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IESE-Report No. 061.12/E  
Version 1.0  
May 17, 2012

A publication by Fraunhofer IESE

TravelApp mConcAppt Interaction Concept Documentation

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Abstract

This document comprises results from the first requirements workshop on the TravelApp conducted at the Fraunhofer IESE on November 18th 2011. The primary target of the TravelApp is to support employees to create their travel expense report after a business trip. In addition TravelApp will be presented at the CeBIT 2012 as an example showing the software engineering approach at Fraunhofer IESE.

**Keywords:** CeBIT 2012, mConcAppt, mobile, requirements workshop, interaction design, TravelApp

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# Introduction

This document comprises results from the first requirements workshop on the TravelApp conducted at the Fraunhofer IESE on November 18th. The primary target of TravelApp is to support employees to create their travel expense report after a business trip. In addition TravelApp will be presented at the CeBIT 2012 as an example showing the way of software engineering at Fraunhofer IESE.

At the beginning of this document we describe identified stakeholders. In addition, prospective users of the system are described in detail by creating a User Persona. Based on that the as-is and the to-be situation of creating a travel expense report at Fraunhofer IESE will be explained. Those explanations are leading to interaction cases, responsible for the purposed interaction design. Mockups and their description conclude this document.

# Usage Context

As a team leader at Fraunhofer IESE, Mike (see 3.2) is used to spend about 40% of working time on business travels. To fill out the form of a travel expense report, Mike needs a lot of detailed information about his last travel. Unfortunately, he usually isn’t able or doesn’t remember to write down all the required information as arrival and departure times, traveled distances, and an exact timesheet of his customer appointment during business travels. After arriving at Fraunhofer IESE from a business trip, he is usually very busy performing his day to day business and recapture work of the business trip. This circumstance hinders him from filling out the travel expense report immediately after arriving in the office. The next day Mike starts to fill in the travel expense report, but lots of information isn’t clear because he doesn’t remember the exact times or other detailed information. In addition Mike has to spend a lot of time for filling out the report. In case of that his daily business is postponed and he is unsatisfied with the overall overhead workload.

Assumption: Using a mobile device collecting required data for the travel expense report should reduce the cognitive load and supports Mike by filling out the required form later. Automatic collection of required data would also reduce time effort for expense reporting significantly.

# Stakeholder Description

## Stakeholders and Goals

One major general aim of TravelApp is presentation of the app at CeBIT 2012. Therefore, the app isn’t solely focusing on actual user requirements. Internal interest of Fraunhofer IESE are considered and prioritized in order to achieve a good representation at the exhibition. The considered stakeholders during app conception are significantly extended by stakeholder that are responsible for representation at CeBIT 2012.

|  |  |  |
| --- | --- | --- |
| Stakeholder Name | Stakeholder Role | Stakeholder Main Goals |
| Developer | Develops the system | Engineering an information system, representing competences of Fraunhofer IESE; Meeting the deadline (CeBIT 2012) |
| Travel management | Uses the output of the system | Simplify subsequent processing of travel expense reports; time savings; receiving all required data from a business travel at once |
| User (IESE MAB) | Main user | Uses the system; simplifying travel expense reports; time savings; reducing cognitive load during and after business travels |
| CeBIT-Visitor (customer of IESE 🡪 prospective user) | User | Prospective user; integrating the system into their own infrastructure |
| IL | Decision maker | Good representation of Fraunhofer IESE’s competencies at CeBIT 2012; representation of Fraunhofer IESE USP’s |
| RA GoMobile | Develops the system | Implementation of the project; Testing and refining own methods of development; |
| Division Head IS | Decision maker | Good representation of Fraunhofer IESE’s competencies at CeBIT 2012; representation of Division USP’s |
| Department Head ISD | Decision maker | Good representation of Fraunhofer IESE’s competencies at CeBIT 2012; representation of Department USP’s |
| Business Area Manager | Represents Fraunhofer IESE and its products | Customer acquisition; distribution of products and competencies |

Table 1: Stakeholders and Goals

## User Persona



Figure 1: User Persona

**User Goal „Spending as much time as possible with main tasks“**

**Description:** Reducing the average time of filling out a travel expense report provides Mike more time for his daily business and increases his efficiency at work.

**User Goal “Spending more time at team member care”**

**Description:** Spending less time on paperwork like travel expense reports gives Mike more opportunities for taking care about team members.

**User Goal “Fulfill TM processes”**

**Description:** To ease further processing of travel expense reports and to save time of TM colleagues, Mike wants to fill out the forms correct and in the way TM needs them.

# As-is Situation

At the beginning of this chapter a short description of the current as-is situation is given. After that the as-is situation will be explained in detail going through three typical scenarios of business travels and travel expense reports at Fraunhofer IESE.

## Description of the As-is Situation

Today each employee of Fraunhofer IESE has to fill out a travel expense report after business travels. Travel expense reports require detailed information about times, distances, and resulting costs during the travel. Due to lack of time, it is often not possible for employees to fill out travel expense reports during a business travel or immediately after arriving at Fraunhofer IESE. For that reason detailed information gets lost and the cognitive load is increased because of trying to remember all information until a travel expense report can be filled out.

In addition to information required for the travel expense report, all vouchers and bills about resulting costs from a business travel need to be collected too. Those must be added to the travel expense report. Because of digitalizing vouchers and bills by travel management using a scanner all documents need to be clued at a larger paper sheet.

In the case of a longer business travel, the itinerary needs to be summarized on a blank piece of paper too.

