

# **Logbooking Software for Science**

F.P. van der Meulen, 500713781, (tel)+31 6 17506168

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Amsterdam University of Applied Sciences

HBO-ICT, Game Development

C.J. Rijsenbrij

Software for Science

Marten Teitsma

February Semester, 2017-2018

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## **1 Preface**

## **2 Abstraction**

The abstraction of the report.

## 3 Introduction

This chapter will describe the background of the research, it will describe the companies that are involved with this, the risen problem will be discussed and based on that a research question will be formulated and finally the structure of the research report will be explained and why there was chosen for this kind of structure.

### 3.1 The companies involved

This thesis features two companies: Software for Sciences and CERN, Conseil European pour la Recherche Nuclaire.

#### 3.1.1 Software for Science

To be added later

#### 3.1.2 CERN

To be added later

Since 2017, the University of Applied Sciences of Amsterdam collaborates with CERN, Conseil European pour la Recherche Nuclaire, by doing research for ALICE(A Large Ion Collider Experiment). ALICE detects the collisions with Ions such as lead resulting in quark-gluon plasma which is believed to have existed just a few milliseconds after the Big Bang. After the quark-gluon plasma is resolved an enormous number of particles is emitted and detected by ALICE. The detection is transformed into data which has to be processed and made available for physicists doing research on the smallest particles imaginable.

### 3.2 The problem

ALICE will receive a major upgrade in 2019/2020. During this period, the new O computer system will be implemented. This gives an opportunity to upgrade the bookkeeping system currently in use. The bookkeeping system consists of two systems: the electronic logbook and Alimonitor. These systems have been in development since 2009 and evolved during the years. Due to this development process, the applications are a bit confusing, not efficient and overall candidates for improvement.

Software for Science has received the task to handle the improved bookkeeping system from CERN. At first, a prototype of the new system will be made to give an expression to CERN about the new system. This prototype is focused on the Electronic Logbook part of the new system. The demonstration for this prototype takes place in June 2018. In order to deliver the demo, a requirements document is made with all the ideas and wishes from the CERN development team. Not every requirement from CERN can be implemented in to the prototype due to time constraints and the scale of the requirements.

Therefore, an analysis of the requirements must be made in order to ease the development of the new system and add the important features into the prototype to demo for CERN.

### **3.3 The goal**

The goal of this research paper will be:

A prototype of the logbooking software for ALICE which will have the analyzed requirements, combined with recommendations for the future of the development process for the logbooking software.

This goal is created based upon the development process of the logbook prototype. Furthermore, Dave, maak meer text hier

### **3.4 Research questions**

Before doing the research, one compromising research question is drawn up. This research question is further worked out in sub research questions. The compromising research question will be asked like this:

Which Requirements can be implemented into the logbook system prototype for ALICE and what are the consequences for developing?

#### **3.4.1 Sub research questions**

To solve the problem that has been defined, it is important to divide the report different sections. Based upon the problem, it is possible to divide the research question in four different sub research sections. These sub sections can be written as the following research questions:

1. How to analyse requirements?
2. Analyzing the requirements
3. CERN reaction.
4. What are the consequences for developing?

## **4 Methods and techniques**

This chapter will talk about the used methods and techniques during the internship. These techniques will be the programming languages and programming frameworks that are used to create the prototype.

### **4.1 Javascript**

The main programming language for this research is Javascript. Javascript was one of the hard requirements set by CERN.

### **4.2 AliceO2/WebUi framework**

The preference of CERN is to use CERN's own developed frameworks as much as it is possible to do so. The WebUi framework is a framework to handle HTTP requests made by the client, in this case, the front-end. The base of this framework is the ExpressJs framework.

The ExpressJs framework is a lightweight framework for handling HTTP calls. CERN has expanded this framework with features such as Json Web token support, debug logger systems and support for CERN's own authentication system,

### **4.3 Postgresql**

The main database that will be used for the prototype is a Postgres database.

### **4.4 Mocha**

The testing framework that has been chosen is the Mocha testing framework.

### **4.5 Sublime text 3**

The development enviroment for developing the prototype is Sublime Text 3.

