Master's Thesis

IS enabled process innovation at Alcoa Fjardaál

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June 2012

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June 2012
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Number of characters: 187.547
CD attached with recordings of the interviews

ABSTRACT

The purpose of this thesis was to investigate the following research question: *"What is the safety processes at Alcoa Fjardaál and how is the system, MES, used regarding the processes? Does this contain problems and if so how can they be improved?"*
his abstract summarizes the studies performed in this thesis and the results from this. The case of the thesis was the safety process at Alcoa Fjardaál. Work safety is a core value at Alcoa, and their goal is to have zero work-related injuries and illnesses. In co-operation with Alcoa Fjardaál, it was agreed to look closer into the processes and issues related to health and safety and furthermore look into how to facilitate the wish of further involvement of the operators in the Manufacturing Execution Systems (MES).
To gain an understanding of the safety process, we interviewed three safety manager, 11 coaches, six operators, a process owner of MES, an ABS specialist, an education employee and an IT employee. These interviews provided us with the knowledge and understanding of the safety process which made it possible for us to identify problems as well as opportunities of improvement. The identification was made by analysing the interviews within three main parts: 'Analysis of the process', 'analysis of the system design' and last 'training of the coaches and the operators'. The found problems were discussed to find solutions, and this part of the thesis drew on theory from the paper "IS Driven Process Innovation: A Literature Review Based on Swanson's Tri-Core Model of IS Innovation" (Dorset, Müller and Purup 2012). We wrote this paper during our last semester, and it contains state-of-the-art knowledge regarding process innovation. The paper was a review of the literature on IS driven process innovation, and the focus of this paper was on how organizations could drive process innovation efforts by means of Information Systems (IS). Swanson's tri-core model of IS innovation was used as an analytical framework as the paper contains three types of process innovation. The review literature contributed to an understanding of each of these three types as it was categorized according to Swanson's three innovation types. For each type the review literature provided a number of themes, and the themes regarding type 3 innovation was used in this thesis because the solutions to the problems in the safety process were found to affect Alcoa Fjardaál at all levels and thereby the technical core also called type 3 innovation. The theory on type 3 innovation was used as a theoretical foundation to support the discussion of solutions and for providing structure to the discussion. Through the discussion a number of solutions were found and grouped in the following categories:

- Alcoa Fjardaál needs to decide and clarify what they want to change and commit to it
- Standardized training for the operators, coaches and safety employees
- Preparing for the implementation of the changes
- Alcoa Fjardaál needs to be better at sharing knowledge and communicating clearly

In the end of the thesis, it will be discussed if the solutions are in accordance with the advices that were given to practitioners in the paper or if there are grounds for more nuances in the advices.

PREFACE

We would like to thank the people who have been kind enough to contribute to our project. First we would like to thanks Alcoa Fjardaál for their contribution and for making this co-operation possible. We would likewise like to thank Janne Sigurdsson and George Ogmundsson for their involvement in finding the right thesis and making our stay at Alcoa informative and satisfying. Furthermore we are grateful for their personal effort to make us feel welcome and appreciated.
We also thank the IT-department at Alcoa Fjardaál for their helpful service and Bjarni Haraldsson for his kind help with practical issues. Moreover we want to thank the employees from the administration for making time to an interview. In addition a great thanks to the safety team, the coaches and the operators who provided all the information we wanted, without them the project would not have been possible.
Furthermore we would like to thank our mentor Sune Dueholm Müller for knowledgeable and inspirational supervision.

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INTRODUCTION

INTRODUCTION

The financial situation, the customers' requirements and keen competition are pressuring today's production factories to maintain a strong reputation in order to be a considerable competitor in the market. A part of maintaining a strong reputation is ensuring the safety of the employees and trying to eliminate the hazards of production.

In heavy industries, like the production of aluminium, incidents are a part of the daily work. Employees have to be aware of the dangers that can arise when working with e.g. hot metal and heavy machinery. The incidents can lead to serious injuries or even death if the right precautions are not taken. Health and safety is therefore very important, and The Aluminium Association is focusing on issues related to the 'health and safety' area (The homepage of the Aluminium Association). One of Alcoa's goals is to have zero work-related injuries (The homepage of Alcoa), and the vision of Alcoa International for 'health and safety' as well as for the 'environment' includes:

"We work safely in a manner that protects and promotes the health and well-being of the individual and the environment." (The homepage of Alcoa)

The intense focus on 'health and safety' for the employees means that there is a demand to keep track of incidents and make changes to prevent similar incidents (ABS document, appendix A). Reducing incidents mean increased safety for the employees which is why it is important to handle the incidents effectively. An information system enables organizations to improve their efficiency (Grover et. al. 1997), and Alcoa Fjardaál has chosen to track every incident in their information system, Manufacturing Execution Systems (MES). The system is being used all over the plant from production to incident management. In regards to 'health and safety' the MES can help prevent incidents. In order to gain as much as possible from the MES, it is important to be aware of any problems in regards to the use of the system and the processes surrounding the system. Problems could mean that the incidents are not dealt with in the best way.

This project will be based on IS enabled process innovation of the safety process at Alcoa Fjardaál in relation to analysing and optimizing the safety processes and the usage of the MES.

1.1 Problem field

In the following section we will describe our problem field regarding Alcoa Fjardaál and the ABS requirements that Alcoa Corporation has made. In the end we will present research questions of the project.

1.1.1 Description of the problem field

To help manage the organization, the Alcoa Corporation has made an ABS (Alcoa Business System) that includes a set of principles and tools. The three main principles of the ABS are:

1. Make to use
2. Eliminate waste
3. People linchpin the system

The first principle includes the ideal of single-piece production as well as producing on demand, defect free, safely and at the lowest possible cost. The principle is based on producing to customer usage, instead of producing to inventory. The second principle is to continuously improve the cost, quality and speed of all the manufacturing and the business processes. The third principle includes the people environment and the involvement of all employees in identifying and solving problems that are linked to principle one and two.

In the ABS, the third principle is drawn upon in the section regarding problem solving. Problems have to be solved using a scientific method, and it is furthermore required that the problem is solved in a short amount of time and close to the location of the occurrence. The root cause should be found by using the methods incorporated into the system. The organization should be able to measure the number of problems identified and compare it to the number of problems solved. When a problem is solved, verification activities have to be carried out, and the operators need to be a part of this when possible. In addition an effort has to be made to coach each person involved in the problem solving (appendix A).

Alcoa Fjardaál is thus also using the ABS requirements; however they are having problems living up to the requirements in the ‘health and safety’ area, even though this is an area that the Alcoa Corporation highly prioritizes. Alcoa Fjardaál has identified that they, for instance, have problems with involving the operators and their following up process e.g. the verification activities. Not only can the problem with failing to meet the requirement create issues with the Alcoa Corporation but the problems related to the work safety can also harm the reputation of the Corporation.

In co-operation with Alcoa Fjardaál, it has been agreed to look closer into processes and issues related to the Health and Safety department and into how it is possible to facilitate the strategic wish to involve the operators more in the system. Alcoa Fjardaál wants employees to record into the system when they observe something that is unsafe. The Health and Safety department is responsible for the ‘health and safety’ part of the MES and how incidents are handled.

We are going examine the following questions:

- What is the safety process at Alcoa Fjardaál and does it contain problems?
- How is the system, MES, used regarding the safety processes?
- How can the wish, about the operators being more involved in the system, be facilitated?
- What kind of initiatives does it take to deal with potential problems in the safety process?

The research question is therefore:
What is the safety processes at Alcoa Fjardaál and how is the system, MES, used regarding the processes? Does this contain problems and if so how can they be improved?

1.2 Structure of the project

The following subsection describes the overall project structure. The project is structured as shown in the model underneath (figure 1). First we presented the thesis as well as the research question. Then we will go through our theoretical foundation and our methodical considerations. Thereafter the analysis will identify problems in the safety process. Based on the analytical foundation, the discussion will present suggestions for improvements in the processes, design of the system and training. We will also make suggestions about how the improvements can be implemented at Alcoa Fjardaál. In the end we are going to look closer into how this case study has given new perspectives on the theoretical foundation.

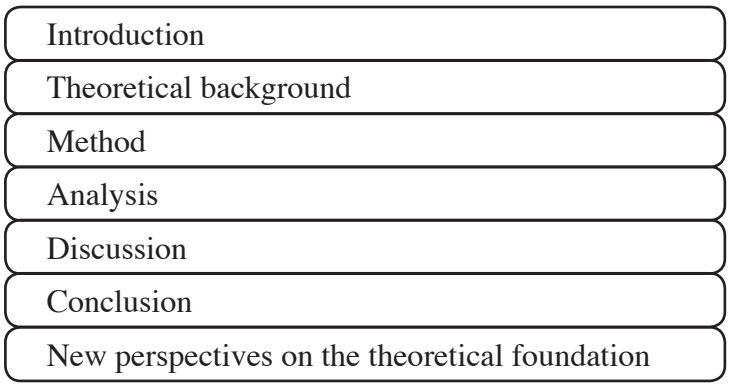

Figure 1

1.3 Theoretical background

We have chosen to base this project on our paper from 2012 "IS driven process innovation: A literature review based on Swanson's tri-core model of IS innovation" (Dorset, Müller, Purup 2012). In the following section we are going to the present the theme of process innovation and in the end Swanson's tri-cores model will be described.

1.3.1 Process innovation

As described in the paper by Dorset, Müller and Purup a changes in the system requires an organization to have a strategy for enhancing the organization's ability to cope with changes through a continuous process of renewal (Wastell et al. 2007) and to reshape behaviours to ensure success (Abraham and Junglas 2011). We are using the defining of process innovation from Thomas Davenport because it clarifies the concept of process innovation:

"The term process innovation encompasses the envisioning of new work strategies, the actual process design activity, and the implementation of the change in all its complex technological, human, and organizational dimensions." (Davenport 1993)

Process innovation is relevant to our project with Alcoa Fjardaál because we want to look more closely into the current safety process, the use of the MES and also how the potential changes should be implemented.

1.3.2 Theoretical framework

A typology of three different types of process innovations is provided by Swanson's tri-core model of IS innovation from Swanson's paper from 1994 "Information Systems Innovation among Organizations". We used the paper as an analytical framework in a review of the literature on IS driven process innovation, and the focus of our paper was on how organizations can drive process innovation efforts by means of Information Systems (IS). We identified 837 potentially relevant articles from exhaustive searches in the 110 journals on the AIS list of MIS journal rankings (The homepage of the AIS). Out of this initial pool, 32 articles were found that concerned IS driven process innovation. Within these articles we pinpointed ten themes which, by themselves, contribute to an understanding of each of the three types of innovation. In addition, we found five common issues across the innovation types. These issues are: "Organizational size", "leadership", "strategy", "resistance" and "knowledge".

