Functional Specification Document

KTI – Kapsch Tablet Infrastructure

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Content

1. Requirement Specification 3
2. Embedding in Organization 4
3. Target Groups 5
4. Service Requirements 6
4.1. Hardening of mobile Enddevices 6
4.2. Employees‘ perspective (eg.: production supervisor, service technicians) 7
4.3. Company’ perspective 7
4.3.1. IT-Outsourcing companys 8
4.4. Functional description 9
4.4.1. Users 9
4.4.2. IT-Leitung 9
4.4.3. Kapsch 9
4.5. Quality Criteria 10
4.6. System architecture 11
4.6.1. Hardware 11
4.6.2. Software 13
4.7. Functions 14
4.8. Test cases 15
4.9. Milestones 15
4.10. Addition 16
4.11. Glossary 16

History

Person	Date	Note
Steinhäuser, Müller	**15.12.2014**	**Creating Functional Specification Document**
Hammer, Götze, Kaufmann	**16.12.2014**	**Making first notes for preperation**
Hammer, Götze, Müller, Steinhäuser	**20.12.2014**	**Finishing first version**

1. Requirement Specification

Project objectives

Main objectives

- **Identifying indicators, which need to be fulfilled by an Android based industrial solution**
- **Identifying, highlighting and describing different realization concepts**
- **Evaluation of selected concepts for prototyping**
- **Outline the results of the prototype concept**

Non-objectives

- **Developing a self-programmed solution**
- **Solve problems of a selected standard solution**
- **Prototype is a ready-to-sell product**

2. Embedding in Organization

The product which Kapsch will generate from the result of our project, is going to be used by various groups of employees who will be increasingly active in the field. Our project aims at ensuring that the final product can be used by employees of Kapsch's as well as those customers and thus is an important part of the infrastructure.

The final product can be individually calibrated to the needs of customers, which means that the product for each customer receives its own expression.

Furthermore, it is not possible that customers or users are able to embed personal devices in infrastructure. This is only reserved to the devices, we and further more Kapsch calibrate and provide.

3. Target Groups

The target groups of our project are the future customers of Kapsch, which have decided to use tablets in their business process. It is to mention, that our end product is not the finale system solution for the costumers of Kapsch. The Kapsch BusinessCom AG will use our project as a pre-study of possible solution varieties for developing the real project.
Kapsch costumers are (efficient) companies of different industries. Logistics, building industries, industry in general and also the retailer sector are some examples. Employees of the building industries can use a technic device like a tablet for their specific workflow to reduce the organisation time of their paper. They are not forced to execute the elaborate process of scanning every important construction plan or some other specific document for sending it to the partners via email. Through this project solution employees would save a lot of time. Employees would have every document as a digital file. The whole process of sharing with other people will be faster than before. Saving time is the motive for companies in general to implement a tablet infrastructure with a specific software solution for their employees.
Companies of the retailer sector are interested in such software solutions to increase their own costumers offer. They anticipate a better costumer's satisfaction and thereby a better position on the market. For example McDonalds provide their customers tablets for surfing, using apps and also for playing games on the tablet in some of their restaurants.

4. Service Requirements

As from today's perspective, the use of mobile devices in the corporate sector has grown significantly, it is necessary to provide the user with a safe and easy platform for the implementation of business processes.

4.1. Hardening of mobile Enddevices

Such a platform requires a very safe hardening of the mobile end devices. The devices have to be both physically and software-side secured, to prevent data loss or abuse.

- **Physically**
  - **It should not be possible to trigger certain hidden features of the mobile end device using a keyboard shortcut.**
  - **It should not be possible to reset the mobile end device using a key combination and so bypass the safety precautions.**
  - **If needed, the mobile end device must be protected from physical damage. (Falling-damage, etc.)**
- **Software-side**
  - **The mobile terminal should be protected against malicious and inadvertent changes by the user.**
  - **Users are not allowed to install their own apps and make adjustments on their own.**
  - **The user has only apps and setting options are available that have been determined in advance by the IT management.**

4.2. Employees‘ perspective (eg.: production supervisor, service technicians)

If we now consider our product from employees' perspective, we see so far many advantages in availability than the 24 hours 7 days a week, our product is available.
By this we mean that the final product of Kapsch, is designed without an external cause for continuous operation and is to be used as such.
One limitation that affects the user is that it is not permitted by Kapsch or the person responsible for the product in the respective company, that the system should be changed consciously or unconsciously.
By Subconscious or unconscious change the system we mean:
• Conscious Change: the user has deliberately changed parts of the system.
• Unconscious change: the user should be due to the fault of IT management and system administrations of the company have more freedom than he should have.
Despite all of that users should not be hindered or restricted at work through these limitations. The aim of our project or product is to facilitate the work of the user and not difficult it.