## As-is Situation Scenarios

|  |  |
| --- | --- |
| Item | Description |
| Context situation 1 | A one day business travel. Meeting an industrial partner (John Deere ETIC) in Kaiserslautern. Means of travel is a company vehicle of Fraunhofer IESE. |
| Precondition | The appointment is agreed by the customer. The business travel was requested in time and is approved. |
| Step 1 | Mike is looking for the right company vehicle |
| Step 2 | Mike gets the car key and driver’s logbook |
| Step 3 | Mike goes to the car and drives to ETIC (He should check the current mileage before departure but he doesn’t) |
| Step 4 | Mike arrives at ETIC. (Till now the following times should be known:   * Departure at Fraunhofer IESE * Arrival at ETIC * Beginning of customer appointment * Mileage of companies vehicle at departure |
| Step 5 | Mike successfully finished the customer appointment |
| Step 6 | Mike drives back to Fraunhofer IESE |
| Step 7 | Arriving at Fraunhofer IESE |
| Step 8 | Mike fills out the driver’s logbook |
| Step 9 | Mike is keeping the driven distance (12 km) in mind for later use in travel expense report |
| Step 10 | Mike delivers the car key and driver’s logbook. (In addition to the information described in step 4 mike needs to know the following things:   * End of customer appointment * Departure from the customer * Arriving at Fraunhofer IESE * Distance driven) |
| Step 11 | Fill out travel expense report (immediately after arriving at Fraunhofer IESE).  Information needed:   * Departure/Arrival at Fraunhofer IESE * Arrival/Departure at ETIC * Start/End of customer appointment * Amount of driven kilometers * Which company car was used * Catering not needed (crossing this field out on the form) * Signature and date |
| Step 12 | Optional bill of refueling needs to be filled out |
| Step 13 | Hand the travel expense report the secretary |
| Post condition | The secretary delivers the complete travel expense report to travel management (TM)for post processing |

Table 2: As-is Situation 1

|  |  |
| --- | --- |
| Item | Description |
| Context situation 2 | Mike and another employee (Gleb) are traveling to CeBIT 2012 in Hannover. The business travel starts at their home. Later they will use the train together traveling from Kaiserslautern to Hannover. |
| Precondition | The business travel was requested in time and is approved. Tickets and reservation for traveling with the train are already bought. Also tickets for CeBIT 2012. |
| Step 1 | Journey to main station Kaiserslautern   |  |  | | --- | --- | | Mike | Gleb | | Starting at 6:50 using a taxi | Starting at 6:55 using his own car | | 7 o’clock arriving at main station | 7 o’clock arriving at main station | |
| Step 2 | Train departs at 7 o’clock to Mannheim  During the trip:   * Looking for seat reservation * Ticket inspection   + Mike has to search for his ticket in his bag |
| Step 3 | 8:00 Arrival at Mannheim main station |
| Step 4 | 8:30 Departure Mannheim main station to Hannover exhibition site |
| Step 5 | 12:00 Arrival at Hannover exhibition site |
| Step 6 | Lunch at Mc Donalds |
| Step 7 | 13:00 – 17:00 Visiting CeBIT |
| Step 8 | Till 18:00 Dinner with colleagues |
| Step 9 | 20:00 Return to Kaiserslautern (train delays, late arrival) |
| Step 10 | 2:15 Arrival at Kaiserslautern main station |
| Step 11 | Driving home   |  |  | | --- | --- | | Mike | Gleb | | 2:15 Departure using a taxi | 2:15 Departure using his own car | | 2:25 Arrival at home | 2:20 Arrival at home | |
| Step 12 | Filling out travel expense report (earliest possible at the next day because of train delay)  Required information:   |  |  | | --- | --- | | Mike | Gleb | | * Departure/Arrival time (KL) * Start/End of business time * Information about the catering * Means of travel: Train (X), taxi (X) (with a rationale) * CeBIT-ticket (15 €) * Travel nr. * Date and signature | * Departure/Arrival time (KL) * Start/End of business time * Information about the catering * Means of travel: Train (X), own car (X) (with a rationale) * CeBIT-ticket (15 €) * Travel nr. * Date and signature | |
| Step 13 | Gluing bills and voucher on blank piece of paper (DIN A4) |
| Step 14 | Delivering travel expense reports and vouchers/bills to secretary |
| Post condition | Travel expense report completed, secretary delivers it to travel management |