The following paragraph will present a definition of the three types as well as the themes identified within the relevant articles concerning each type.

Type 1 innovation: The IS core

Type 1 innovation is *"defined as process innovation restricted to the functional IS core"* (Swanson 1994: 1076). This innovation mainly impacts other parts of the organization indirect, e.g. through improvements in IS efficiency.In type 1 innovation there are three themes. The first is "leadership" which focuses on the management style of the IT management, the importance of senior management support and the employees' willingness to participate. The second theme is "resistance" and is about the employees' resistance to changes produced by the innovation. The third theme, "organizational size", focuses on the size of the organization and of the IT department as important factors influencing the adoption of IS innovations.

Type 2 innovation: The administrative core

A type 2 innovation *"applies IS products and services to the administrative core of the host organization business"* (Swanson 1994: 1977). This innovation does not directly affect the core business technology for the organization's production of goods and services. This means that this type of innovation does not affect the core business technology of the production. In the type 2 innovation there are two themes. The first theme is "knowledge" and deals with how IS can support knowledge management. The second theme is "leadership" and focuses on the role of senior management in innovation adoption but also emphasizes the importance of gaining the support of the employees.

Type 3 innovation: The technical core

A type 3 innovation *"integrates IS products and services with core business technology, and typically impacts upon general business administration as well"* (Swanson 1994: 1977). Here the whole business is potentially affected by the innovation. It might be a strategic innovation that provides a competitive advantage to an early adopter. Such advantages include product or service differentiation and low cost production. Type 3 innovations may compel changes and innovations in the administrative structure or the IS function which in turn may result in a type 1 or 2 innovation (Grover et al. 1997).

There are five themes that concern type 3 innovation. The first is "strategy" which is about aligning the IT and business strategies, reconciling expectations and deciding upon technological solutions. The second theme is "barriers" which deals with obstacles to implementation, whereas the third theme "success factors" focuses on conditions for successful IS driven organizational

changes. The fourth theme "implementation methods" centres on the step-by-step process in achieving innovation success. The last theme is "knowledge sharing" which focuses on how knowledge and ideas are spread and integrated into the organization.

The organization is affected differently by the three innovation types. A type 1 innovation is an IS process innovation, while type 2 and type 3 innovations both *"involve IS products in the service of basic business processes and products"* (Swanson 1994: 1979). A type 2 innovation supports the business administrative process, whereas a type 3 innovation focuses on core business products and processes. All three types of innovation are likely to develop over time across domains as they are successfully adopted (Swanson 1994: 1977).

The paper, "IS driven process innovation: A literature review based on Swanson's tri-core model of IS innovation" (Dorset, Müller, Purup 2012), will be used in this project to discuss and suggest solutions to the problems that Alcoa Fjardaál has in the use of their IS system. Therefore we firstly have to identify the problems in the safety process of Alcoa Fjardaál in order to understand which kind of solutions we will argue for. The solutions that we present will relate more to one of the three process innovation types, and the themes from this type will be included in the discussion to make our suggestions more valid and enhance the quality of the suggestions. Furthermore it will be discussed if the theory is sufficient or if there are perspectives found in the case study that the theory does not cover.

CHAPTER 2

METHOD

METHOD

The purpose of this chapter is to clarify the considerations of method that was made prior to this project. The next section will provide the reader an insight into how the solutions of the project have been made.

2.1 Research design, case study

In this project, the research design will be qualitative in the form of a case study. We will make an empirical study in order to examine the phenomenon in the context in which it takes places (Antoft and Salomonsen 2007). As our case is the safety process at Alcoa Fjardaál, we will interview safety managers, coaches and operators at Alcoa Fjardaál to clarify the safety process followed after an incident occurs and how the process can be improved.

We chose to start off with a grounded approach as we wanted to explore the current situation at Alcoa Fjardaál in regards to their safety processes. We wanted to gain an understanding of the conditions, the processes and the employees. The grounded approach is appropriate for this as we did not know what we would meet at Alcoa Fjardaál and therefore wanted an open approach. However, before we chose to co-operate with Alcoa Fjardaál, we knew that we wanted to focus on improvement of processes driven by IS as we found this to be an interesting subject, and furthermore we have previously written a review of the existing literature on IS driven process innovation. As it was a review of different theories concerning the same theme, we did not have a certain way of looking at the IS driven process innovation, but rather we gained an understanding of different stances. This means that we had a broad frame that later was narrowed down to safety processes, but we did not know which kind of issues to look for in the process. The grounded approach helped us gather information that we could use in our analysis to identify problems in the process.

The discussion present a discussion of the problems identified in the analysis against the literature from the mentioned paper as this is state-of-the-art knowledge regarding process innovation. The theory will be used to support the discussion of solutions for the found problems. Furthermore the theory contributes by giving a structure for the discussion as the five themes, presented in the paper, will be used to organize the discussion of the solutions. In the chapter new perspectives on the theoretical foundation, it will be discussed if our solutions are in accordance to the advices for practitioners presented in the paper or if there are new nuances to the advices for practitioners.

We are working with a single case design as we are only working with one case. Furthermore we are working with multiple points of view, but we consider them as one unit of analysis as all the views have been used to gain an understanding of the current situation. This is therefore a holistic case study design (Yin 2009:50).

2.2 Criteria for judging the quality of project

2.2.1 Validity

The internal validity concerns whether you examined what you wanted to examine (De Vaus 2001) and whether *"you are observing, identifying or 'measuring' what you say you are"* (Mason 2002:39).

We have talked to three safety managers, 11 coaches and six operators, which means that none of their statements stands alone. We were able to speak with the safety manager from each production area, and furthermore we spoke to 11 out of the 16 coaches which means that we spoke to two-thirds of all the coaches. Summary accounts were sent to the key informants in order for them to determine the validity of our understanding (Mason 2002). Our key informants were the safety managers, the coaches, the education employee, the process owner of MES, ABS specialist and the IT-employee. The summary accounts were sent to the individual mail accounts of each of the respondents to keep the summary accounts anonymous.
In order to understand the process we gathered information from different levels of the parties involved in the safety processes, and the descriptions were found similar
All of the above heightens the internal validity.

The external validity concerns whether the findings of the study are generalizable beyond this case study. This involves if it is possible to *"make some form of wider claim on the basis of your research and analysis"* (Mason 2002:39). As this is a case study, it does not make sense to talk about statistic generalization; however it is possible to talk about analytic generalization (Yin 2007). In the chapter new perspectives on the theoretical foundation, we have lifted the propositions for improvements at Alcoa to a more general perspective to see if the propositions are useful for other enterprises that face a type 3 process innovation. This will be done by looking into whether the practical advices of the theory are in accords with the knowledge gained through this project. We might be able to present new nuances to the theory or find new perspectives that the theory does not includes. As we are able to present a more general perspective, the external validity is high in regards to analytic generalization.

2.2.2 Reliability

The reliability concerns the consistency of the results of the study (Kvale and Brinkmann 2009) as the object is to make sure that other investigators will come to the same conclusions if they follow the same procedures and conduct the same study as the original case study did (Yin 2009). *"The goal of reliability is to minimize the errors and biases in a study"* (Yin 2009:45).
The internal reliability regards whether the *"members of the research team agree about what they see and hear"* (Bryman 2004:273). This is enhanced by making sure that there is agreement about the content of the interviews (Bryman 2004). We chose to record all the interviews as this made it possible to listen to the tape in case of disputed points. All the summary accounts of the interviews were read and compared to the recorded interviews to make sure that we both had the same understanding of the interview. The internal reliability is therefore high.

The external reliability concerns *"the degree to which a study can be replicated"* (Bryman 2004:273). The external reliability is in this project low as the study cannot be repeated. Others might not find the same results by doing the same investigation as it is not possible to 'freeze' social settings and circumstances (Bryman 2004). Alcoa Fjardaál could make new initiatives, improvements and updates. All high and medium incidents can lead to changes, and therefore changes are inevitable. The respondents could also get better and more familiar with the MES and its terms.

This table shows the conclusions regarding the criteria for judging the quality of our project:

Criteria for judging the quality	Conclusion
Validity	
Internal validity: The degree to which the study examines what was intended	High
External validity: The degree to which there can be made an analytic generalization	High
Reliability	
Internal reliability: The degree to which there is an internal consistency	High
External reliability: The degree to which the study can be repeated	Low

Figure 2

2.3 Case description of the Alcoa Corporation

2.3.1 Alcoa Corporation's history

Alcoa is the world´s leading producer of primary aluminium and fabricated aluminium. They are also the world´s largest miner of bauxite and refiner of alumina. In February 1886, Charles Martin Hall (1863-1914) developed the commercial process for smelting aluminium as he discovered an inexpensive method for isolating pure aluminium from its compounds and in 1888 the Pittsburgh Reduction Company was formed. The name, however, was changed in 1907 to Aluminium Company of America and officially shortened in 1999 to Alcoa. Alcoa´s lightweight aluminium changed the aluminium industry forever.

Alcoa strives for excellence in everything they do, and the vision of Alcoa is *"to be the best company in the world - in the eyes of our customers, shareholders, communities and people"* (The homepage of Alcoa).
This vision includes values such as integrity in dealing with customers, suppliers, co-workers, shareholders and the impacted communities; profitability; and accountable for behaviours, actions and results. A core value at Alcoa is work safety. They strive for protecting and promoting the health and well-being of their employees, contractors and the communities in which they operate. In 2011, they achieved their first full calendar year without an employee fatality. Their goal is to have zero work-related injuries and illnesses. The lost workday injury rate is 1/10 the average of U.S. manufacturing workplaces.

	Alcoa	U.S. manufacturing average
2007	0.12	1.3
2008	0.12	1.2
2009	0.13	1.0
2010	0.12	1.1

Figure 3: Lost workday incident rate represents the number of injuries and illnesses resulting on one or more days away from work or without days of job transfer or restrictions per 100 fill-time worker (The homepage of Alcoa).

Alcoa has approximately 61,000 employees and operates in more than 200 locations in 31 countries.
Two of these locations are in Iceland. Reydarfjordur is the location of an aluminium smelter, and the office in Reykjavik is the Iceland administrative contact point for the company's operations in Iceland (The homepage of Alcoa).