4.3. Company’ perspective

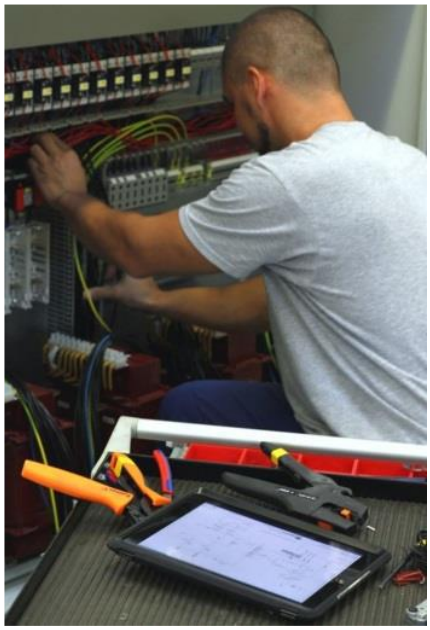
For the evaluated software solution, there are various corporate perspectives from which the final product can be considered.

For the IT management some factors have a special importance, as these make their life a lot easier and therefore some more costs can be saved.

One of those factors is the remote maintenance. Current solutions had a lack of functionality in resetting devices from the company headquarter, which will be a major point of the evaluation process.

Until now, wrong configured devices needed to be sent back to IT—Management by post. This leaded to enormous maintenance costs and a huge time loss. Another important aspect is the remote management. Through this functionality of the evaluated solution the IT-Department is able to alter the devices content. This results in the possibility of the installation or deletion of applications or the possibility of a factory-reset, which deletes the device data unrestorable.

4.3.1. IT-Outsourcing companys



From the view of an IT-Outsourcing company, like Kapsch, the final solution will offer the possibility to use it for different types of customers and to adapt it individually. So one of the most important factors is the scalability of the concept and the possibility of using it in different environments. It must be usable for a construction company as well as for a trading or service company. The solution should be adaptable for each customer individually. For example, in a construction company it is necessary that specific applications are usable all the time. The rest of the system should be secured in a way that the employee is not able, accidently or not, to put the device into an unusable state. The time of implementing a system is another important factor in the view of a providing company. This time should be kept as low as possible. As mentioned above flexibility should be given in a form that the solution is usable with 2 devices as good as with 200 devices.

4.4. Functional description

4.4.1. Users

For endusers it is a key fact that they can use the tablet specifically for his tasks. Neither more nor less. The standard android user experience should not be changed. The user is:

- **Able to open and use ,only the from the company specified, applications**
- **Not able to alter the device settings**
- **Not able to install or delete any applications**
- **Able to reset the device to a pre-defined state**
- **Able to delete all of his usage data before leaving the device, like his browser history. (This is extremely important in the stationary trade.)**

4.4.2. IT-Leitung

The IT management of a company must have access to different functions of the evaluated solution to ensure smooth operation and to gather important information about the use of the equipment. The central IT of the costumer should

- **Multiple sites can manage devices centrally**
- **can read the status of the individual devices and locations**
- **Error messages can be read and analyzed**
- **Single / All devices, when needed, can be reseted to a defined state**
- **Statistics and reports on the individual Tablets / locations read**
- **install and delete apps on the Enddevices**
- **Guidelines for the use of the browser set**
  the device settings

4.4.3. Kapsch

Due to the fact that Kapsch will distribute the solution to many different customers, it must also fulfill certain functions and standards so that Kapsch can wait customers' devices and manage them easily. Thus, the business solution must provide the following options for the client.