Table 3: As-is Situation 2

|  |  |
| --- | --- |
| Item | Description |
| Context situation 3 | One week business travel to MobiCASE in California. The travel starts at Kaiserslautern. At the end of the business travel the employee stays one more day in California for holiday (private). |
| Precondition | The business travel was requested in time and is approved. Flight tickets and reservation for the hotel are already organized. Also tickets for exhibition. |
| Step 1 | D1: Using Rita’s Airport-Shuttle from KL 🡪 FRA |
| Step 2 | D1: Flight from FRA 🡪 LAX (Lunch 2 times during the flight) |
| Step 3 | D1: Share taxi from airport LA 🡪 Conference hotel |
| Step 4 | D2-D6:   1. Hotel (without breakfast) 2. Lunch at conference   Specials:  1x Evening event  3x Subway token |
| Step 5 | D7: (Monday) Holyday (private) |
| Step 6 | D8: Flight LAX 🡪 FRA |
| Step 7 | D9: Arrival at FRA airport |
| Step 8 | D9: Rental car FRA 🡪 KL |
| Step 9 | D9: Fueling |
| Step 10 | D9: Key handover to reception |
| Step 11 | D10: Travel expense report  Required information:   * Departure KL * Departure FRA * Arrival LAX * Time of crossing the border * Start/End of business activities * Departure LAX * Arrival FRA (time of crossing the border) * Departure FRA * Arrival KL * Detailed information about catering during the trip * Means of travel: Plane (X), taxi (X), rental car (X), others: AP shuttle (X) (all with rationale) * Participation fee (mobiCASE) * Costs for:   + Rental car and fuel   + Subway token   + Hotel   + Others (like internet fee in the hotel) * Date and signature |
| Step 12 | Gluing vouchers and bills on pieces of paper (size A4):   * 3 subway token (all on one piece of paper) * Rental car * Fuel * Hotel bill * Others (internet) |
| Step 13 | Summarizing the itinerary on an extra piece of paper |
| Step 14 | Other documents (SOS-Card, print out of the conference’s website) |
| Step 15 | Hand all documents the secretary |
| Post condition | Secretary delivers all documents to travel management for further handling |

Table 4: As-is Situation 3

## Problems in As-is Situation

* + - The travel expense report requires lots of information which aren’t captured during the business travel
    - In most cases filling out the travel expense report immediately after arriving isn’t possible (results in high cognitive load, because Mike has to remember lots of detailed information)
    - It takes a lot of time to create the travel expense report
    - Even business travels without any costs need to be reported
    - Digitalizing bills and vouchers take a lot of time (Gluing on pieces of paper 🡪 scanning)
    - Each employee fills out travel expense reports in his/her own way (e.g. crossing unused parts of the report). Causes more work at travel management postprocessing the reports.

# Product Philosophy

|  |  |
| --- | --- |
| Keyword | Description |
| unobtrusive | The app is unobtrusive because it collects lots of information by itself. The user has to start it once time at the beginning of a business trip and all required times are collected without any further interaction. The user just has to confirm them at the end of the trip. |
| integrated | The app is perfectly integrated in the business trip process of Fraunhofer IESE. |
| fast | All tasks (e.g. adding an artifact, confirming a time, getting information) are done very fast. The users are on the move so they can’t spent much time using the app. |
| supporting | The app acts as a reminder and collector. It supports the user at the creation of a travel expense report at the end of a business trip. |
| easy | The app should be easy to use. No instruction or help manual should be needed to use the functionality of the application. |
| automated | Lots of steps during the business process are done automatically by the application. The users just have to confirm particular steps. |
| correct | Collected data, information, and suggestions should always be as correct as possible to reduce manual adjustments by the users. |

Table 5: Product Philosophy

# To-be Situation

In most cases employees are carrying a mobile device with them during business travels. Using this mobile device for collecting required information and data eases the creation of travel expense reports. Therefore, the user can use functions provided by the mobile device. One example is to take a photo of a bill or a voucher and ‘attach’ it to other information about a business travel. Doing this will result in less time-consumption for the employee, because no more gluing is required and in reduced effort for travel management because of being able to skip the scanning process during travel expense report handling.

After collecting all artifacts (artifact in this case means: all required data and additional items like bills and vouchers) during a business travel the system supports the users evaluating the collected data and generates a travel expense report with that information. Because of system generated travel expense reports its output is standardized and easier to handle for the travel management.

|  |  |
| --- | --- |
| Item | Description |
| Context situation 1 | A business travel for one day. Meeting an industrial partner (John Deere ETIC) in Kaiserslautern. Means of travel is a company vehicle of Fraunhofer IESE. |
| Precondition | The appointment is agreed by the customer. The business travel was requested in time and is approved. |
| Step 1 | Mike starts TravelApp on his mobile device. The app shows him detailed information about his next business travel |
| Step 2 | Mike gets the car key and driver’s logbook |
| Step 3 | Mike goes to the car and drives to ETIC |
| Step 4 | Mike arrives at ETIC. The app collects data about the time of leaving Fraunhofer IESE and arriving at ETIC. After that TravelApp reminds Mike to enter the time of beginning and end of the customer appointment. |
| Step 5 | Mike successfully finished the customer appointment. Required time information was tagged without a big effort. |
| Step 6 | Mike drives back to Fraunhofer IESE |
| Step 7 | Arriving at Fraunhofer IESE. The app collects the time of arriving and reminds Mike to take another picture from current mileage. |
| Step 8 | Mike fills out the driver’s logbook. Because tracking the GPRS-positions of Mike, the application provides the amount of driven kilometers. |
| Step 9 | Mike delivers the car key and driver’s logbook. |
| Step 10 | Back at his office the app uploads the whole information. That gives Mike the chance to finish the travel expense report on his desktop computer. (Fill out travel expense report takes less time because of having all required information added to the business travel by the app.) |
| Step 12 | Optional: Mike takes a picture from the fueling bill. TravelApp adds it to Mike’s current business travel. |
| Step 13 | Mike promotes the travel expense report directly to travel management using his mobile device or desktop pc. |
| Post condition | Travel expense report is completed and delivered to travel management |