2.3.2 Alcoa Fjardaál

Fjardaál, which means "Aluminium of the Fjords" in Icelandic, is one of the biggest developmental and economic projects in Iceland's history. The construction of Fjardaál began in 2004 and Fjardaál reached full operation on April 8, 2008. The facility consists of a smelter, a casthouse, a rod production and a deep-water port. Fjardaál produces 940 tons of aluminium a day and has the capacity for producing 346,000 metric tons of aluminium per year for shipment. There are 480 employees at the facility today and about one-third of them are women which is the highest percentage of any of Alcoa's smelters worldwide. The age of the employees range from 18 to 70, and the employees have diverse education and experience. Around 20% of them have a university degree, 20% a vocational college degree and the rest have all kinds of different educations and backgrounds.

Alcoa Fjardaál is currently working together with the local authorities and other partners to explore the feasibility of a second smelter in Iceland. This smelter may be powered by tapping the abundant geothermal resources of Iceland. The smelter would be the world's first of its kind.

In this project we have mainly interviewed employees from the potline, the casthouse and the rodshop as we found it relevant to gather information from the different production areas that use the MES for reporting incidents. The selection of respondents will be discussed in the method section. The potline is divided into potline A and potline B as there are two areas of production. The employees have 12-hours shifts, and they are divided into four shifts; A, B, C and D (The homepage of Alcoa).

2.4 Safety at Alcoa Fjardaál

This section will address how safety incidents are managed at Alcoa Fjardaál. It will start of by describing the classification of safety incidents at Alcoa Fjardaál, and then the department for safety issues will be presented. This also includes the different levels that are involved in dealing with the safety problems in different stages of the safety process. In the next subsection the current safety process will be shown. The last subsections concern the tools that are used for either avoiding serious safety incidents or methods that are used to investigate the serious incidents that have happened.

2.4.1 Incidents

Alcoa Fjardaál is operating with three types of incidents concerning the safety of the employees. All safety incidents are categorised into one of the following three categories: low, medium and high. The categorisation of an incident is based on the seriousness of the incident or the assumption that it could have been serious. The incidents in the low category are not investigated, but both medium and high incidents are investigated to prevent them from happening again.

The Health and Safety department operates according to the following incident pyramid: For every 1000 low incidents there are 10 medium incidents and 1 high incident. They try to put as much

energy into the low category to fix the low problems so they will not lead to medium incidents. By putting a “near-miss” incident into the system, they try to prevent serious incidents from happening.

- A low incident is e.g. an injury not requiring treatment or an instance of missing safety equipment such as protective glasses.
- A medium incident is e.g. an injury requiring treatment
- A high incident is a serious injury or death.

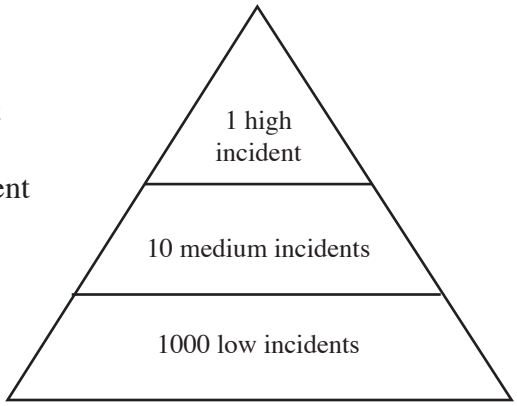

Figure 4

2.4.2 Managing safety incidents

There are five managers that are mostly involved in ‘health and safety’: CEO of Alcoa Fjardaál, the head of Health and Safety department, the managers of the potline, the casthouse and the rodshop, respectively. They read the information about incidents, evaluate the situation, review preventive measures and report incidents to the governing body.

The Environment, Health and Safety team (EHS) consists of the head of Health and Safety, a safety expert for the whole plant and three safety managers who are mainly responsible for the potline, casthouse and rodshop, respectively. The EHS team gives the coaches advice, reviews incidents and assists with investigations, especially in critical investigations. They are also responsible for coaches’ training which is based on the team experiences. Every morning the team goes over what has happened in the last 24 hours, and they talk about any incidents and about who is responsible for running the investigation.

The safety manager of potline has eight coaches, while the safety managers from casthouse and rodshop each have four coaches. The coaches are the ones who are mainly putting the incidents into the system and are doing most of the investigations. The coaches are responsible for their team, and they have a team leader to assist them, however the team leader can vary from time to time. If the coach is sick, an experienced team leader is capable of taking over. The team leaders are not capable of running an investigation, but they can report low incidents.

In each area the number of operators varies. The operators have permits to report incidents into MES, but not many are doing it as they mostly report to a coach or a team leader. The permit is limited which means that the operators cannot see any names in MES. Names can only be seen by the persons with an investigator’s permit which all the coaches and managers have.

The following figure shows the organisation of Health and Safety.

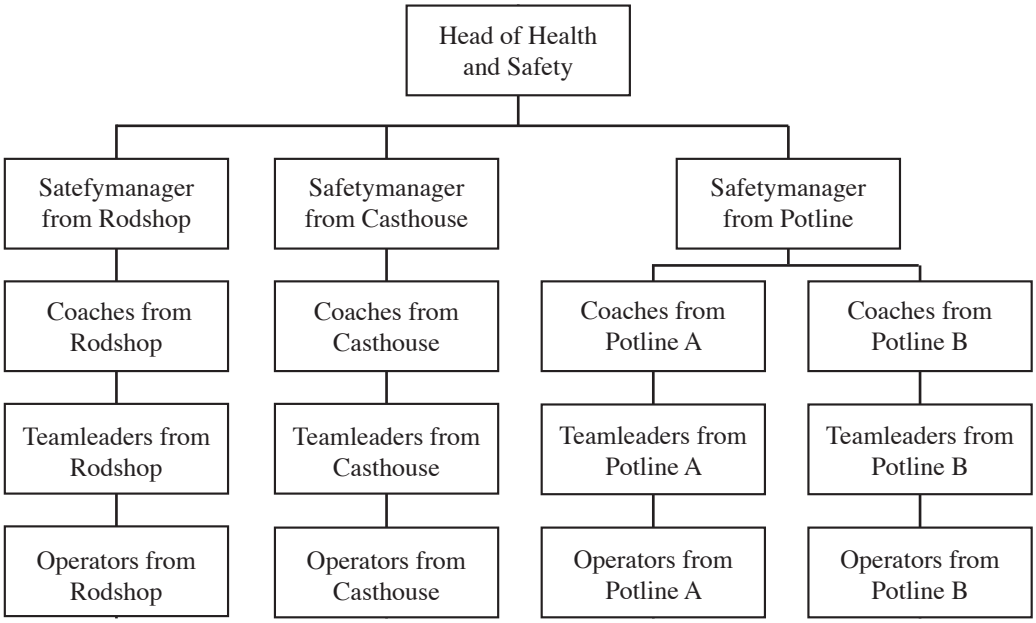

Figure 5

2.4.3 Safety process

We asked all the coaches about the process after an incident has occurred, and with them we drew a swimlane diagram after the sunny-day principle that is the typical process. We asked them to describe a medium or high incident, and we found that the process was quite similar with a few deviances. The general sunny-day process for an incident with an injury is shown in the figure in Appendix B.

We have divided the process into four subprocesses:

1. An incident happens
2. The incident is reported into the system
3. The investigations is carried out and entered into the system
4. The investigation is over

The sunny-day process for an incident with an injury is as following:

1. **An incident happens**
   When an injury happens, the coach is called, and he comes to the accident right away. The injured employee is sent to health care immediately, and they will assess the injuries. If the incident involves a mobile vehicle, the employee is always sent to health care to take an alcohol test.

2. **The incident is reported into the system**
   The information is put into the MES right away. This includes information about the time of the incident, who was involved, where it happened, what happened and the categorisation of the incident. After the information is reported into the system, an email with a notification about the incident is automatically sent out to the relevant employees.

3. **The investigation is carried out and entered into the system**
   The coach starts by getting an overview of the incident and takes pictures of the sight. Witnesses are interviewed which lead to a more detailed description of what happened. To find the root cause of the problem, a method is used, and when the root cause is found, corrective actions are made to ensure that the incident cannot occur again.

4. **The investigation is over**
   As a result of the investigation corrective actions are formulated, and the involved persons will be informed and the corrective action will be shared with the right persons.

In the interviews we found that the work of some coaches deviates from the sunny-day process, and in the following section we will point these deviances out.

1. **An incident happens**
   The use of health care deviances as some of coaches and safety manager use health care to make a classification of the incident, and others only use health care to treatment of the injuries.

2. **The incident is reported into the system**
   There are deviances regarding the time of reporting the information into the MES. Some of the coaches like to bring a piece of paper and take notes when they investigate and put it into the system when the investigation is done (potline coach 5, safety manager 1, potline coach 4). Potline coach 4 explains that she sometimes waits to report into the system if she has other things to do, but it depends on the incident. If it is a high incident, she reports right away. Potline coach 5 is not capable of finishing the investigation on his own, but he always starts the investigation in the system by reporting in what he knows at the time. If the operator is fit to get back to work, the coaches often ask the operator to follow them to the office, and they will go through the incident together right away. The operator will be questioned about the sequence of events. However if the operator is sent home, he will be interviewed, the next time he is at work. Potline coach 7 says that the investigation sometimes has to be postponed, e.g. if they need more information, and the involved persons or witnesses are not available. If it is the nightshift, there might be some people that are not available.

3. **The investigation is carried out and entered in to the system**
   Potline coach 5 and rodshop coach 1 explain that other personnel e.g. technical and maintenance staff might be involved to get a clearer picture of the sequence. Not all the coaches are capable of investigating high incidents on their own, e.g. casthouse coach 2 involves the safety team in high incidents, and usually they take over. Potline coach 5 reports that the safety team also helps him with the focus of the investigation. He can start the investigation in the system, but he needs help to finish it.

4. **The investigation is over and the corrective actions are in place**
   Potline coach 7 explains that they try to finish the investigation of an incident before they leave. If you have three shifts and then leave, you will try to finish before you leave. Potline coach 6 and potline coach 5 say that the target is to finish within the same shift or within 24 hours after. When casthouse coach 2's shift is done, he will give the report to the coach after him, and that coach will talk to the next shift. Potline coach 4 explains that if it is necessary, the information will be put on the information board[1].

2.4.4 Methods of investigation

From Alcoa Fjardaál, we learned that two methods, Fishbone and 5-whys, are being used in investigations. This section will shortly present these methods and the intended way of using the methods, however how they are used at Alcoa Fjardaál is not the subject here as that will be brought up in the analysis.

