed about the status, like; is pin my code changed or not!!!

### 3.4.4 Preconditions

#### **The mobile phone must be on**

The mobile phone must be on and ready for use

#### **Different conditions are possible**

The mobile phone could be in standard status  
Or it's also possible that the user is in the menu and starts from there

### 3.4.5 Post Conditions

#### **The Pin Code is changed**

The change of the PIN ends with a correctly changed PIN an is ready for new interaction

#### **The Pin Code isn't changed**

There was a problem while changing the PIN and the user is informed about the failure. (It's very important that the user is informed about this failure -> the next PIN insertion is coming soon

### 3.4.6 Extension Points

#### **No correct old PIN**

- a. The user presses the menu button
- b. The user navigates to the security menu
- c. The user searches for the menu point "change PIN" an presses the "choose" button
- d. The mobile shows on the display, please insert your old pin
- e. The user inserts it in the right way
- f. The mobile checks them
  - a. The PIN is incorrect
  - b. The mobile show on the display, this pin is wrong, please reinsert the right pin
  - c. The user insert the PIN, if correct go on, if false the phone goes to the end
- g. The mobile shows on the display, "please insert your new PIN"
- h. The user inserts his new desired PIN
- i. The mobile shows on the display, "please reinsert your new PIN"
- j. The user reinserts his pin
- k. The mobile checks matching
- l. The mobile shows on the display, "your PIN is changed".
- m. The mobile returns to standard screen and waits for interaction

## The user inserts a too short PIN

- a. The user presses the menu button
- b. The user navigates to the security menu
- c. The user searches for the menu entry “change PIN” and presses the “choose” button
- d. The mobile shows on the display, “please insert your old pin”
- e. The user inserts it in the right way
- f. The mobile checks it
- g. The mobile shows on the display, “please insert your new pin”
- h. The user insert a new desired pin
  - a. The user inserts only 1 to 3 numbers but four a required
  - b. The mobile phone is waiting
  - c. After two minutes the phone stops interaction and returns to the start point

## The user inserts a new PIN with wrong digits

- a. The user presses the menu button
- b. The user navigates to the security menu
- c. The user search for the menu point “PIN change” and presses the “choose” button
- d. The mobile shows on the display, “please insert your old pin”
- e. The user inserts them in the right way
- f. The mobile checks them
- g. The mobile shows on the display, “please insert your new pin”
- h. The user inserts his new desired pin
- i. The mobile shows on the display, “please reinsert your new pin”
- j. The user reinserts his pin
- k. The mobile checks matching and validation
  - a. There is a wrong special character in the PIN
  - b. The mobile write out, please enter only a PIN within the numbers zero to nine
  - c. The user inserts a new desired pin
  - d. The mobile shows on the display, “please reinsert your new pin”
  - e. The user reinserts his pin
  - f. The mobile checks matching
- l. The mobile shows on the display, “your pin is changed”.
- m. The mobile returns to the standard screen and waits for interaction

## 3.5 Take an incoming call

### 3.5.1 Brief Description

This is the standard use case also for a nowadays mobile phone, there are more and more features, by the almost important is phone calling.

## 3.5.2 Flow of Events

### Basic Flow

- a. The mobile phone rings or the vibrator is activated
- b. On the display is the number or name of the incoming call shown
- c. The user presses the “take call” button
- d. The mobile phone activates the call

## 3.5.3 Special Requirements

A non functional requirement is that the reaction time is short. The time between receiving the incoming call and the first ring or vibration should be as short as possible, and the phone number must be shown at the same time. During an ongoing phone call it must be possible to interact with the phone in a normal way (reaction time) e.g. for entering a phone number.

## 3.5.4 Preconditions

### The Status of the mobile is on

The mobile phone must be on.

### The SIM Card must be activate

The SIM card must be activated an correctly logged in by the common carrier

### The right Pin is insert

The Pin must be correctly inserted.

## 3.5.5 Post Conditions

### The phone call is started

The phone call is established and the communication can be started

## 3.5.6 Extension Points

### Low battery

- a. The mobile phone rings and the vibrator is activated
  - a. On each of this steps the phone could send an error message, low battery
  - b. This message must be repeated three times
  - c. After this, the system stops hard
- b. On the display is shown the number or name of the incoming call
- c. The user presses the “take call” button
- d. The mobile phone activates the call

At this extension Point it's necessary to know that an incoming call needs much power an so it is important that the user is informed as soon as possible.