Table 6: To-be Situation 1

|  |  |
| --- | --- |
| Item | Description |
| Context situation 2 | Mike and another employee (Gleb) are traveling to CeBIT 2011 in Hannover. The business travel starts at their home. Later they will use the train together to travel from Kaiserslautern to Hannover. |
| Precondition | The business travel was requested in time and is approved. Tickets and reservation for traveling with the train are already bought and loaded on their mobile devices. Also tickets for CeBIT 2012.  TravelApp is started. |
| Step 1 | Journey to main station Kaiserslautern   |  |  | | --- | --- | | Mike | Gleb | | Starting at 6:50 using a taxi | Starting at 6:55 using his own car | | 7 o’clock arriving at main station | 7 o’clock arriving at main station | |
| Step 2 | Train departs at 7 o’clock 🡪 MA  During the trip:   * Looking for seat reservation * Ticket inspection   + TravelApp shows the train ticket   + Mike takes a picture from his taxi bill using his mobile device |
| Step 3 | 8:00 Arrival at MA main station |
| Step 4 | 8:30 Departure MA main station 🡪 HAN exhibition site |
| Step 5 | 12:00 Arrival at HAN exhibition site  Arrivals and departures are automatically collected by TravelApp. |
| Step 6 | Lunch at Mc Donalds. Taking a picture from the bill with TravelApp |
| Step 7 | 13:00 – 17:00 Visiting CeBIT  Required time information are collected by TravelApp |
| Step 8 | Till 18:00 Dinner with colleagues  Taking a picture from the bill. TravelApp adds it to the current business travel |
| Step 9 | 20:00 Returning to Kaiserslautern (train delays, late arrival) |
| Step 10 | 2:15 Arrival at KL main station |
| Step 11 | Driving home   |  |  | | --- | --- | | Mike | Gleb | | 2:15 Departure using a taxi | 2:15 Departure using his own car | | 2:25 Arrival at home | 2:20 Arrival at home | |
| Step 12 | Filling out travel expense report (earliest possible at the next day because of train delay) using mobile device or desktop pc.  Because of having all information collected with TravelApp no details are lost and the report is easily created. |
| Step 13 | The travel expense reports are forwarded directly to travel management using a mobile device or desktop pc. |
| Post condition | Travel expense report is completed and delivered to travel management |

Table 7: To-be Situation 2

|  |  |
| --- | --- |
| Item | Description |
| Context situation 3 | One week business travel to MobiCASE in California. The travel starts at Kaiserslautern. At the end of the business travel the employee stays one more day in California for holiday (private). |
| Precondition | The business travel was requested in time and is approved. Flight tickets and reservation for the hotel are already organized. Also tickets for exhibition. |
| Step 1 | D1: Using Rita’s Airport-Shuttle from KL 🡪 FRA (TravelApp collects required information automatically and reminds Mike to take a picture from the AP shuttle’s bill) |
| Step 2 | D1: Flight from FRA 🡪 LAX (Lunch 2 times during the flight) (during flight the mobile device has no connection. In most cases it is turned off.) |
| Step 3 | After arriving at LAX Mike turns his mobile device on. TravelApp collects data about arriving time and time of crossing the border. |
| Step 4 | D1: Share taxi from airport LA 🡪 Conference hotel |
| Step 5 | Mike takes a picture from the taxi bill |
| Step 6 | D2-D6:   1. Hotel (without breakfast) 2. Lunch at conference   Specials:  1x Evening event  3x Subway token (pictures with TravelApp are taken) |
| Step 7 | D7: (Monday) Holyday (private) this day is marked das private in the TravelApp |
| Step 8 | D8: Flight LAX 🡪 FRA |
| Step 9 | D9: Arrival at FRA airport |
| Step 10 | D9: Rental car FRA 🡪 KL  (during the travel from LAX 🡪 KL TravelApp collects all required information automatically) |
| Step 11 | D9: Fueling |
| Step 12 | Taking a picture from the fueling bill |
| Step 13 | D9: Key handover to reception |
| Step 14 | D10: Travel expense report  Back at his office the app uploads the whole information giving Mike the chance to finish the travel expense report on his desktop computer. (Fill out travel expense report takes less time because of having all required information added by the app.) |
| Step 15 | Summarizing the itinerary happens automatically because of all collected data from TravelApp |
| Step 16 | Other documents (SOS-Card, print out of the conference’s website) |
| Step 17 | The travel expense report were promoted directly to travel management using a mobile device or desktop pc. |
| Post condition | Travel expense report is completed and delivered to travel management |

Table 8: To-be Situation 3

# Solution

## Assumptions

The following assumptions are taken as a basis for the provided solution:

* + - Complex or time intensive tasks are not processed on the smartphone (e.g. long text input)
    - The itinerary is known and available in advance (on the mobile device)
    - The itinerary also represents the minimum requirement of data
    - The app is designed to provide the most benefit when it is used during the business trip
    - The focus of the application is to collect data and provide it in a structured way for post processing

## Key Solution Concepts

**Integrate the collection of artifacts into the ‘workflow’ of a business travel**

Lots of travel information is known in advance of a business trip for example the complete itinerary. The itinerary provides the basic information about the business trip, like departure times of trains or gate information of flights. In addition an itinerary provides the minimum of required data to create a travel expense report. The application is able to provide the complete itinerary including times, reservation and tickets booked in advance. This encourages the user to check travel information using the application. Sometimes he ‘has to’ use the application for example in case of a ticket inspection. Because of these circumstances the user often starts the application.

**Adding artifacts fast**

Collecting artifacts need to be fulfilled very fast. Therefore the app provides 1-tap-solutions for collecting common artifacts. For example if the user checks the time of the train ride, the application provides a possibility to ‘collect’ the time of departure very close to the information of train ride and with just one tap. This makes it very easy for the user to collect basic artifacts on-the-fly during a business trip.