Kapsch can

- **Adjust the platform for various clients individually**
- **The solution, according to the number of required equipment, scale to any size**

4.5.Quality Criteria

- **Cost-effective**
- **Nowadays all companies, which are using common software on their tablets for business processes have a big problem. Every time when the tablet of an employee does not working right as it should, the tablet has to be send to Kapsch to fix it. In the most cases the employee itself is responsible for this. The result of this time-consuming process is that the employee is restricted of working on. So every tablet, which has to be send to Kapsch make indirect costs for the company.**
  By the new modified software, the employees' wouldn´t be able to crash the tablet software. So no tablet has to be fixed by Kapsch. For the companies it means that there are no indirect costs for repairing the employee´s tablets.
- **Business-standard security**
- **Flexibility**

    - **The end software product of Kapsch can be adaptable for every costumer and their necessities. Kapsch can control which specific system configurations have to be activated and which are not needed by the costumer. This specific system configuration can be for example activating companies necessary Apps. This results in one specific, individual software solution for every costumer.**

4.6. System architecture

4.6.1. Hardware

The Hardware component of the solution will be a standard Android Tablet. There is no requirement for a certain processor or amount of RAM, because the solution should be usable on any tablet available on the market. The only restriction is, that it should be capable of smoothly running the operating system. With choosing Android 4.2 as Operating System, it is necessary that the device fullfills the following requirements, set by Google. Therefore we refer on the following document:

https://static.googleusercontent.com/media/source.android.com/de//compatibility/4.2/android-4.2-cdd.pdf

4.6.1.1. Screen

- **Screen size of at least 426 dp x 320 dp**
- **Screen aspect ratio of between 4:3 and 16:9**
- **A minimum of 120 dpi**
- **Devices MUST support dynamic orientation by applications to either portrait or landscape screen orientation**
- **Device implementations MUST support both OpenGL ES 1.0 and 2.0**
- **Screen Types**
    - **Fixed-pixel display implementations: the screen is a single panel that supports only a single pixel width and height. Typically the screen is physically integrated with the device. Examples include mobile phones, tablets, and so on.**
    - **Variable-pixel display implementations: the device implementation either has no embedded screen and includes a video output port such as VGA, HDMI or a wireless port for display, or has an embedded screen that can change pixel dimensions. Examples include televisions, set-top boxes, and so on.**

Devices MUST support displays capable of rendering 16-bit color graphics

4.6.1.2. Input Devices

- **MUST provide at least one soft keyboard implementation (regardless of whether a hard keyboard is present)**
- **The Home, Menu and Back functions are essential to the Android navigation paradigm. Device implementations MUST make these functions available to the user at all times when running applications**
- **Device implementations SHOULD have a pointer input system of some kind (either mouse-like, or touch).**

4.6.1.3. Sensors

- **Device implementations SHOULD include a 3-axis accelerometer.**
- **Device implementations SHOULD include a 3-axis magnetometer (i.e. compass.)**
- **Device implementations SHOULD include a GPS receiver.**
- **Device implementations SHOULD include a gyroscope (i.e. angular change sensor.)**

4.6.1.4. Data Connectivity

- **Device implementations MUST include support for one or more forms of data networking.**
- **Android 4.2 MAY be used on devices that do not include telephony hardware**
- **Android 4.2 device implementations SHOULD include support for one or more forms of 802.11 (b/g/a/n, etc.)**
- **Device implementations SHOULD include support for Wifi direct (Wifi peer-to-peer)**
- **Device implementations SHOULD include a Bluetooth transceiver.**
- **Device implementations SHOULD include a transceiver and related hardware for Near-Field Communications (NFC).**

4.6.1.5. Cameras

- **Device implementations SHOULD include a rear-facing camera, and MAY include a front-facing camera**
- **Rear-facing Camera**
  - **MUST have a resolution of at least 2 megapixels**
- **Front-facing Camera**
  - **MUST have a resolution of at least VGA (that is, 640x480 pixels)**
  - **MUST horizontally reflect (i.e. mirror) the stream displayed by an app in a Camera Preview.**

4.6.1.6. Memory and Storage

- **Device implementations MUST have at least 340MB of memory available to the kernel and userspace. The 340MB MUST be in addition to any memory dedicated to hardware components such as radio, video, and so on that is not under the kernel's control.**
- **Device implementations MUST offer shared storage for applications. The shared storage provided MUST be at least 1GB in size.**