Both the fishbone and the 5-whys are methods that can help the investigator find the root cause of an incident. The root cause is important to find in order to avoid a repetition of the incidents in the future.
The fishbone diagram (also called a cause-effect diagram or Ishikawa diagram) is a diagram that makes it possible to work back from a given problem and identify the main categories of possible causes for the problem. For each of these categories, possible causes for the problem are identified and as these causes are put into the diagram, it enables a discussion and clarification of each of them (Law 2009). At Alcoa Fjardaál they have chosen five main categories to help them identify the causes of safety problems:

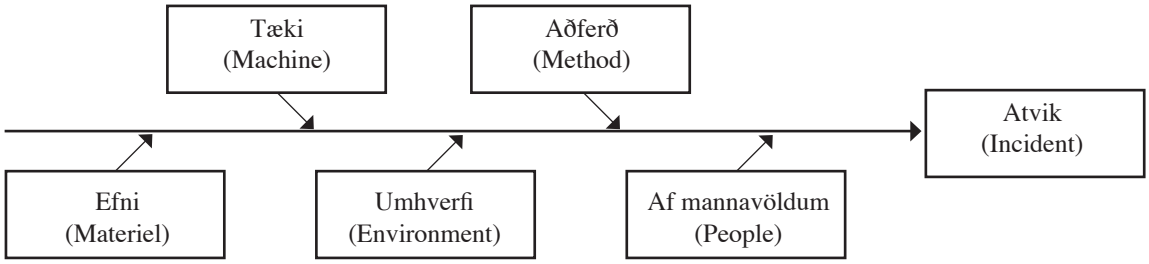

Figure 6

5-whys

5-whys is a question based technique that is used to explore the cause and effect relationship underlying a problem. When a problem arises, the 5-whys is used to identify the root cause which makes it possible to prevent the problem from happing again. The 5-whys method involves asking five questions. The answer to first why-question will be followed by a wondering that will lead to the next why-question. The why-question is always related to the answer to the previous why-question. By doing this the root cause of the problem will be found (Christiansen et. al. 2010).

1. The information boards are placed in various areas in the plant. It is used to inform the employees about the latest information.

2.5 Interview

In this project we used interviews to gather knowledge about the safety processes and the use of the MES in regards to safety at Alcoa Fjardaál. First, we wanted an understanding of the current safety process and where there might be problems. Second, we wanted to know how Alcoa Fjardaál uses the MES and hear what the users think of the system. We were interested in gaining both managers' and employees' perspectives on the process and use of the MES. This provides an opportunity to understand what problems the employees experience and the context in which they are working.

In the beginning our goal was to get as much knowledge as we could about the process. Prior to our visit to Alcoa Fjardaál, we only had the knowledge about the safety process that we had gained through a couple of phone meetings with the CEO of Alcoa Fjardaál and safety manager 1. This meant that our first interviews at Alcoa Fjardaál were done without a static interview guide as the interviews were conducted on the basis of a list of topics that were found relevant. We were mostly interested in discovering problems in the process, but to do this it was important to gain an understanding of the existing process, the MES, or the attitude towards the two. The first respondents, which were the safety managers, were allowed to take more of a lead during the interviews as we both needed to gain an understanding of the process as well as of the system, and we did not want to interrupt something that could be important. As we gained more knowledge about the problems, our interview guide became more structured and focused, and we able to ask more questions and to be critical of the process. However, it was important for us to have a dynamic interview guide. This allowed us to ask questions about any new subject that the respondents brought up and include the new subject in the following interviews.

2.5.1 Interview guide

The interview guide (appendix E) is divided into topics in order to make it possible to analyse each topic and compare the interviews with each other. The interview guides were developed during the interview period because we discovered new issues we wanted to ask the respondents about. As mentioned earlier we had two approaches to the interview. First we had an exploratory approach, and afterwards we had a more clarifying approach. This also meant that the interview guide for the coaches and the operators was based on the knowledge we gained from our exploratory research.

The main focuses during the interviews were the process, the system and the training. The MES was used actively during the interviews in order to see how the employees used the system in regards to 'health and safety'. In co-operation with the coaches and safety persons we made a swimlane diagram of the process from an incident occurs to the investigation is finished. The understanding of the process made us able to analyse if there were some discrepancies. In the first interviews we heard that training was unstructured, and we found that this was an issue we needed to look closer into, and the following respondents were therefore asked about training.

2.5.2 Choice of respondents

As mentioned earlier we wanted an understanding of the process for addressing safety problems and the current use of the MES, and therefore we wanted to talk to the safety manager of each production area as well as the coaches as they are usually the ones to report the incidents. However, we also wanted to talk to some of the operators because we wanted to get information regarding their knowledge of the system. We were also interested in knowing whether the operators want to do more in the system as the management wishes to involve the operators more in the future.

The casthouse, the rodshop and the potline each has a safety manager. We chose to interview these three managers first as they were able to give us an overview of the safety processes. The safety manager from the potline was also our contact person, and in order to get access to the respondents that we wanted, we went through him. We therefore discussed with him who we wanted to talk to as we were interested in getting a diversity of employees. This meant that we wanted to talk to employees from different production areas, and we asked to talk to both new and experienced coaches. However, to get in contact with the operators, we asked a coach from the rodshop and the casthouse as well as the safety manager from the potline to each find two operators who could talk to us.

We interviewed 11 coaches; two from the casthouse, eight from the potline and three from the rodshop. Out of the 11 coaches only one was a woman. Three of the coaches were employed as coaches, and the rest of them had been operators before being upgraded to coaches. The coaches had been employed for three to five years. Five of the coaches had been coaches for less than two-and-a-half years and the remaining six coaches had been coaches for more than four years. The coaches rated their IT-skills to be between five and eight on a scale from one to ten.
We also interviewed six operators, two from each department. They had been employed from one year to five years, and they rated their IT-skills from 'learning' the system to eight. Half of the six operators were women. Potline coach 7 is really a team leader, but we have chosen to place him on an equal footing with the coaches as he is taken over for the coaches when they are not there. He is therefore able to do the same things as the coaches, and he has the same permits as the coaches. From now on he will be referred to as a coach to make the reading easier.

We also interviewed two employees from the ABS team as they were able to give us an understanding of how the information reported in the system could help or hamper the meeting of the ABS requirements.
Furthermore we talked to an employee from the IT-department as we wanted to know more about how changes in the system were made and if it would be difficult to make changes. It was also an opportunity to discuss some of our thoughts on improving the MES.
As we found diversity in the training of the coaches and operators, we also talked to an employee from the education department. We talked to her about the amount of training, but we also discussed some of her difficulties with the MES.

Because we interviewed employees in different production areas and at different levels of the production areas, it meant that we were able to compile both the vertical and horizontal dimensions. Since we were talking to safety managers, coaches and operators we are able to understand how the different levels affect each other e.g. if the management influences the situation of the coaches and the operators. We are also able to find out whether there is agreement on various issues on the different levels. The fact that we spoke to more persons on the same level but from different production areas have made it possible for us to gather information about whether the production areas were different or similar. This helped us to gain information about whether something was unique to a certain production area and find out why the uniqueness was present. However, similarities between the different production areas are also important as they are almost certainly a result of decisions made on a higher level. We therefore find it very positive that we were able to interview across levels and production areas.

2.5.3 Ethics

In order to document the interviews we have chosen to record the interviews. In that way we as interviewers can concentrate on the interview. The words and tone of voice is permanent recorded

and can be listen to again and again. But the recording does not contain the visual aspects of the situation; neither the physical placement nor the facial expression and gesture of the participants are included. However we chose to make notes during the interviews, and in that way we got the opportunity to get important facial expression or gesture written down for later use.

As we want to analyse the interviews, we needed to get the information transcribed in order to make the interviews more structured and easier to analyse. There are many different methods of transcriptions. We have chosen not to transcribe the interviews word for word but to make summary accounts because we do not need to analyse the meaning of each sentence. To determine the validity of our understanding, the summary accounts were sent to the individual mail of each respondent by mail to keep the accounts anonymous. The respondents were given 14 days to respond with corrections and comments. This deadline was chosen due to time pressure and because it was believed that the mail from us would be read within that timeframe

2.5.4 Anonymity

We wanted to keep the identities of the respondents anonymous as they should feel free to say what they want, and furthermore it is not relevant to identify any particular person. In order to do this all respondents are identified by their work title instead of their names. In this way we will be the only ones who know the identities. However, place of work, work title and length of their work period will appear which could give persons with knowledge about the different production areas a hint about who is behind the different comments. We know that the safety manager 1 has the information about who we have interviewed and will be able to guess or recognize the interviewed employees so full anonymity cannot be guaranteed. This maybe led some employees to hold back certain information, but we have no possibilities to change this. However, we have not felt that employees were trying to keep information from us.

2.5.6 Context and clothes

During our visit at Alcoa Fjardaál we worked normal work hours from 8 a.m. to 4 p.m. We spent most of the time interviewing and were given our own computer with our own email account and access to the MES. By having an Alcoa Fjardaál email, we could invite the relevant employees to interviews. We also were given permission to walk freely around most of the plant without being accompanied by an employee. Our base on the plant was in the administration department where we always had access to one of the meeting rooms. This made it possible for us to be part of the plant for the ten days we were there, and thus we were given the opportunity to experience the culture of Alcoa Fjardaál and make observations from the inside.

Due to the safety at Alcoa Fjardaál, we had to wear safety clothing consisting of a boiler suit, a green helmet, safety glasses, earplugs and safety shoes. However, our safety clothes were not identical to the clothes of the employees at Alcoa Fjardaál. They wore blue trousers, an orange coloured jacket and a blue or a yellow helmet. This meant that we could not go as native as if we had been wearing the same clothes as the employees, but we did not stick out as much as if we had been wearing normal clothes. This could have been the reason for us not being seen as much as visitors as we had anticipated. The Alcoa Fjardaál “uniform” made it easier to create a trusting atmosphere between us and the employees. We thought a lot about how to avoid appearing as know-it-all university students; on the contrary, we wanted to present an open and respectful attitude toward the employees. We were there to learn from them. We chose to meet the respondents in their surroundings i.e. meeting rooms in the casthouse, the rodshop and the potline and therefore close to their workplace to provide a more relaxed atmosphere. It also had the effect

that the interviewed coaches were able to answer their work phone during the interview or leave the interview if necessary in order to help their employees. That we were able to interview the employees in their surroundings also gave us a better feeling and understanding of the work done in the 'health and safety' area around the plant. The interviewed coaches often took their own computers to the interview, and in that way they could show us how they worked in the MES.