To support the user at fast collection of artifacts, the starting behavior of the app differs depending on the context the user is in. If the app is started during a business travel all travel information are shown on the devices screen. And with the travel information the possibility to add artifacts is offered to the user.

**Adding artifacts**

Resulting costs (e.g. subway tickets, internet in the hotel) often appear during business travels. The user must be able to add artifacts to a travel which are not in the list provided from the travel management.

**App content/data is provided by an external system**

All required data is provided by an external system. This includes not only the information of a specific business travel. Artifact types in general are provided from an external system too. This makes the application very flexible and easy to be updated.

**Process validation**

Generating validated travel expense reports is important for the travel management (for further handling) and the user (not writing a report twice because of rejection). The application provides the possibility to check the current status of artifact collection against the required data. The application shows which artifacts are not collected but required and offer a solution to add them.

**Generating travel expense reports by the system**

Based on the collected information, the app offers the possibility to create travel expense reports. That report can be submitted directly to travel management or send to a printer. If more employees participate in a business trip the travel expense report and all the artifacts can be shared between the employees. This makes it obsolete that all of the participants have to collect the information.

**Tasks should fit the device**

Because of a smartphone is not the best choice for complex task fulfillment (like long text entries) the creation of the travel expense report is not the focus of the application. Lots of users will use their desktop pc or a more suitable device like a tablet-pc for the completion of a travel expense report. To support multiple devices during the process of a travel expense report creation collected data should not only be saved on the mobile device itself. Using a decentralized data storage (e.g. iCloud for iOS-devices) makes it very easy for the user to synchronize the collected data and to choose the best fitting device for the current task.

## Main System Functions

|  |  |
| --- | --- |
| Item | Description |
| ID | SF1 |
| Name | Get travel information |
| Input data | Material provided by the backend |
| Precondition | Travel management entered information |
| Description | 1 The app connects to the backend  2 The backend authenticates the user and provides all travel information  3 The app downloads all travel information and stores it on the device |
| Exception | Interrupted connection |
| Business rules | - |
| Quality requirements | Interrupted downloads can be resumed |
| Output data | Travel information |
| Post condition | All travel information are downloaded |

Table 9: Main System Function SF1

|  |  |
| --- | --- |
| Item | Description |
| ID | SF2 |
| Name | Add artifacts (fast) |
| Input data | - |
| Precondition | Travel management entered information, the artifact the user wants to add is in the list of travel information |
| Description | 1 The app shows all travel information and artifacts  2 The app offers a direct solution using functionalities of the mobile device to collect the artifact (e.g. camera) |
| Exception | Interrupted by an incoming call |
| Business rules | - |
| Quality requirements | After an interrupt the app resumes at the last state before the interrupt |
| Output data | Required artifact |
| Post condition | The artifact is collected and added to the travel information |

Table 10: Main System Function SF2

|  |  |
| --- | --- |
| Item | Description |
| ID | SF3 |
| Name | Add other artifacts |
| Input data | A list of possible artifacts provided by travel management |
| Precondition | Travel management entered information a list of artifacts is available on the backend |
| Description | 1 The app request general information from the backend  2 The backend transmits general information to the app  3 The app stores the transmitted information  4 The app provides a list of general artifacts which the user can add |
| Exception | Interrupted by an incoming call |
| Business rules | - |
| Quality requirements | After an interrupt the app resumes at the last state before the interrupt |
| Output data | Required artifact |
| Post condition | The artifact is collected and added to the travel information |

Table 11: Main System Function SF3

|  |  |
| --- | --- |
| Item | Description |
| ID | SF4 |
| Name | Generate a travel expense report |
| Input data | All required information and artifacts of a business travel |
| Precondition | Required artifacts are collected |
| Description | 1 The app generates a business travel expense report using all information and artifacts of this business travel  2 The app provides the possibilities to submit the report to travel management, share the report with other employees, or send the report to a printer |
| Exception | Interrupted by an incoming call |
| Business rules | Travel expense reports must commit with the requirements of travel management |
| Quality requirements | Travel expense reports must commit with the requirements of travel management |
| Output data | Travel expense report |
| Post condition | Travel expense report is generated |

Table 12: Main System Function SF4

# App Functionality

TravelApp will support the user to make the collection of information during a business trip very easy. In addition the app will save all information and offers the possibility to create a travel expense report of the collected artifacts. That report can be submitted directly to the travel management or send to a printer. If more employees participate in a business trip the travel expense report and all the artifacts can be shared between the employees. This makes it needless that all of the participants have to collect the information.

Another solution that eases the creation of travel expense reports is the travel management itself. After an appointment of a business travel, travel management will be able to register required artifacts to this travel. That information will be stored on a backend-server. The app communicates with this server and after authenticating the user, the app gets detailed information about the business travels of this employee. So all required artifacts are directly visible to the user after opening the app. Interacting with a required artifact shown on the screen, leads directly to a system function of the mobile device, supporting the user to collect the information (e.g. the camera is opened if the required artifact is a bill).

Another advantage of this solution is a very customizable app client. All required information about travels and artifacts are transferred from the backend server to the app client. The process (workflow) of creating a travel expense report isn’t integrated in the application. The backend (travel management) provides all information required for a business trip to the user. This makes it possible to customize the workflow in every way without the need of customizing the app client.