## 3.6 Save a phone number

### 3.6.1 Brief Description

The user wants to save a new phone number into the integrated phonebook of his mobile phone.

### 3.6.2 Flow of Events

#### Basic Flow

- a. The user takes out his mobile phone and calls up the function phonebook of his mobile.
  - a. The user can not find the option to enter a new contact
- b. He selects the option to enter a new contact
- c. The mobile presents a form to the user with the different values to enter
- d. The user enters the now phone number into the first, pre-selected form field
- e. After approving the first value the user enters the name of the new contact
  - a. The user has entered a wrong value and wants to correct it
- f. After approving the name the user can input additional information, like email addresses or company name in the additional form fields.
  - a. The user has entered a wrong value and wants to correct it
- g. After entering the last dataset the user can leave the phonebook and the new contact is saved automatically
  - a. The user decides to discard all the entered data and only wants to get out of the form

### 3.6.3 Special Requirements

A non functional requirement is that the reaction time is short. It must be very easy for the user to navigate in the different form fields to enter his values.

### 3.6.4 Preconditions

#### The Status of the mobile is on

The mobile phone must be on.

#### The SIM Card must be activate

The SIM card must be activated an correctly logged in by the common carrier

#### The right Pin is insert

The Pin must be correctly inserted.

## 3.6.5 Post Conditions

### **The phone number is saved**

The entered phone number and the associated name are stored on the SIM of the mobile phone.

## 3.6.6 Extension Point

None.

# 3.7 Search for a phone number in the phonebook

## 3.7.1 Brief Description

The user wants to search for a phone number in the phonebook of his mobile phone.

## 3.7.2 Flow of Events

### **Basic Flow**

- a. The user takes out his mobile phone and calls up the function phonebook of his mobile.
- b. He selects the option to search for a contact
  - a. The user can not find the option to search for a contact
- c. The mobile presents a form to the user where he can enter the name of the contact so search for
- d. The user enters now the name into the pre-selected form field
  - a. The user has entered a wrong value and wants to correct it
- e. After approving the entered value the mobile phone shows a processing/waiting screen
- f. The results are presented to the user in the a form of a listing of all matches
  - a. There are no matches
  - b. The phone allows the user to redefine his search term
- g. The user uses the navigation buttons to select the wanted result set
  - a. The user decides to discard the search and only wants to get out of search feature
- h. The mobile phone now presents a selection of different option for the user e.g. calling the number, send a SMS to the number, ...

## 3.7.3 Special Requirements

An non functional requirement is that the search time is short. It must be very easy for the user to navigate in the different form fields to enter his values. There should also be some kind of fuzzy logic for finding matches, in case the user mistypes his search term.

## 3.7.4 Preconditions

### **The Status of the mobile is on**

The mobile phone must be on.

## **The SIM Card must be activate**

The SIM card must be activated an correctly logged in by the common carrier

## **The right Pin is insert**

The Pin must be correctly inserted.

### *3.7.5 Post Conditions*

## **The phone number is found and presented on the display**

The phone number, which the user was searching for is presented on the display and the user can now select different option, like beginning a call or sending SMS.

### *3.7.6 Extension Points*

None.

## **3.8 Delete a phone number in the phonebook**

### *3.8.1 Brief Description*

The user wants to delete a phone number from the integrated phonebook of his mobile phone.

### *3.8.2 Flow of Events*

#### **Basic Flow**

- a. The user takes out his mobile phone and calls up the function phonebook of his mobile.
- b. The user selects the contact he wants to delete in his phonebook
  - a. The user can not find the contact to delete
- c. The user selects the “delete” option in the available menu or presses a specific button to initiate the delete action
  - a. The user can not find the option to delete a contact/number
- d. Before finally deleting the number/contact the user must confirm the delete action
  - a. The user does not confirm the delete process
  - b. The phone automatically cancels the delete process after a specified timeout value
- e. The contact is delete from the phonebook

### *3.8.3 Special Requirements*

It must be assured that a phone number is only deleted if a user really wants to do this.

## 3.8.4 Preconditions

### **The Status of the mobile is on**

The mobile phone must be on.

### **The SIM Card must be activate**

The SIM card must be activated an correctly logged in by the common carrier

### **The right Pin is insert**

The Pin must be correctly inserted.