2.5.7 Icelandic is hard to understand

The Alcoa Fjardaál company language is Icelandic, and the employees do not have to be able to speak English in order to work at the plant. Most of respondents were good at English, but a few had a bit of trouble understanding and particularly answering in English which meant that a common understanding took more of an effort to achieve. Furthermore there may have been details that the employees left out because they did not know how to express them in English. We experienced that the employees sometimes did not understand the questions right and at first we tried to follow their line of thought to see if it was interesting for the interview or if it could lead us to the next question. If it was not relevant, we tried to ask again by either rephrasing or giving examples. In the same way we tried to eliminate misunderstandings which meant that if there were expressions or answers we did not understand, we tried to ask more specific questions to get a better understanding. We also experienced that the respondents had difficulties finding words from time to time, and we tried to help them with suggestions toward the word we thought they were looking for. The consequence of this could be that we caused them to answer differently than they had intended, however, we do not think that the respondents have used a suggested word uncritically as we experienced in several cases that they said no to our word suggestions. The respondents, we felt were insecure about being interviewed in English because they did English very well, we tried to help by saying that it was quite all right and that we would help them through the interview.
During the interviews we learned to understand some of the system in Icelandic so that we could interview, if necessary, from the Icelandic version of the system. Even though we had some language barriers in some of the interviews we also met a great deal of enthusiasm from the employees about being interviewed.

The language difficulties did not have a negative effect on the internal validity of the interviews because if a language barrier was experienced we lowered the expectations for how much information we could get from the employee. Furthermore we solved the language problems by making the questions simpler and by using the MES in a work related context.

CHAPTER 3

ANALYSIS

ANALYSIS

3.1 Introduction to the analysis

In this chapter will be based on the summary accounts (appendix F) and presents the problems found in the safety processes of Alcoa Fjardaál. Through our interviews we learned about a number of different problems and the following chapter contains an analysis and comparison of the interviews with the coaches and the safety managers regarding their perspective on the problems in the safety process. The problems will be presented first and are followed by a description of how the problems can be seen in the current situation at Alcoa Fjardaál. The analysis is divided into three main parts: 'Analysis of the process', 'analysis of the system design' and last 'training of the coaches and the operators'. All of these three main parts are analyses of the current situation regarding safety. Furthermore, all of the main parts include factors that will affect the wish of the management about having the operators more involved in the system in the future. In the end of this chapter we will make a recapitulation which provides an overview of the results of the analysis and points out the problems that we have found in the analysis.

3.2 Analysis of the process

Problems: **Lack of standardization in regards to the 'verkeftirlit'**
Lack of a standardization regarding methods of investigation
Lack of feedback on investigations
Further involvement of the operators in the system could lead to problems

The first subsection will show problems associated with a process that is designed as a way to prevent serious incidents. The process involves the use of the 'verkeftirlit' (a form for job observation), and it will be shown that there are problems associated with a lack of standardization because the 'verkeftirlit' are put into the MES in different ways. This means that information is put into the system, but Alcoa Fjardaál is not able to learn from it. Following this problem, we will look more closely into a problem that occurs when an incident has happened, and an investigation is being carried out. It was found that there are problems concerning the methods used to investigate as there is a lack of standardization of the use of these methods. The next problem that will be addressed is the lack of feedback on the investigations that the coaches have completed. This means that the coaches do not have an opportunity to learn how to improve their work. Last we will look into a problematic situation that might arise in the future. The CEO of Alcoa Fjardaál told us that they would like the operators to be a bigger part of the system in the future. We therefore found it interesting to ask both the coaches and the operators to give us their perspective on this idea.

3.2.1 'Verkeftirlit'

This part of the analysis of the safety process shows that there is a lack of standardization in regards to the preventive measures taken to avoid serious incidents. The 'verkeftirlit' is used to catch problems before they can lead to a serious incident, and it was found that here are no clear guidelines for how to report the 'verkeftirlit' which means that they are put into the system in various ways. This is a problem as it is not possible to make statistics based on the information that is put in the system.

‘Verkeftirlit’ is used to improve the safety for the operators in all production areas at Alcoa Fjardaál. The ‘verkeftirlit’ is a piece of paper that is used to check the safety gear that the operators should be using and it will be filled out by observing a working operator.. It is a checklist which includes safety equipment, tolls, work position and work task. Each of these things has to be marked either safe or unsafe. The ‘verkeftirlit’ can be seen in the appendix C.

We have found that the coaches are putting the ‘verkeftirlit’ in different places in MES and that some are putting all the ‘verkeftirlit’ in, while others are only putting in the ones with something listed as unsafe. We have also heard that the safety manager in the rodshop puts a week of ‘verkeftirlit’ into the same report. All of this means that there is a problem with making statistics. Statistics are an important tool for getting an overview of the safety issues and a way to discover changes. This can help solve problems before they become serious problems. This subsection will compare the statements of the coaches and the operators, show how the ‘verkeftirlit’ are used and why there are problems making statistics on the basis of the ‘verkeftirlit’.

3.2.2 Filling of the ‘verkeftirlit’

In potline, the coaches are ordered to fill out at least four ‘verkeftirlit’ on each shift (potline coach 1, potline coach 2, potline coach 3, potline coach 4, potline coach 6). In casthouse, they are supposed to do four ‘verkeftirlit’ every shift, but it depends on the time and what else is going on. Sometimes they do one-two and sometime seven-ten (casthouse coach 1). However casthouse coach 2 tells that the operators on his shift (23 operators) to do at least one each per shift, but they do not always do it. The reason for this is that they do not always have the time e.g. *“because of a lack of people”* (16.09 casthouse coach 2). Rodshop coach 1 says that the safety team forces rodshop operators to do at least four per shift and the coaches should make at least two. The number of ‘verkeftirlit’ submitted, depends on *“how active people are […] so for each shift there are from four to six-seven people who are filling them out”* (14.35 rodshop coach 2). Rodshop coach 1 says that they try to get as many coaches as possible to do the ‘verkeftirlit’ as he believes that it is useless if only a few people do it.

In all the production areas the operators are filling the ‘verkeftirlit’ (potline operator1, potline operator 2, rodshop operator1, casthouse operator2), and they put them in a box and then somebody else puts them in the system (potline coach 4, rodshop operator 1, casthouse operator 2, casthouse coach 1). However, in casthouse coach 1´s shift, the ‘verkeftirlit’ are not being filled out by the operators yet as they are going through some other training. When they are done, they will start doing the ‘verkeftirlit’. (casthouse coach 1). Potline operator 2 thinks that it increases the operators’ responsibility to fill out the ‘verkeftirlit’.

Potline coach 4 tells that there are no names written on the ‘verkeftirlit’ as names could lead to a war between the operators *“because people take it very personally”* (23.11 potline coach 4). However if potline coach 4 fills them out herself, she will put her own name on them. Potline operator 1, rodshop coach 2 and safety manager 3 tell that they do only write the name of the person who did the inspection, but not the name of the inspected operator. Potline operator1 sees it as a *“checkout for your work friends”* (9.21 potline operators 1). If it is the 3rd time, the friend has e.g. the unsafe shoes on then it will be reported to the coach.

Five of the coaches in potline say that they put the ‘verkeftirlit’ in the MES themselves (potline coach 1, potline coach 2, potline coach 3, potline coach 5, potline coach 6). In rodshop, rodshop

coach 3 is putting them in the system; however both rodshop coach 1 and rodshop coach 2 give them to their safety manager. In casthouse, casthouse coach 1 is putting them in himself, but casthouse coach 2 gives them to their safety manager; however the reason might be that casthouse coach 2 only has been a coach for three months.

3.2.3 'Verkeftirlit' in the system

Potline coach 2, potline coach 3, potline coach 5, potline coach 6 , rodshop coach 3 and casthouse coach 1 are all reporting the 'verkeftirlit' separately in the system. In the past potline coach 2 has put them in together, but the safety managers did not like it. However safety manager 3 gathers the 'verkeftirlit' and once a week he puts them in the system in one report (rodshop coach 1, safety manager 3). Rodshop coach 3 mentions he has heard coaches say that it takes a long time to report the 'verkeftirlit' separately in the system, but he totally disagrees. He says that if you gather 10 small incidents then it takes 10 minutes to put them in separately, however if you put one in every time you make one, then it will take a long time.

When potline coach 2 puts the 'verkeftirlit' in the system, he puts them under 'úttekt'[2], and the subcategory is 'safety'. Potline coach 4 and safety manager 3 also put them in 'úttekt'. If there is no problem with the 'verkeftirlit', casthouse coach 1 puts it in as an 'úttekt', but if there is something unsafe, then he puts them in 'health and safety' e.g. if someone did not use a seatbelt, it is an incident. Rodshop coach 3 only reports the 'verkeftirlit' in the system if there is *"something wrong in the safety area"* (33.13 rodshop coach 3) e.g. someone is not using goggles, earplugs or the right gloves. But if it is something else e.g. if somebody is not using their work position right, then he just talks to the person. If it happens repeatedly, then he puts it in the MES.

Casthouse coach 1 thinks that there are too many things in the MES because a lot of employees are making the 'úttekt'. There may be around 10 per shift in all from all production areas and even more if employees have made extras.

Potline coach 1 and casthouse operator 2 think that the 'verkeftirlit' is a good tool, and potline operator1 thinks the 'verkeftirlit' is important to keep safety up. A month ago they were pushed to use the 'verkeftirlit' more because they had a lot of incidents last year. It automatically makes the safety better. Casthouse operator 1 believes that it is good for the new employees to see that they are using 'verkeftirlit' as that can make them feel safer. Potline coach 2 and rodshop coach 1 also think that it is a good tool, but they both agree that the 'verkeftirlit' is used too much. Potline coach 2 believes that it *"is going to have a weaker and weaker effect each time. When you have done 1000 of these then it is just a routine job"* (48.40 potline coach 2). For now it could be put aside, but it is necessary with the new employees as it allows you to keep an eye on them. Rodshop coach 1 says that even though something is really good, more of it may not be better. He does not think that everything has to be documented as you could just go and tell the person to e.g. remember his mask.

In this section it was shown that there are problems regarding the use of the 'verkeftirlit' as there is not a standard way of reporting them in the system. The 'verkeftirlit' is reported in the system in different places, the number of 'verkeftirlit' in one report varies and some report all the

2. The Icelandic 'úttekt' is basically a translation of the word audit. 'Verkeftirlit' is a form of audit (safety manager 1).