## 5 Results

This section of the report will talk about the results of the research. It will answer the previous set-up sub research questions. With these answers, it will be possible to formulate an answer with recommendations for the future.

### 5.1 Preparing for the requirement analysis

Before the requirement analysis can be started, is it important to know how to do a requirement analysis. There are multiple techniques available to do an analysis. A couple of these techniques are: (technieken + bron). What is also important, is to fully understand the requirements. It is dangerous to make assumption about vague terms, because it could mean something completely different and that can affect the analysis in a negative way. It could also affect the outcome of the analysis and making a sample prototype product more difficult, due to the wrong assumptions in terms of work and the definition of done for a requirement. Finally, it is important to look at the time each requirement needs to be completed. If the time is not calculated into the analysis, the possible prototype could either consists of requirements that take too much time to make or requirements that are done within a short amount of time.

It is important to define points of attention for the requirement analysis. These criteria can be used, in combination with the analyzing techniques and the time constraint, to make the analysis go smooth. These criteria are based upon the goals set for the prototype.

The first and main point of attention for the analysis is that there is a prioritization of the different kind of entries into the logbooking system. There are, for instance, announcements, run records, on call intervention logs and the log entries. This is the main aspect of the current system, so it would be logical to add this aswell into the prototype.

The second point of attention are the new features. For instance, features like the commentary sections and the templates for the EOS reports, are not available in the current logbooking system. If these features could be added into the prototype, the users of the logbooking system could give feedback so that, in the future of the development process, this feedback could be taken into account.

The third and final point of attention is simplicity. It is more important to show a couple of features that are bugfree and work as intended rather than a lot of halfworking features.

One of the software requirements analysis techniques to prioritize requirements is the Analytic Hierarchy Process technique. (bron van pakistaanse artikel die dit voor het eerst beschrijft). "In AHP, initially whole requirements are recognized and then criteria under which these requirements will be preferred. In AHP we pair wise analyzing between the probable pairs of the hierarchy. Now users can recognize the possible relationship between the hierarchies. We then pair wise analyze them and users can select its preferences from the scale which ranges from 1 to 9." (Bron van Pakistaanse artikel). One of the main



advantages of using this technique is that ””(Bron pakistaanse artikel). This advantage is usefull for analysing the requirements for the ALICE logbooking prototype, because it ””(citaat bron Pakistaanse artikel).

The second software requirements analysis technique that will be used for the software is the Hierachy Analytic Hierachy Process technique(bron van artikel die dit voor het eerst beschrijft). HAHP is a technique that creates so called planes of requirements in order to simplify the requirement analysis process. A plane is a group of requirements that are grouped together if they share a similarity. These planes can, for example, align to a user of the system or a feature that will be implemented into the final product. For this requirement analysis, the planes will consists of features since this will be more important for the prototype than the users themselves.

Inside the requirement document were some vague terms that weren’t explained. The terms were follow-ups, on call intervention, announcements, and an EOS report. Iets over de features die er staan, maar onduidelijk zijn.

To solve the vague requirements and unknown wishes, a former shifter by the name of Pascal Buschoten has been interviewed. The full transscript can be found in the attachments. The interview with Pascal clarified a couple of terms like the on call intervention and the end of shift reports with templates. On call Interventions are emergency issues with a detector, a particle collider or anoter system that need to be solved as soon as possible. These issues need to be fixed within a very short amount of time. Currently, there is not a formal template availiable for the EOS reports and because of that, all the reports do not follow the same structure. With a template, it is better to evaluate all the EOS reports).

Lastly, time will be an important factor for the requirement analysis. The time will be estimated using the story points technique. This technique consists of giving so called points to requirements in order to organize the effort and scale of a requirement.

To sum it up, the AHP and the Hierachy AHP techniques will be used to prioritize the user stories, three points of attention for the features are set for the prototype followed with an estimation for every requirement.

## **6 Conclusion**

Concluding the report with a conclusion.

## **7 Recommendations**

Recommendations for future use of the electronic logbooking system.

## 8 Subface

## **9 Glossary**

This section of the report will explain terms that will be used during the report. At first, the term framework will be explained, followed by the term requirement. More terms to be added.