4.6.1.7. USB

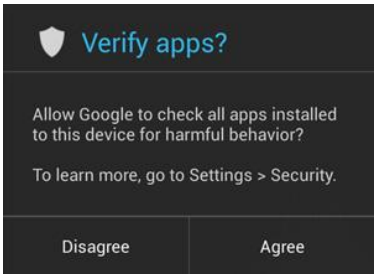
- **Device implementations SHOULD include a USB client port, and SHOULD include a USB host port.**
- **Client-port**
  - **the port MUST be connectable to a USB host with a standard USB-A port**
  - **the port SHOULD use the micro USB form factor on the device side**
- **Host-port**
  - **it MAY use a non-standard port form factor, but if so MUST ship with a cable or cables adapting the port to standard USB-A**

4.6.2. Software

4.6.2.1. Operating System (OS)

We decided on using Android 4.2+ as our operating system, because of the major security improvements made in this version of Android. It is also economically more sense full, due to the fact, that older versions need more maintenance and won´t be supported anymore soon. The following features were the reason of not choosing Android 4.0+ as OS, like suggested by Kapsch:

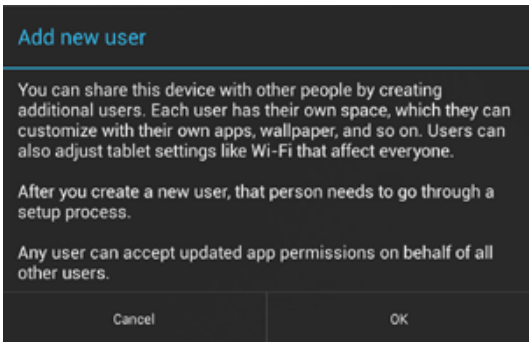
- **A new built-in scanning service, which checks installed app for a harmful behaviour. Whenever sideloading an App, the device sends information about the programm anonymously to Googles Servers, which then analyse the information and compare it with the info, stored in Googles Databases.**



- **An improved app-permission screen. It shows up, anytime you install an app outside of the Google Play store and gives you information about the requested permissions.**

- **A background feature, informing you every time an application tries to send a text message that could cost money. Typically when a message is sent to a fee-collecting short code, which is a number that automatically bills your carrier, when receiving a message.**

- **Multiuser support for Android tablets. This enables the device administrator to configure multiple user, each of whom maintains his own separate home scree, apps, wallpapers and general settings.**



4.6.2.2. Mobile Device Management (MDM)

Another important part of the evaluated solution is the mobile device management system, which gives the IT-management the possibility to collect status information about the registered devices.

Another feature is the management of applications, which can be grouped into specific user groups, like management, accounting, technical or anything else. It is not limited to a single type of end device, which means that tablets, smartphones, laptops, etc. can be managed parallel. It consists out of a server and a client component. The server typically stores all information and configurations and spreads them across the different devices. It also collects statistics about the usage of each device. A client is a device, like the ones mentioned above, with a special application installed, that enables the connection to the MDM-server.

4.7.Functions

/L100/ Handling and workflow of the mobile end devices are retained for the user. This means that if knowledge with Android Tablets is present, the user itself does not need to get used to a new user interface.

/L200/ The user is able to call a set of predefined sites in the internal web browser and interact with them, if authorized by the IT management. This means subsequently that it is not allowed to call their own websites.

/L300/ The user can reset the Android tablet on the spot to a predefined state if necessary.

/L400/ The user is able to reset the mobile end device to a predefined state when leaving his work, to erase his tracks of use.

/L500/ The user has a predefined set of apps or applications. The apps are determined by the IT department, so the user has no control. That means, subsequently, that users are not allowed to install their own apps from the Internet or from Google Play Store.

/L600/ The device resets itself to a predefined state after a predefined time span of inactivity, to prevent data abuse.

4.8.Test cases

See the attachment: Checklist_Template_20141119_v0_5

4.9.Milestones

MILESTONEPLAN				
WBS-Code	**Milestone**	**Plan date**	**Revised date**	**Actual date**
1.1.5	Project-Planning finished	06.11.2014	20.12.2014	20.12.2014
1.2.5	Preparation of templates, specifications and research work finished	19.12.2014	23.12.2014	20.12.2014
1.3.4	Creating research paper completed	30.01.2015	-	20.12.2014
1.3.6	Configuring prototype finished	20.02.2015	-	20.12.2014
1.5	Result presentation	15.05.2015	-	20.12.2014

4.10. Addition

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4.11. Glossary

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