‘verkeftirlit’ in the system while others only report the ones that describe something unsafe. All of this means that it is impossible to make accurate statistics based on the information which also means that the resources, currently used to report the ‘verkeftirlit’ in the system, are wasted. The lack of standardization regarding the ‘verkeftirlit is therefore a problem that needs to be addressed.

3.2.4 Fishbone and 5-whys

The fishbone and the 5-whys are methods used in the investigations to find the root cause of an incident. There is no standard for the use of the fishbone or the 5-whys as the management has not implemented well-defined guidelines for choice of method. The consequences are that the use of the methods varies, the 5-whys is not used correctly and the correct root cause of a problem might not be discovered. The lack of a standardization regarding methods of investigation is therefore a problem.

From the management, we learned that there is no standard way of investigating as there are two methods and no control regarding which one to choose, and this is a potential problem as some of the investigations may not be carried out in the best way, and the right root cause may not be found.
The process owner of MES and the ABS specialist say that the employees are not good at root cause analysis which means that the corrective actions, made to correct the identified cause, are not useful as they do not solve the actual problem. By not having a standard way of doing the investigations, there is no a standard to improve on. If the employees are not doing investigations the same way, it is hard to learn from each other and to improve their ability to make investigations.
Another problem is that employees are not using the 5-whys method correctly. Safety manager 2 more often sees it used incorrectly than correctly. Sometimes employees ask five questions that are not related which is the point of the 5-whys and you are supposed to get closer and closer to the root cause and in the end find the root cause that led to the incident.
This subsection of the analysis will start by presenting why there are two methods and next the coaches’ current use of the methods as well as reasons behind the choice will be discussed.
There are two methods because Alcoa Fjardaál in the beginning tried to get both fishbone and 5-whys implemented in investigations; however they did not succeed (safety manager 1). In order to get at least something to work, they decided to try to get involvement in either one of the methods. At that time there was more agreement on the fishbone, and therefore they focused on the fishbone and made some effort to teach the coaches how to use the fishbone (CEO of Alcoa Fjardaál). According to the CEO of Alcoa Fjardaál, there has been a discussion about further standardization, but for now they are basically stuck, and they have not taken the next step which would be to combine the two methods. For some it is an issue that there are two possible methods to use, but personally the CEO of Alcoa Fjardaál likes to identify where to investigate by using the fishbone. When she has identified where to investigate, she will use the 5-whys. Safety manager 1 also finds that it is a good idea to combine the two methods as he thinks that the two methods give a good harmony. He thinks that the fishbone can be used to find the best question to start the 5-whys with. Safety manager 2 also thinks that it is a good idea to combine, and he believes that starting with fishbone will help with the 5-whys and will help to find the root cause.

We have found that six out of ten coaches are only using the fishbone (potline coach 1, potline coach 3, potline coach 4, potline coach 5, potline coach 6, casthouse coach 1, casthouse coach 2), one coach is only using the 5-whys (rodshop coach 3), two coaches are using both (rodshop coach 1, rodshop coach 2) and one coach is using neither the fishbone or the 5-whys (potline coach 2). It

is interesting that the three coaches that use the 5-whys are from rodshop. We have not interviewed the last coach from rodshop, but we can say that at least three of the four rodshop coaches are using the 5-whys which is a higher percentage than in the other production areas.
Some of the coaches mention that they do not have to use both methods. They can choose which one they want to use (potline coach 1, potline coach 3, potline coach 4, casthouse coach 2). Only potline coach 6 says that he was asked to stop using the 5-whys and instead only use the fishbone. Another coach was told to use both methods (casthouse coach 2).

Of the coaches that use the fishbone, they find that it is easier (potline coach 3, potline coach 4, potline coach 5), it *"makes you think about every angle"* (33.55 potline coach 5), it is useful for finding and looking at the problem (potline coach 3) and it gets to the root cause (potline coach 6). Potline coach 1 cannot give a reason; he just likes it better than the 5-whys. Potline coach 3 mentions that in case of a high incident, he will call help from the safety manager, and they will use the fishbone together. Casthouse coach 1 also uses the fishbone, but he points out that he tries to ask around three-five why-questions in his investigation, but the questions are not connected to the 5-whys as they are from a piece of paper with questions to have in mind during investigations. Potline coach 2 is not using the fishbone, but he knows how to use it. He says that it is not usually used in investigations, and he has not witnessed it in use.

The reasons behind not using the 5-whys vary. Potline coach 5 finds it difficult because around the third why-questions, he does not know what to ask about. Potline coach 6 was told only to use the fishbone, and casthouse coach 2 does not know how to use the 5-whys. Potline coach 4 thinks that it is stupid to ask the same question again and just change the questions a little bit while potline coach 2 finds the 5-whys a bit embarrassing. He explains: If he is investigating why a seatbelt was not used in a car, he would ask the person *"why?"* The person might say that he forgot. Then he would have to ask: *"Why did you forget?"* And the answer might be that the person was thinking of something else and the next question would then be: *"Why were you thinking of something else?"* Potline coach 2 imagines that people might be thinking: *"Are you retarded?"* (19.22 potline coach 2). Potline coach 2 thinks that the 5-whys is the past and that the method is not used anymore by the coaches or safety team. He is the only coach that we have talked to that says that he neither uses the fishbone or the 5-whys. Instead he is using questions and common sense. He is not sure that the fishbone or the 5-whys is the best method which safety manager 2 also mentions. Safety manager 2 would like to challenge the use and the training of the fishbone. He thinks that the method called Appolo, used for bigger problems especially with equipment, could be suggested as an alternative method.

The only coach that only uses the 5-whys says that the reason is that he never has been taught to use the fishbone and therefore he finds the 5-whys easier (rodshop coach 3). He finds that *"the 5-whys is a good method […] because you get to the root cause"* (20.18 rodshop coach 3). Rodshop coach 1 also finds that the 5-whys is a good method, even though it can lead him to a dead end. If that happens, he gathers some people and they will try to find the cause together. Sometimes they *"ask 5-whys on each category in the fishbone"* (31.51 rodshop coach 1). Rodshop coach 1 says that he might combine the methods if the investigation is complex, big or if it is hard to get to the root cause. Combining the methods was also mentioned to be a good idea by the CEO, safety manager 1 and safety manager 2.

The analysis above shows that there are no standards regarding the use of the investigation's methods. As shown the use of the methods varies which can lead to problems as it is critical to find

the right root cause of the incidents or else they will not be avoided in the future. It is therefore important that Alcoa Fjardaál deals with the lack of standardization regarding the methods used in investigations.

3.2.5 Lack of feedback

When investigations have been entered into the system, the coaches do not get any feedback unless they have made an insufficient investigation. Also, one coach would like to have feedback on investigations made by Alcoa Europa. As coaches do not get feedback, the coaches are not given the opportunity to make better investigations, and furthermore the motivation of the coaches to make the best investigations possible might be hampered as they know that they will not get credit for it.

We have heard from three of the coaches that there is only feedback on their investigation if the safety team was not satisfied with the investigation (potline coach 2, potline coach 4, potline coach 5). This means that the coaches are not told what they did right as they only get the criticism. To encourage the coaches to make better investigations, they need to know what they are doing well, and where they can put in some extra effort. In the end it would also save time for the safety managers as more of the investigations would be done correctly the first time. When the coaches are motivated to make their investigation, it is a waste not to use it.

Potline coach 2 and potline coach 5 would both like to get more feedback. Potline coach 2 says that when an investigation has been finished by the coach in the system, it automatically goes to his supervisor and to the safety manager who will check whether the investigation is satisfying. They only get feedback if the investigation is insufficient (potline coach 2, potline coach 5). Potline coach 5 tells that he only hears if the safety manager is not satisfied with his investigation, and he has to re-do it or if the safety managers do not agree with the categorization of the incidents e.g. if he thinks the incident is medium, and they think that it is high. Potline coach 4 also mentions that she would like to make her investigations better and avoid negative feedback, but she does not know how to achieve that. She does not know what exactly should be put in the different fields and feedback would therefore be good.

Potline coach 2 also mentions that in cases with a bigger incident, people from Alcoa Europa are coming to help with the investigation. When the investigation is finished, the coaches are not told about it even when it happened in their work area. Potline coach 2 would like to have some feedback about what happened.

It was found that there is a lack of feedback, as the coaches do not receive any feedback from the safety managers unless they have made an insufficient investigation. The coaches are motivated to learn to make better investigation and it is therefore a shame that this opportunity is not seized. The better the investigations the coaches are able to make, the less time and resources are used afterwards to improve the investigations.

3.2.6 Operators in the system

This subsection will present the operators' current use of the system and whether they have reported safety incidents in the system. However, for the most part this subsection will look into how the attitude of the coaches and the operators about the operators being more in the system in the future and issues related to this. We found that most of the coaches and the operators are positive towards the idea, and some find that it will increase the responsibility of the operators and

improve the information in the system. This means that if the management commits to the idea and presents it the right way, they have a good basis for implementing the idea.

This subsection will first go through what the operators think about being more involved in the system and second go through what the coaches think as they are also an important factor in making changes in the work processes. The attitude of the coaches is important for the way which the new idea is presented to the operators and implemented.

None of the operators that we talked to were opposed to using the system, however one operator mentioned that he is used to the way that things are now, and *"if they are going to change anything or do anything better, the management would have to show the people the better thing so [they say]: "Oh yeah that is maybe a little bit better"* (2.48 potline operator 1). At the moment it varies how much the operators use the system. Four of the six operators report more or less frequently low incidents (rodshop operator 1, casthouse operator 2, potline operator 1, potline operator 2) and two of them would like to do more in the system (casthouse operator 2, potline operator 2). The two remaining of the six coaches have either not put anything in the system (casthouse operator 1) or are still learning the system, but are capable of reporting incidents (rodshop operator 2). Both of these two are interested in getting more involved. In all, two out of the six operators are not sure if they want to use the system more than they are now which means that they are unsure of whether they want to do more than report low incidents (rodshop operator 1, potline operator 1).

One of the coaches thinks that if the operators were asked to report in the system, they would feel more involved, and it would give them more responsibility (rodshop operator 1). Rodshop operator 2 also thinks that it would be good for the operators all over the plant to use the system. She thinks that everybody should be capable of reporting in the system as this would enable employees to take over if somebody is sick. Casthouse operator 2 would like to help prevent things from happening e.g. if he sees something that might lead to damage, he would like to report it. He would also like to be more involved in the management part of preventing incidents.
If the operators are to be more involved in reporting, five of the operators mention that training would be important (potline operator 2, casthouse operator 1, casthouse operator 2, rodshop operator 1, rodshop operator 2). However potline operator 2 points out that more training of the operators might be a problem as there is a rapid replacement. Another issue is if there is time available and *"access to computers because there is only one for everyone (meaning the operators in the potline) to use"* (16.55 potline operator 2). Potline operator 2 emphasizes that it is important that they can see that they make a difference. He explains that nobody is looking at the low incidents as only the medium and high incidents get attention. He thinks that somebody at least should look at the reported low incidents.