## Interaction Cases

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_1 |
| Usage Context | The user wants to check some information about his current business travel. |
| Screen Arrangement 1 | The screen shows:   * The itinerary of the current business travel in a scrollable list   The itinerary includes:   * An overview of the single steps of a business travel (e.g. train, airplane, hotel, etc.) * A list of required itinerary items (e.g. time of departure, time of arrival, border crossing, business begins/ends) |
| Human Action 1 | The user starts the application  Usage type: single tap |
| System Action 1 | The application is started |
| Post conditions | The system shows itinerary screen |

Table 13: Interaction Case 1

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_2.1 |
| Usage Context | During the business trip the system provides suggestions for times the user has to track. The user starts the app after a suggestion and accepts it. |
| Screen Arrangement 1 | The screen shows the itinerary of the current business travel. The screen highlights the suggested itinerary item. |
| Human Action 1 | The user wants to accept the suggestion and taps on the itinerary item.  Usage type: single tap |
| System Action 1 | The system shows an alertview offering different alternatives what to do next. |
| Human Action 2 | The user chooses the confirm-button.  Usage type: single tap |
| System Action 2 | The system dismisses the actionsheet. |
| Post conditions | The suggested time was accepted by the user. The item is no longer highlighted. The user is still in the itinerary-screen. |

Table 14: Interaction Case 2.1

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_2.2 |
| Usage Context | The user wants to add a required time. Because of the system doesn’t provide any suggestion or provides a wrong suggestion the user wants to track the current manually. |
| Screen Arrangement 1 | The screen shows the itinerary in a scrollable list. In case of a wrong suggestion the suggested item is highlighted. If there was no suggestion nothing is highlighted. |
| Human Action 1 | The user taps on the item  Usage type: single tap |
| System Action 1 | The system shows an alertview offering different alternatives what to do next |
| Human Action 2 | 1. The user taps on the actual-time-button 2. The user taps on the manual input button   Usage type: single tap |
| System Action 2.1 | The system dismisses the actionsheet and enters the current time. |
| System Action 2.2 | The system provides a datepicker for manual time input |
| Human Action 3.2 | The user enters the date using the date picker and confirms it  Usage tap: flick, single tap |
| Post conditions | The time is tracked and visible in the itinerary screen. |

Table 15: Interaction Case 2.2

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_3 |
| Usage Context | The user receives a receipt and wants to add it to the current business travel. |
| Screen Arrangement 1 | The system shows the itinerary |
| Human Action 1 | User pushes the add-artifact-button (+) |
| System Action 1 | The system opens the camera of the mobile device |
| Human Action 2 | The user takes a picture from the receipt  Usage type: single tap |
| System Action 2 | The system displays the taken photo and offers the possibility to retake the photo or use it for further handling |
| Human Action 3 | The user wants to keep the photo and presses the ‘use’-button |
| System Action 3 | The system shows a list of different types of receipts |
| Human Action 4 | The user selects one of the artifact types.  Usage type: save |
| System Action 4 | The system shows the available receipt details. E.g.:   * Price * Location information * Rationale * Time/date information * The picture of the receipt |
| Human Action 5 | The user is able to change every entry in the receipts detail. After checking all entries the user saves the artifact  Usage type: single tap |
| System Action 5 | The system saves the artifact and removes the screen using a special transition:  The screen ‘flies’ into the show-artifacts-button on the itinerary screen (see genie effect) |
| Post conditions | The itinerary screen is shown and the artifact is added. |

Table 16: Interaction Case 3

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_4 |
| Usage Context | The user wants to change a detail of an already added artifact |
| Screen Arrangement 1 | The itinerary screen is visible |
| Human Action 1 | The user opens the artifact list  Usage type: single tap |
| System Action 1 | Shows a list with already collected artifacts for the current business travel |
| Human Action 2 | The user selects the artifact he wants to change  Usage type: scroll (flick) and single tap |
| System action 2 | Shows the detail information for the selected artifact |
| Human Action 3 | The user selects the detail he wants to change  Usage type: scroll(flick) and single tap |
| System Action 3 | Shows an input mask to change the value of the detail information. Depending on the type of information the system offers different input devices:   * Price: numeric onscreen keyboard * Date/Time: datepicker * Location: locationpicker * Rationale: rationalepicker * Type: List of artifact types |
| Human Action 4 | The user changes the value and saves the changes  Usage type: flick and single tap |
| System Action 4 | The system shows the artifacts details with the changed value |
| Post conditions | The value is changed, the user is able to go back to the artifacts list or to change other values of the current artifact |

Table 17: Interaction Case 4

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_5 |
| Usage context | The user wants to see travel information of another business trip. |
| Screen Arrangement 1 | The screen shows:   * Top bar with two buttons   + Main menu   + Add artifact * Travel information   + Travels name/description   + Arrival 🡪 Departure   + Departure 🡪 Arrival   + Required travel artifacts |
| Human Action 1 | User taps on main menu  Usage type: single tap |
| System Action 1 | The system shows a list with all available business trips for the current user |
| Human Action 2 | The user selects the business trip he wants  Usage type: flick and single tap |
| System Action 2 | The system shows the detailed information (itinerary) of the selected business trip in itinerary screen |
| Post conditions | The system shows the selected travel. |

Table 18: Interaction Case 5

|  |  |
| --- | --- |
| Item | Description |
| ID | IC\_6 |
| Usage Context | During the business trip the user wants to collect information about meals (breakfast, dinner, lunch) that were paid by the Fraunhofer IESE |
| Screen Arrangement 1 | Itinerary screen is shown. |
| Human Action 1 | The user taps on the catering-button  Usage type: single tap |
| System Action 1 | Shows a an arrangement of buttons offering the possibility to select single meals for a day or to select all meals of this kind (breakfast, lunch, or dinner) |
| Human Action 2 | The user selects all meals paid by Fraunhofer IESE  Usage type: single tap |
| System Action 2 | The system marks all selected meals |
| Post conditions | The user has entered information about the catering during the trip. The catering information screen can be closed. The trips itinerary is visible. |