### **The phone number is stored in the phonebook**

The phone number must be stored in the phonebook to delete it.

## 3.8.5 Post Conditions

### **The phonenumber is deleted from the SIM card**

The selected phone number has to be cleared of the SIM card when the user selects the delete function.

## 3.8.6 Extension Points

None.

# 3.9 Set the mobile phones internal clock

## 3.9.1 Brief Description

The user wants to set/change the internal clock of his mobile phone.

## 3.9.2 Flow of Events

### **Basic Flow**

- a. The user takes out his mobile phone and calls up the options menu of his mobile phone
  - a. The user can not find the options menu
- b. He selects the option to set/change the time/date settings
  - a. The user can not find the menu entry for set/change the time settings
- c. The mobile presents a input form to the user for changing the date/time values

- a. The user has entered an invalid value
- b. The phone request from the user to re-enter a valid time/date
- d. The phone requests confirmation from the user if he really wants to change the time/date
- e. After approving the confirmation by the user the new clock values are applied.
- f. The phone returns to the options menu

### 3.9.3 *Special Requirements*

For this use case are no non functional requirements necessary.

### 3.9.4 *Preconditions*

#### **The Status of the mobile is on**

The mobile phone must be on.

### 3.9.5 *Post Conditions*

#### **The internal clock time is set/changed**

The date/time of the phones internal clock is set to the user supplied value.

### 3.9.6 *Extension Points*

It would be a valuable feature if the mobile phone would be able to acquire the actual time via the cell phones providers network.

## **3.10 Create a new Short Message**

### 3.10.1 *Brief Description*

The user wants to create a new SMS with his mobile phone; he does not want to send it right now.

### 3.10.2 *Flow of Events*

#### **Basic Flow**

- a. The user takes out his mobile phone and calls up the “Send SMS” of his mobile phone, this is done via a specific combination of keyboard inputs
- b. The user can now enter a message, he uses the phones keyboard to enter his message, the user can change capitalization via a special keyboard button
- c. The user has finished entering his message and now wants to define where the message should be sent to.
  - a. The user decides to discard the message
- d. The phone requests the user to input the recipients phone number
- e. The user enters the recipients phone number with the keyboard

- a. The recipients number is stored in the internal phonebook and the user wants to select it from there
- b. The user uses the “search for phone number” function to find the needed contact
- f. The phone asks the user if he wants to send the message immediately or if he wants to save it right now
- g. The user wants to save the message right now and does not want to send it immediately

### 3.10.3 Special Requirements

For this use case are no non functional requirements necessary.

### 3.10.4 Preconditions

#### **The Status of the mobile is on**

The mobile phone must be on.

#### **The SIM Card must be activate**

The SIM card must be activated and correctly logged in by the common carrier

#### **The right Pin is insert**

The Pin must be correctly inserted.

### 3.10.5 Post Conditions

#### **The SMS is stored in the mobile phones memory**

All the text the user has input and the recipient’s number are stored in the mobile phones memory, and are ready for sending at a later time.

### 3.10.6 Extension Points

Different techniques for speeding up the text input process could be added, e.g. the very popular “T9” feature.

## 3.11 Send a SMS

### 3.11.1 Brief Description

The user wants to send a SMS with his mobile phone; the SMS text and recipient can already be stored in the mobile phone

## 3.11.2 Flow of Events

### Basic Flow

- a. The user takes out his mobile phone and calls up the “Send SMS” of his mobile phone, this is done via a specific combination of keyboard inputs
- b. The user can now enter a message, he uses the phones keyboard to enter his message, the user can change capitalization via a special keyboard button
  - a. The user wants to recall a stored text from the mobiles phone memory
  - b. The mobile phone presents a selection of all stored texts/templates
  - c. The end user selects the wanted template an confirms his selection
- c. The user has finished entering his message and now wants to define where the message should be sent to.
  - a. The user decides to discard the message
- d. The phone requests the user to input the recipients phone number
- e. The user enters the recipients phone number with the keyboard
  - a. The phone number is already stored in the selected template, so the user has not to enter anything and can immediately proceed to the next screen.
- f. The phone asks the user if he wants to send the message immediately or if he wants to save it right now
- g. The user wants to send the message right now.
- h. The phone asks the user if he is sure, about sending the message.
- i. The user confirms that he wants to send the message.
- j. The mobile phone adds the actual date and time to the message and sends it via the providers SMS gateway.