## 10 Resource List

## **11 Attachments**

### **11.1 Interview transscript**

# **Transscript Interview**

Frederick van der Meulen

April 21, 2018



# 1 Overview

To gain more in-dept information regarding some requirements, Pascal Buschoten, a former shifter, has been interviewed.

## 2 Interview questions + answers

The interview is split into three parts; common, front-end and back-end related questions. The common questions are about features or requiremetns that aren't clear for the front-end and the back-end. The front-end questions are about the front-end and finally the back-end questions are about the back-end of the new logbooking system.

Pascal is answering all the questions. Sometimes during the interview, Heiko and Dr. Marten stepped in to expand the answer. They're answers and comments are given into the answers of the research questions.

### 2.1 Common questions

**Do you have any objections if this interview is recorded? The record will only be used to write the full answers down as s source for the thesis?** I do not have any objections that this interview is recorded.

**Can you introduce yourself and tell what you have done for CERN?** I'm Pascal Buschoten and, for my graduation project, I've spend one year working at CERN. I've worked at a prototype for data process algorithmes for the upgrade of OSquare. That was mainly aimed at the TPC, Time Projection Chamber, that is the biggest detector of CERN. The data that comes free from that detector contains a lot of noise, for example, particles that make signals that are not usefull. I've tried to remove this noise from the data. After that, I've stayed there for two years as a trainee and I've worked a lot with drivers for the PCI-Express Reroute cards, cards that read out the data from the cables that are connected to the detectors. That was a big task, because the drivers needed to be developed, maintained and a lot of new requirements we're added to the system. My second task was evaluating a database for the process-configuration, that is all the processes that are running on the OSquare farm. At the start-up of the processes, they need to gain parameters, and it happends often in one big burst at the start of a run. I've looked at a couple of back-end systems to look at which back-end fitted the most for this process. I've also written an interface for this system. And that's what I've done during my time at CERN.

**This interview is divided into three parts: some common questions regarding concepts that are not clear to us(Naomi and Frederick red.) so that we gain insight into them. Is this clear for you?** Yes.

**During reading the requirements for the new logbooking system, the term**

**follow-ups are regularly mentioned. Do you know what they mean with this?** I've got a vague guess, but I'm not sure. Perhaps they mean that, when they have an on call intervention, then they write down what's next to do or what the other problems could be? I'm not sure.

**One of the possibilities for the new system is the functionality to add files to log entries. What kind of files are added? Are these text based files or special files related to ALICE?** I think that these are text based files, such as logs, and maybe crash-dumps, but generally, if you want to give more information, you write it down into a bug report.

**There are announcements in the current system. What are these announcements and who creates these announcements?** Can you show these announcements(asked to Heiko van der Heijden)? I don't know exactly what this means. Is this into the current system? (Heiko shows the announcements). I have no idea what this means.

**What are on call interventions? Who can make these and how many times do they appear** I've done on calls when I was in the DAC(Data Acquisition Chain) team, and everyone in the team is responsible or maintains a piece of software in the DAC. On every moment, someone needs to be accessible when problems arise that the shifters cannot solve in the control room. So the team has decided that every member must take a sum of days in a year to be on call duty. When you are on call duty, you have a CERN phone with you and if there's a problem, you will be called. Once you are called, you must run to a terminal and log in remotely and look if you can solve the problem. Usually, you look at logs, and if you can't solve this, then you call the specialist on that area. For example, if there's something wrong with the logbook, you call Vasco, the specialist on that area. There are levels of preparedness. So when there is an important period of runs, then you must be reachable in a very small amount of time and being able to perform an intervention. (Frederick): To sum it up, On call interventions are interventions that cannot be created by shifters, and they only happen when there are problems with the system, then you need to solve the problems, and if you cannot solve them, then you need to call a specialist. Did I understand it correctly? (Pascal): yes, a shift leader can say, for instance that you need to call that person. (Naomi): does a on call intervention get added to a log? (Pascal): Every 24 hours, an on caller must make a log entry, and there you give a summary on what you have done. But it's not attached to one specific run. It's usually on multiple runs. (Dr. Marten): Every run can take 2 minutes, 2 hours or 0 seconds. (Pascal): That happens sometime (Dr. Marten): Why does that happen actually? (Pascal): Wrong configuration usually. (Dr. Marten): But how is it possible that that can start? (Pascal): It's not literally zero seconds, but it is possible that something can go wrong in a short amount of time. It doesn't happen that often though.