Table 19: Interaction Case 6

## Screen Flow and Mockups



Figure 2: Screen Flow

|  |  |  |
| --- | --- | --- |
| Screen 1: Itinerary | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\mainscreen.png | **General** | The screen shows the complete itinerary, including all steps of the journey and all required time based artifacts known in advance |
| **1** | Button opens a list with all trips assigned to the user |
| **Screen** | Travels (Screen 2) |
| **Gesture** | Single tap |
| **Transition** | The itinerary view slides to the right. At the end of the transition the itinerary screen is still visible at the right border of the screen (‘half push’) |
| **2** | Opens a list with collected artifacts in a modal view. If no artifact is collected an Alertview appears (‘No artifacts collected’ – OK) and the artifact list is not shown. |
| **Screen** | Artifact list (Screen 6) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **3** | Opens the catering screen in a modal view |
| **Screen** | Catering (Screen 3) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **4** | Starts the add-artifact-flow beginning with the camera in a modal view |
| **Screen** | Camera (Screen 7.1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **5.1 – 5.3** | Artifacts from the itinerary in different states. Tapping on artifacts opens an actionsheet and offers several time input methods, depending on the artifacts status. |
| **Screen** | Itinerary with Actionsheet (Screen 1.2) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **Details** | **Different kinds of artifacts**   * Trip Start Time (For outward and backward trip) * Trip End Time (For outward and backward trip) * Border Crossing Time * Business Start Time * Business End Time * Mileage for company car   **Different artifact status**   * **5.1** Confirmed: Confirmed artifact * **5.2** Proposed: Proposed but not confirmed artifact * **5.3** New: Unconfirmed artifact without a proposal (default state) |
| **6** | Shows detailed information about the step of the journey (e.g. train, airplane) (Mockup is missing, simple PDF View) |
| **Screen** | PDF View |
| **Gesture** | Single tap |
| **Transition** | Push/pop |
| **7** | (Not shown in the mockup)  At the end of the itinerary is a button which submits the current itinerary state to the travel management. The user will be informed if the transmit was successful or not |
| **Screen** | Itinerary Screen |
| **Gesture** | Single tap |
| **Transition** | - |

Table 20: Mockup and Description - Itinerary

|  |  |  |
| --- | --- | --- |
| Screen 1.2: Itinerary with Actionsheet | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\mainscreen_1.2.png | **General** | Itinerary screen after tapping on an artifact. |
| **1** | Confirms the proposed time and dismisses the actionsheet. If there is no proposed time (status: confirmed, new) this button is not available |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **2** | Sets the current system time as the artifacts time. A proposed time will be overwritten. A previously confirmed time will be overwritten too (both without asking for user confirmation) |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **3** | Dismisses the actionsheet and opens a datepicker (modal view) for manual input. |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **Details** | The datepickers minute interval is 15 minutes. The datepicker can be closed via a “Cancel”-Button (without saving) or a “Done”-Button (with saving).  Rule for rounding: ‘round to nearest 15 minutes’  C:\Users\kiefer\Documents\projects\cebit-app\mockups final\artifact_detail_datepicker.png |
| **4** | Dismisses the actionsheet without setting a date |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |

Table 21: Mockup and Description - Itinerary with Actionsheet

|  |  |  |
| --- | --- | --- |
| Screen 2: Travels | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\travels.png | **General** | The screen shows a list of all business trips assigned to the user. |
| **1** | Selecting a travel opens the itinerary of it (Screen 1: Itinerary) |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | The itinerary slides in from the right to the left (half push) |
| **2** | Tapping on the button dismisses the current screen and shows the itinerary |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | The itinerary slides in from the right to the left (half push) |
|  |  |

Table 22: Mockup and Description - Travels

|  |  |  |
| --- | --- | --- |
| Screen 3: Catering | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\catering.png | **General** | The screen allows the user to enter required information about the catering during the business trip. The user has to select all meals (breakfast, dinner, lunch) he didn’t paid by its own during the trip.  Selected items marked with a checkmark unselected items are marked with an ‘X’. |
| **1** | Closes the modal view. Changes made are automatically accepted |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **2** | Selects/deselects all breakfast, lunch, or dinner as selected at once. Deselecting one of the meals turn the switch off. |
| **Screen** | Catering (Screen 3) |
| **Gesture** | Single Tap |
| **Transition** | - |
| **3** | Single meals can be selected/deselected |
| **Screen** | Catering (Screen 3) |
| **Gesture** | Single tap |
| **Transition** |  |
|  | - |

Table 23: Mockup and Description - Catering

|  |  |  |
| --- | --- | --- |
| Screen 4: Artifact list | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\artifact_list.png | **General** | Shows all collected artifacts for one business trip. |
| **1** | Closes the modal view |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **2** | Tapping on the button dismisses the current screen and shows the itinerary |
| **Screen** | Camera (Screen 7) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **3** | Tapping on a row of the list opens the detail view of an artifact |
| **Screen** | Artifact details (Screen 5.1) |
| **Gesture** | Single tap |
| **Transition** | Push/Pop |
|  |  |