## 3.11.3 Special Requirements

For this use case are no non functional requirements necessary.

## 3.11.4 Preconditions

### The Status of the mobile is on

The mobile phone must be on.

### The SIM Card must be activate

The SIM card must be activated an correctly logged in by the common carrier

### The right Pin is insert

The Pin must be correctly inserted.

### The mobile phone is connected to he providers network

The mobile phone must be connected to the providers network to send the SMS, otherwise the transmission will fail.

## 3.11.5 Post Conditions

## **The SMS is sent to the recipient**

All the text the user has input is sent to the user supplied recipient's number. The sent message includes the sending date and time.

### *3.11.6 Extension Points*

None

## **3.12 Show Battery status**

### *3.12.1 Brief Description*

The user wants to see the status of the mobile phones battery.

### *3.12.2 Flow of Events*

#### **Basic Flow**

- a. The mobile phone is powered on.
- b. The user presses a special keyboard combination to activate the battery status display
- c. The mobile phone presents a graphical and textual presentation of the battery status
- d. After a timeout value of 10 seconds the standard display screen is displayed again

### *3.12.3 Special Requirements*

The battery status display should not be too optimistic about the remaining battery power.

### *3.12.4 Preconditions*

#### **The Status of the mobile is on**

The mobile phone must be on.

### *3.12.5 Post Conditions*

#### **The battery status is displayed**

The battery status is displayed to the end user for a certain amount of time.

### *3.12.6 Extension Points*

None.

## 3.13 Turn vibrator on

### 3.13.1 Brief Description

The user wants to turn on the vibrator feature of his mobile phone.

### 3.13.2 Flow of Events

#### Basic Flow

- e. The mobile phone is powered on.
- f. The user presses a special keyboard combination to activate the vibrator mode.
- g. The mobile phone shows via a status display that the internal speaker is now turned off and that the vibrator is being activated
- h. After a timeout value of 5 seconds the standard display screen is displayed again

### 3.13.3 Special Requirements

The vibrator should be as powerful as possible, but it should not drain too much of the battery power.

### 3.13.4 Preconditions

#### The Status of the mobile is on

The mobile phone must be on.

### 3.13.5 Post Conditions

#### The vibrator status is changed

The status of the vibrator is changed to on and the internal speaker is deactivated.

### 3.13.6 Extension Points

None.

## 3.14 Turn vibrator off

### 3.14.1 Brief Description

The user wants to turn off the vibrator feature of his mobile phone.

## 3.14.2 Flow of Events

### Basic Flow

- i. The mobile phone is powered on.
- j. The user presses a special keyboard combination to de-activate the vibrator mode.
- k. The mobile phone shows via a status display that the internal speaker is now turned on again and that the vibrator is being de-activated
- l. After a timeout value of 5 seconds the standard display screen is displayed again

## 3.14.3 Special Requirements

None.

## 3.14.4 Preconditions

### The Status of the mobile is on

The mobile phone must be on.

## 3.14.5 Post Conditions

### The vibrator status is changed

The status of the vibrator is changed to off and the internal speaker is activated. Any incoming events should be announced via the speaker.

## 3.14.6 Extension Points

None.

## 4. Questions that are left out by use cases

Based on [2] we want to provide some thoughts about parts of the Freud 77 mobile that cannot be captured using use cases.

As we all know use cases represent the flow of actions in which a user interacts with the system. In the primary way they are about objects and how the user interacts with them. One of the major concepts of use cases is information hiding therefore important aspects of our target system are left out.

Below we want to give some examples which parts / aspects do not have a clear representation within use cases:

- The way the Freud 77 mobile looks is not described in use cases, though it is a very important issue.
- The physical usability of the mobile is not represented in use cases. E.g. the size of the buttons and so on.
- In general most of the non-functional requirements such as weight, display luminance, material do not appear in use cases.
- Also the usability of the software is not described in the use cases. E.g. the menu hierarchy, the sort of icons used or the text size.
- Further use cases are not suitable to show the back-end implementation of the functions. For example the sorting algorithm used to sort the telephone book or the table in which contacts are stored on the SIM card.
- Generally which technology or material is used for realizing a product is not stated in use cases, but it also affects the impression or even the price of the product. In case of mobiles the decision can be: plastic, aluminum or magnesium?
- Accidental error situations are obviously described with use cases. But when one starts in the fine sorted object oriented world there are not many error objects introduced (especially external ones). So what happens if the battery supplies no power in a certain state of the system (for example the phone is currently writing on the SIM card), or what is the behavior if the device is in rough conditions (for instance at -30°)

The issues listed above do not disqualify the use case technique, but they show the effects of the information hiding concept.