Nine of the 11 coaches think that the operators should be more in the system (rodshop coach 1 rodshop coach 2, rodshop coach 3, potline coach 1, potline coach 2, potline coach 3, potline coach 5, potline coach 6, casthouse coach 1). Only potline coach 4 says that she does not want the operators reporting in the system as she has had some bad experiences with that in the past. Rodshop coach 3 says that during the last year he reported 90% of the incidents; however they are trying to change that, so everybody will report the incidents into the system, and he thinks that it is a good idea. Rodshop coach 1 thinks that it is important that the MES is overall owned *"because if the system is only for a few coaches and a few safety specialists then no one understands it, and no one can see the point in using it"* (15.09 rodshop coach 1).

Casthouse coach 1, potline coach 5 and potline coach 6 think that the operators mostly should report low incidents because medium and high incidents require investigation (casthouse coach 1). However, rodshop coach 2 and rodshop coach 3 believe that the operators could be able to report low, medium and high incidents into the system. Rodshop coach 1 already has his operators reporting both medium and high incidents, but they do not investigate.

The mentioned advantages of the operators in the system vary. Potline coach 1 thinks that it would be good for both the operators and the coaches. Potline coach 3 thinks that it might lead to less paper use as the operators could report incidents directly into the system. Potline coach 6 mentions that more information will be put in the system, maybe even something that would otherwise be missing and rodshop coach 2 thinks that incidents will be reported faster into the system. Rodshop coach 2 furthermore mentions that it will give the coaches more time to do other things, and the operators will hopefully gain more experience and learn more from the incidents. Rodshop coach 1 believes that the operators will get *"more information and get more understanding of what is going on and what is needed to be put in"* (13.53 rodshop coach 1). Potline coach 2 thinks that the operators could use the system for more than reporting as he thinks that it would be a good idea if the operators could look things up in the system, e.g. if they had not been at work for a while, they could look up in the system what had happened since they last were in. He thinks that it *"will not just prevent accidents from happening, but it will also teach people to show responsibility and make them take responsibility for the work, they are doing. […] If you are an adult and working then you want to go home with all your fingers and stuff. If you show that you care, then you are a good worker"* (31.23 potline coach 2). Some of the coaches, however, think that there needs to be some limit on the operators' use of the system. Rodshop coach 3 thinks that if an operator is involved or might have caused an incident, he should not be the one who reports it in the system. Potline coach 2 does not think that the operators should be able to look names up, and potline coach 5 is not sure if he wants the operators to go in the system and read about incidents because he wants to inform the operators in the beginning of the shift. Casthouse coach 2 thinks that it should only be the team leader who should be able to put things in MES. Casthouse coach 1 mentions that the employee, who reports medium or high incidents, is the only one who can make changes – in addition to the safety manager. He thinks that the coaches should be able to change the operators' reports.

Other issues are if the operators have time, computer skills and interest. Potline coach 1 points out that the operators need to have time to use the system as they do not have time at the moment, on the other hand, rodshop coach 3 thinks that the operators already have time to use the system during their shift. Potline coach 2 mentions that some of the operators are not used to working with computers and that some might even be afraid of them. Rodshop coach 1 tells that when they hire employees, they do not need to know anything about computers. Most employees under 45 have used computers, and it is often easier for them to learn to report into the system. Potline coach 7 estimates that about half of the operators would like to do more, but the rest would not. Another problem can be that employees have different definitions of low, medium and high incidents (rodshop coach 3). Another problem related to the categorization is if employees start consciously misusing the categories e.g. they want a fan that has been broken for a long time to be fixed now, and they therefore report it in medium as the want it dealt with now (rodshop coach 3).

The coach, that does not want the operators to use the system, explains that they tried to involve the operators two years ago by getting them to put things in the system (potline coach 4). However

it *"was a war"* (20.18 potline coach 4): One employee reported another employee, who saw that he had been reported and then tried to find something wrong with the first guy so he could report him. However, rodshop coach 1 has good experiences with having the operators in the system. He thinks that the avoidance of a war is a question of culture. He thinks that it always will be hard to get employees to report that they did something wrong, but he has told them that it is acceptable to write "anonymous" in the system. For him the important thing is to get it in the system so they can talk about it on the next shift meeting. Furthermore he thinks that the culture can be taught, and that the culture should be that if you see something wrong, then you put it in the system so that *"everyone else can learn from it"* (21.27 rodshop coach 1). However, if an employee breaks the rules or always does something wrong then it may not be reported anonymously. All the names in MES are not visible to the operators (rodshop coach 1).

3.2.7 Operators reporting in the 'verkeftirlit'

As mentioned before the coaches and operators fill out 'verkeftirlit'. During our interview we also discussed if this would be something that the operators could be reporting in the system. Here first the coaches and then the operators express their opinion.

Potline coach 1, potline coach 3, potline coach 5, casthouse coach 1 and casthouse coach 2 think that the operators could put the 'verkeftirlit' in the system. Rodshop coach 2 also thinks that the operators could put them in the system, but whether that is a good idea or not, he is not sure. Potline coach 3 thinks that it would increase the operators' responsibility towards the 'verkeftirlit', and potline coach 5 believes that it would make the operators feel a part of the process. Potline coach 5 also thinks that it would mostly benefit the operators if they could use the system because it will not help him much as it does not take him long to put the 'verkeftirlit' in the system. But *"for the operators it would be an important job"* (44.08 potline coach 5) and they will have more responsibility. But, casthouse coach 1 sees benefits for the coaches as he thinks that it would save time for the coaches. Potline coach 2 however feels that it is best that he is reporting them in the system as he is the one in the potline that is dispensable. If there is an operator with a minor injury e.g. broken finger, so he cannot be in the potline, then potline coach 2 thinks that the operator could do it.

Potline operator 2 is already reporting the 'verkeftirlit' into the system while the rest of the operators would like to be able do it on their own (potline operator 1, casthouse operator 1, casthouse operator2, rodshop operator 1, rodshop operator 2). Casthouse operator 1 thinks it would help the employee who usually reports them in the system, but he also thinks that it might give the operators a better understanding of how the 'verkeftirlit' are used and what the purpose of them are. Rodshop operator 2 thinks that it would be good if everybody could put them in, so they would not have to ask another employee to do it. Both rodshop operators think that it might increase the feeling of responsibility, if the operators had to put them 'verkeftirlit' in the system. Rodshop operator 1 believes that it also might encourage the operators. However casthouse operator 2 does not think it would make her more active in using the 'verkeftirlit'.
If the operators should start reporting the 'verkeftirlit' in the system, they need more training (rodshop operator1), time to report it in the system (potline operator 2, casthouse operator1) and enough computers (potline coach 1, potline operator 2). There is currently one computer for around 30 operators (potline coach 1). Casthouse operator 1 thinks that it is also important that there is no critic if they do not do report the 'verkeftirlit' in MES, even if they are supposed to do it.

It was found that most of the coaches and operators are positive about management's idea to have the operators more involved in the system in the future and report incidents into the system. Furthermore it was found that most of both the coaches and the operators think that the operators could put the 'verkeftirlit' in the system. However issues such as time, computer skills and interest need to be addressed.

3.3 Analysis of the system design

Problems: **Too much functionality and lack of user-friendliness**
Difficult to make accurate statistics
The operator's lack of understanding in use of the system

Alcoa keeps track of any incident from low to high in the MES, and the employees have to report all incidents into the system. During the interviews we learned that the coaches had several problems with the use of the system. We found that the system is not intuitive which results in the coaches reporting differently into the system, and therefore it is not possible to get accurate statistics out of the system in a simple way. In the following section we will identify problems related to the user-friendliness and to the amount of functionality that the system has. The next subsection is about the problems with the statistics and in the last subsection we are analysing how the operators find the use of the system.

3.3.1 Too much functionality and lack of user-friendliness

The coaches are reporting incidents into the system, but the system has too much functionality and is not user-friendly. Too much functionality can be confusing for the coaches which can lead to an incorrect use of the system, and it can take more time than necessary which can cause the coaches to choose to use the system less. Another consequence is that they are reporting very differently into the system which lowers the quality of the reporting and the investigations. In the following subsection we will analyse how the problems of too much functionality and lack of user-friendliness are visible at Alcoa Fjardaál.

We found that the coaches in general find that the system is working fine (rodshop coach 1, rodshop coach 2, potline coach 4, potline coach 5, casthouse coach 1). Potline coach 4, however, says that *"the system is okay, it is not great"* (01:17 potline coach 4) We found some different problems with the use of the system, and the first problem is that the system is used very differently. Rodshop coach 1 and rodshop coach 2 are using the system only for reporting incidents, and rodshop coach 2 is trying to learn from the incidents. Potline coach 4 and potline coach 5 are also getting information out of the system and potline coach 4 finds it easy to do. But potline coach 5 finds it hard to talk about a system that he uses so often. Potline coach 4 thinks that it is good to have everything in one place. She can search for things e.g. the names of the coaches and people from the EHS team. Another problem that the system has too much downtime (rodshop coach 1, potline coach 4 and casthouse coach 2), maybe once per week, and the coaches are not told about it in advance (potline coach 4). While the system is down, the coaches cannot work in it, and that means the information about incidents cannot be reported into the system right away, and the coaches are wasting time in trying repeatedly to log into the system. Another problem is that the system is very slow (the ABS specialist, the process owner of MES, safety manager 2 , potline coach 1, potline coach 5, casthouse coach 2) and this is a huge problem as it lead to lost information (potline coach 4 and casthouse coach 2). Potline coach 2 explains, *"if I am working and it (MES) is not responding to me, I do not have the time to just wait for it, then I am gone*

and then we lose information" (01:52 potline coach 2). Potline coach 5 thinks that use of MES is okay when you know how slow it is. Safety manager 2 says that how slow the system is, depends on the internet connection and how many people are online. The loss of information means that the quality of the investigations will be lower than if the system was working at a proper pace. Rodshop coach 2 thinks that there are probably things that could be done better, but he is not aware of that at the moment.

The functions in MES

The system could also be more user-friendly which potline coach 2 wishes. In the following subsection we will go through the three windows and functions; the reporting window; the picture function; the witness function both from the reporting and investigation window; and options in the system to see where the problems are.