Table 24: Mockup and Description - Artifact list

|  |  |  |
| --- | --- | --- |
| Screen 5.1: Artifact detail | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\artifact_detail.png | **General** | The screen shows detailed information about an artifact. |
| **1** | Goes back to the artifact list. |
| **Screen** | Artifact list (Screen 4) |
| **Gesture** | Single tap |
| **Transition** | Push/Pop |
| **3** | Opens the artifact type list |
| **Screen** | Artifact type list (Screen 6) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **4** | Opens a datepicker in a screen overlay (the artifact detail screen is still visible but overlaid with the onscreen input device) |
| **Screen** | C:\Users\kiefer\Documents\projects\cebit-app\mockup v6\artifact_detail_7.png |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **5** | Opens the locationpicker in a screen overlay (the artifact detail screen is still visible but overlaid with the onscreen input device) |
| **Screen** | **C:\Users\kiefer\Documents\projects\cebit-app\mockups final\location_picker.png** |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **6** | Opens an onscreen keyboard with numbers |
| **Screen** | **C:\Users\kiefer\Documents\projects\cebit-app\mockups final\number_keyboard.png** |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |
| **7** | Shows the previously taken photo in a modal screen |
| **Screen** | Modal screen, image is shown in full screen (‘Done’-Button in navigationbar dismisses the view) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |

Table 25: Mockup and Description - Artifact Details

|  |  |  |
| --- | --- | --- |
| Screen 5.2: Artifact detail | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\artifact_detail_3.png | **General** | The screen shows detailed information about an artifact |
| **1** | Cancels the add artifact flow. Nothing is saved. All previously added data (including the photo) are deleted. |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **2** | Finishes the add artifact flow and saves all data |
| **Screen** | Itinerary (Screen 1) |
| **Gesture** | Single tap |
| **Transition** | The screen flies into the artifact list button in the itinerary screen. Similar to the genie effect. |
| **3-7** | See Artifact details screen (Screen 5.1) |
| **Details** | The following onscreen input devices should be used:  Dates 🡪 datepicker  Location 🡪 locationpicker  Rationale (not shown in the screen) 🡪 rationalpicker  Price 🡪 numeric keyboard |

Table 26: Mockup and Description - Edit Artifact Details

|  |  |  |
| --- | --- | --- |
| Screen 6: Artifact type | Functional description | |
| C:\Users\kiefer\Documents\projects\cebit-app\mockups final\choose_artifact_type.png | **General** | The screen shows a list with the different types of artifacts in a modal view. |
| **1** | Closes the view without saving the changes |
| **Screen** | Case 1 (opened from the camera screen): Itinerary (Screen 1)  Case 2 (opened from artifact detail screen): Artifact detail screen (Screen 5.x) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **2** | Selecting an artifact type from the list dismisses the artifact type screen and loads the artifact details screen for the selected artifact type |
| **Screen** | Artifact details screen (Screen 5.2 during the add artifact flow, else Screen 5.1) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **Details** | Different types of artifact and the required data for the artifact detail screen  **Accommodation Cost**   * Type * Date (From) * Date (Till) * Price * Photo   **Additional Cost**   * Type * Date * Price * Photo * Rationale   **Bus**   * Type * Date * From (location) * To (location) * Price * Photo   **Company Car**   * Type * Date * Price * Photo   **Participation Fee**   * Type * Date * Price * Photo   **Petrol Receipt**   * Type * Date * Price * Photo * Rationale   **Plane**   * Type * Date * From (location) * To (location) * Price * Rationale * Photo   **Rental Car**   * Type * Date * From (location) * To (location) * Price * Rationale * Photo   **Taxi**   * Type * Date * From (location) * To (location) * Price * Rationale * Photo   **Train**   * Type * Date * From (location) * To (location) * Price * Photo |

Table 27: Mockup and Description - Artifact Type

|  |  |  |
| --- | --- | --- |
| Screen 7.2: Camera | Functional description | |
|  | **General** | Camera screen. |
| **1** | Closes the camera and goes back to the screen the camera was started from |
| **Screen** | Previous screen: Itinerary or Artifact list |
| **Gesture** | Single tap |
| **Transition** | Cover vertical (out) |
| **2** | Takes a picture and shows it to the user |
| **Screen** | Camera (Screen 7.2) |
| **Gesture** | Single tap |
| **Transition** | Push/Pop |
|  |  |

Table 28: Mockup and Description - Camera

|  |  |  |
| --- | --- | --- |
| Screen 7.2: Camera | Functional description | |
|  | **General** | The screen shows the picture taken for a visual control by the user |
| **1:** | Opens the camera again to take a new picture |
| **Screen** | Camera (Screen 7.1) |
| **Gesture** | Single tap |
| **Transition** | Push/Pop |
| **2** | Uses the picture and goes to the next step of the add-artifact-flow. |
| **Screen** | Artifact type (Screen 6) |
| **Gesture** | Single tap |
| **Transition** | Cover vertical |

Table 29: Mockup and Description - Camera 2

## Additional Information

* + - If the TravelApp is running in the background, the user should be informed about a suggestion by the use of the notification center provided by iOS.
    - In addition to the notification a badge should be added to the app icon. After closing the app, the badge should disappear.
    - Reopening TravelApp after an interruption (e.g. phone call) should provide the same screen and information like before the interruption.

Document Information

Title: TravelApp mConcAppt   
Interaction Concept   
Documentation

Date: May 17, 2012

Report: IESE-061.12/E

Status: Final

Distribution: Confidential

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