**The requirements refer to a template for making an EOS report. How does a template look like and what is a EOS report?** I've been told to look at the previous report and that's your template. I don't know if there is a formal template. More like this is the structure of the report you need to use. (Heiko): It is a wish from Roberto(one of the product owners at CERN red.), because everyone has their own way of writing down things. (Pascal): I can imagine that. (Dr. Marten): It is also Robert's wish. Once every while they look at the logs to look why their machine is not working well. When everyone is just writing down stuff and use different terms for the same thing, then it's very difficult to check the reports. You can't do search and find due to the different terms. So that's why CERN says that it maybe be usefull to use a template. The other problem is that, if everything becomes a template, then its click click and there issues could arise aswell. So, we need to look at how we can create this.(Frederick): But there are not standard thing you need to fill in such as your name, to keep things simple or a description of your shift? (Pascal): Not in the way of a form, but you write down the time and a summary on what you did and how you fixed it?

**One of the wishes for the new system is a forum like enviroment. This forum idea consists of leaving comments after entries. How do you envision this?** I think that you need to keep it as a simple forum. You can place a comment under every log. You don't need threads and other difficult stuff as if people want to have a discussion, they can do that either in e-mail, Slack or personal. (Frederick): So the forum is just to say something small? (Pascal): Yes

**Are logs only created on location at CERN or can this be made at a different location?** These logs can be made everywhere. When you do an on call, you do not sit ever time at the headquarters of CERN. It 24 hours, so there is not a formal time you need to make the report. Not anymore though. In the past, there was not a formal time, but now there is every day a meeting with Roberto, so the report needs to be made before the meeting.

## 2.2 Front-end related questions

**To gain some insight into the front-end, I(Naomi red.) was wondering what you think about the current front-end of the logbooking system and what you liked and disliked about them** What I liked about the system is that it works, there are a lot of search options, you can search very specifically on issues What I didn't like about the system is that it's a bit old fashioned and a bit slow. (Frederick): What do you mean about old-fashioned? Does it feel old-fashioned, does it look old-fashioned? (Pascal): Yes, those two options that you mentioned and to be specific it doesn't work very well on smart phones. It would be fine if it was possible on a mobile phone.

**What kind of colour scheme would you like to see on the new logbooking**

**system and what did you think about the current white system?** The white looks a bit boring, and there could be some improvements. The people at CERN are tolerable with things that don't look posh, but they prefer it. (Frederick): Can you give us some colour examples? For example no use of yellow? (Pascal): I would prefer it if you could add the colours of ALICE into the design. Just the highlights would be enough.

**How does a big screen view look like and what does it mean?** That's about the control room! I'm not sure if you saw some pictures about the control room? Everyone sits in a glass box and people sit in front of a couple of computer screens and at the top of those screens there are big televisions that show the important information. (Heiko shows a Googled picture of the control room)(Naomi): What kind of information is shown on those big screens? (Pascal): For example, the status of the detectors, it depends on the priorities. Some graphs. (Heiko): The information is more like Teletext. (Naomi): And everyone sees that? (Pascal): yes. (Frederick): To come back to the graphs, what kind of information do they show? (Pascal): I don't know but we need to talk specifically about every graph.

## 2.3 Back-end related questions

**Can you tell us more about the OAuthentication used to log into CERN's products and how it exactly works?** Are you talking on a technical level or a global level? (Frederick): On a technical level and on a global level? (Pascal): From the users side you can log into CERN's products, that's very nice. On a technical level, I don't know that much. (Frederick): So it's more like a token you receive to use CERN's products? (Pascal): yes

**Can you tell us more about SAMS?** My experience with SAMS as a on caller and as a shifter is that I use it to book my shifts. You need to do this early since the other shifters want to book their shifts depending on their vacation and the free days they have. At sams you can look at a kind of agenda and with that you can book your shifts. Sams can also be used to search for phonenumber from shifters to reach somebody. Sams is also used for a big screen view, that sits into the corner of the control room. There, all the cellphone numbers are shown for the on callers.