We also see that use cases are strongly behavior/object-oriented remembering the old sentence “The nouns are the objects, the verbs are the functions”. But what about the adjectives? They have to be specified within another section of the requirements document.

As a system developer one also has to take care of the hidden elements. Just imagine a mobile where all use cases are perfectly realized, but the device has a weight of 5 kg. So the conclusions are:

“Information hiding is good for preserving the overview”  
“Hiding information does not mean that it is not important”

## 5. A Process description for the software of a mobile phone

To design software for a mobile phone is a little bit tricky, there are some main difference form standard Software designing.

- a. Short period from idea to the concrete implementation
- b. As many as possible features which are interesting for the user
- c. As less as possible features to make it ready to use
- d. With a small number of keys a navigation that is easy to use
- e. The mobile must by usable for a broad variety of customers

### 5.1 A cookbook for a new mobile phone software based on Freud 77

This set of activities should be described with concrete requirements process.

Like each process this should also transfer input into output.

There are five standard input factors that are also important for this RE process. In this part of the document a global description should figure out the main points. This is necessary to describe a framework for the mobile phone software RE Process.

A change of this framework should be a strategic one and affect a longer time period. Only changes in the requirements on the stakeholder “user” should be tactical and as short possible.

Encapsulate stable from unstable requirement sets

#### 5.1.1 Input factors

By developing software for mobile phones, this should be the first global step, this part should be reworked by every new software concept but the changes could be smaller and smoother

#### Existing system information

Figure out the interfaces to the hardware part of the mobile phone, describe them as exactly as possible. If the hardware changes only check for the changes, the most interfaces are same an so its an part to accelerate the development process.

#### Stakeholder needs

The most of the stakeholder have only small changes in there requirements, for example a manager would not change the whole requirements set. But be careful about some special Stakeholder like Marketing and also the user of the mobile. There are more unstable in there Requirement sets.

#### Organisational standards

This is the most static input factor. Figure out the requirement set and audit them regularly.

## Regulations

There are many regulations for a contemporary mobile phone, most of them are important for hardware issues but some of them are also important for the software side. The advantage of these requirements set is the static behavior. Changes are rare and they were correctly described a long period before they were implemented. One example could be: changing the encoding standards for transaction.

## 5.2 Some Guidelines

By evaluation this Document we do some exercises which should be changed by the next evaluation step

### 5.2.1 Document structure

For “static” requirement engineering that we figure out in point “Input factors” a standard use case document like this is enough

The majority of the results are static or the changes are small. But it will be a great problem for requirements of users and marketing experts. They are constantly changing and the only solution could be a software package like Requisite Pro. A very special problem with version control could be solved.

And under this background to harmonize the document structure all requirements (static and agile) should be solved in a tool like this.

### 5.2.2 Requirements management

Requirements of stakeholders like common carrier or technique changes should be stakeholder driven, this means, if one of these stakeholders releases an change or an update, a new requirements engineering process should be initiated

For stakeholders like marketing and end-user there are two models possible.

The Marketing section figures out a new strategy for a specially market segment and by the same time a new requirements engineering process must be initiated.

### 5.2.3 Elicit techniques

For stakeholders that permanently integrated in the process the most likely and target-oriented techniques would be open or closed interviews for global problems and workshops for special problems.

For end users it's a little trickier. For consistence enhancement especially basic requirements scenarios are the best way, but they must be permanently updated with other techniques.

For more detailed requirements description, techniques like workshops and interviews are suitable. This solves two problems at once and at acceptable costs.

The user scenarios could be updated with new impressions and deeper in formations.

### 5.2.4 Quality needs

Working documents are highly vulnerable for decreasing quality. To solve this problem each document should be fully reworked every year.

This doesn't mean to ditch the whole documents, but rather a rework step by step. Audit precondition and if they are proper, reuse them, they are pure money.

## **6. Souces**

- [1] Lectures one to three from Pascal Fenkam
- [2] Edward V. Berard, The Object Agency, Inc; Be Careful With "Use Cases"
- [3] Rational RequisitePro Evaluation Assembly V2003.06.13