The reporting window (appendix D) is where the 'health and safety' incidents are reported into MES. Almost all the respondents had tried to use it or are using it actively in their daily work. We found that the system, for some of the coaches, was complicated to use. Safety manager 3 told us that the coaches do not find the system easy to use and that he thinks that the system should be easier. Furthermore potline coach 7 and safety manager 3 say that some of the employees do not like to use the system, and some of them have never worked with computers. Potline coach 3 is one of the coaches that needs help in order to report incidents into the system. He explains that if he has a high incident, he needs help, but he can fill the form out on his own. However, some of the coaches find the MES easy to use, as safety manager 2 thinks that *"it is easy to use, especially if you start by putting low incident in, it gets really easy"* (32.37 rodshop coach 3) and potline coach 3 told us that the medium incidents are okay to fill out. During the interviews it became clear that the reporting window is used in many different ways. This makes the incident reporting very different which means that it is difficult to make statistics as the information is put in different fields and different places in the system. We found that one of the main problems with MES is the usage and the design. All the coaches are using the compulsory fields; 'date', 'category', 'process' and 'summary'. They are also writing their own name and the name of their boss will show up automatically. Potline coach 3 is also writing the name of the involved operator. Four of the coaches do not use the 'subcategory' (potline coach 5, potline coach 6 and potline coach 7, safety manager 3). Safety manager 3 explains that he does not think that the 'category' and the 'subcategory' have anything to do with each other. Potline coach 6 explains that safety manager 1 uses the 'subcategory' and he cannot explain why he does not use it.

Safety manager 2 thinks that in the reporting window the 'main protocol' is difficult to use and that it is barely used because the employees do not understand the different categories. Both potline coach 2 and potline coach 5 do not understand some of the 'categories', 'subcategories', 'main protocol' and 'secondary protocol'. Rodshop coach 2 explain that he is not using the 'main protocol because it *"does not look like we need to have it"* (09:38 rodshop coach 2) and he is not completely sure of what the different categories in the 'main protocol' means. Potline coach 2 feels he is missing training in order to use them correctly, and therefore he might put it all in one category.

On the opposite, four of the coaches are using the 'main protocol' (potline coach 5, potline coach 6, potline coach 7 and rodshop coach 1). Furthermore nine of the coaches are sometimes using the subcategories (potline coach 1, rodshop coach 2, casthouse coach 1, rodshop coach 3, potline coach 3 and potline coach 6, potline coach 7 and safety manager 3, rodshop coach 2).

Many of the coaches are using the 'consequences' (injury, damage or near-miss) and potline coach 3 explains that the 'consequence' is used if it is a medium or a high incident. Potline coach 6, potline coach 7, rodshop coach 2 and casthouse coach 2 are reporting in information about "action taken immediately" after an incident; if some has been taken. Furthermore rodshop coach 3 puts in a time on what has happened and when it happened, e.g. 21.30, 22.00. Rodshop coach 1, rodshop coach 3 and casthouse coach 2 are filling out all the fields. Rodshop coach 1 thinks that filling out all of the fields makes a better report, and he explains that he always writes the summary and the actions that were taken immediately after the incident. Casthouse coach 2 is doing it because he is told to do it. Rodshop coach 3 uses all of the fields in the reporting-window in MES when it is necessary.

One of the reasons for the difficulties in understanding the definitions could be, according to safety manager 2, that the system was translated from English by a Canadian/American company, and he thinks that the categories are not clear enough e.g. the category 'material' in the fishbone and explains that he has *"seen all kind of explanations put at this (material) field"* (17.17 safety manager 2). He would like more appropriate names for the categories.

There are different options about the number of words that the 'description field' should be able to contain. Safety manager 3 is writing a detailed description into the field, however, safety manager 2 does not like too much text as he just wants the basic information. When they are doing the investigation, they have the opportunity to write more. Some incidents do not offer you to write more than a couple of words. Casthouse coach 1 tells that he has at least once experienced that he ran out of space, and it was not possible to write any more letters. There is room for maybe 1000 letters. Potline coach 6 agrees and thinks that the description field and the review field are too small. Potline coach 7 explains that if you have a big incident, there is not enough space for the description. This could be a problem because if there is no room for all the information, some information will be lost, and quality of the investigation will be lowered.

Potline coach 6 also thinks that it is a problem that you have to know the last name of an employee to be able to search for an employee. It could be good if you were able to search after the first name. Potline coach 7 says that they usually just know each other by first name, so it can be hard to search.

Safety manager 3 is not good computers, and he thinks that if the operators and coaches are going to use the system more, it should be simplified. Potline coach 2 agrees as he thinks there are too many subcategories and this means that the filtering could be better. Together with safety manager 3, he thinks that it should be easy and simple to access the system e.g. the desktop could have a button called 'health and safety' and when you click on it, you get a window with different buttons. This means that a few clicks, can get you what you want. At the moment it requires nine clicks to access the system and find the reporting window.

In this section it is shown that the reporting into the system is done differently. It is clear that the lack of user-friendliness and that the coaches have different understandings of how to do to report hinders similar reporting. This means that we found in both the reporting and the investigation window that some functions are not used or working as imagined. The picture function is a good example of how the system has too much functionality which negatively affects the user-friendliness. The lack of user-friendliness is furthermore a problem if the operators should start using MES more.

3.3.2 Picture function

Five of the coaches are using the picture function, if necessary, but they all tell that the function is too slow and too complicated (potline coach 1, potline coach 2, potline coach 4, casthouse coach 1, rodshop coach 3). Potline coach 4 explains that it takes too long a time because she has to put the pictures in the computer and then put them in the P-drive before it is possible to get them into the MES. It is easy to upload the pictures when they are on the P-drive. She thinks that the long process makes her put fewer pictures in the system and if they have a lot of things to do, she sometimes skips the pictures, but she knows that the safety guys will be happy if she puts pictures in. Potline coach 1 thinks it would be easier just to take the pictures from the camera and put it directly into MES, and casthouse coach 1 told us that he usually just prints the pictures out because it is easier than putting them into MES. However they do put medium or high incidents into MES with pictures as much as they can. Also, rodshop coach 3 puts pictures in when it is appropriate e.g.in case of a crash. He does not think that it is possible to put pictures in when he is reporting a low incident as the low incident does not have to be investigated, but he thinks it could be nice to have pictures to show to other shifts or employees. Rodshop coach 3 also thinks that the picture could show exactly what he means. Rodshop coach 1 finds the pictures easy to use and uses them when they say something and mean something. Rodshop coach 3 says that not everybody knows how to put pictures into MES.
Potline coach 2 feels that *"putting in pictures is just a pain, because it can take up to 15 minutes to put one pictures in. So if the system is so slow, then they just skip it"* (20.50 potline coach 2) this means that the picture might be skipped even though it might lead to a worse investigation. Potline coach 2 thinks *"that it is in our nature that if it is going to take time then you just do not bother. And then they lose a lot of opportunities"* (21.02 potline coach 2).

Casthouse coach 2, potline coach 2, potline coach 6, potline coach 7 and rodshop coach 2, on the other hand, do not put the pictures in the system because it is too slow or difficult. Casthouse coach 2 thinks that none of the coaches are putting pictures in the system because it is too slow. He sometimes takes pictures of the place where the incident happened and these pictures are *"just printed it out and put it with the incident report"* (12:05 casthouse coach 2). Potline coach 6 has forgotten how to do it and would need help. Rodshop coach 2 has never put pictures in, but he knows that pictures are used, if they can help the investigation.

This shows that the picture function is too difficult to use and takes too much time which results in fewer pictures being put in the system. The consequence may be a lower quality of the investigations as pictures may give a better impression of the incidents than words only.

3.3.3 Witness function

During the interviews we also learned that the witness function in most cases is not used as intended, and this is also a good example of the problem with lack of user-friendliness. The coaches have found their own way of using this function.

The function is used very differently, and some of the coaches are not using it for witness, but only to inform relevant employees. Rodshop coach 1, rodshop coach 2, rodshop coach 3 and safety manager 2 are using the witness function only for informing Rodshop coach 2 tells that if *"it a medium or high incident we put coaches and safety boss"* (11:10 rodshop coach 2). No one get emails about low incidents, but if it is a high incident, everybody will get the information including the other production areas (rodshop coach 3). Safety manager 2 tells that they do not use it for witnesses, but he explains that it is because a witness can be hard to define. If you are

related to an incident, it is not clear if you can also be a witness. The question is if the names of the witnesses and the people, you want to inform, should be in the same column or if they should be in two different columns. Rodshop coach 1 has been told to use it for people who they want to inform. Some of the coaches use the 'witnesses' function for both for witnesses and for people who should be informed (casthouse coach 2 , potline coach 1, potline coach 6 and safety manager 3).

It is clear that the function is also used to inform instead of using it for actual witness and as safety manager 2 points out, they do not have a definition of what a witness is, and a standard use is therefore not possible.

3.3.4 Email from the system

When a medium or high incident has happened, and it has been reported in the system, all the relevant people get an email with the information that the incident has happened. We have learned that some of the coaches would like this mail to be more informative and in that way increase the user-friendliness. Safety manager 2 would like to have the classification added in the email to know if he needs to act on the incident. More information in the email would be good e.g. because they have to report incident requiring treatment to the rest of Europa within 24 hours. He thinks it that *"having that information could mean a lot"* (39:14 safety manager 2). It would especially be nice in the cases where safety manager 2 is at home as he would know if he should to react now or if it could wait until the next workday.
Safety manager 3 would like it if he would get an email from the system telling him if he is late on doing an assignment.

3.3.5 Corrective actions

In the design and use of the system, another problem is the function "corrective actions" as some actions are assigned to the wrong employees, and it is difficult to get them unassigned. The consequence is that the assigned employees do not solve the actions. Another problem is that some employees choose to do something more or less random just to close the corrective action when the time frame for the action is expiring.

The corrective actions are the result of an investigation and are an important tool to improve the processes and making the machines and equipment better and safer to work with. Their goal is to insure that accidents do not happen again. As safety manager 2 says, *"if the same incident happens twice, it means that we are not doing our job"* (25:50 safety manager 2).

The ABS specialist thinks that it is a quality problem that you can investigate a problem without doing any corrective actions, but by just filling something into the required fields. The process owner of MES agrees and thinks that you need to be accountable for the investigation. Safety manager 2 thinks that it is a plant-wide problem and explains that when one employee is assigned to an action and gets a final date for solving the action, that employee is responsible. However, if the corrective actions are assigned to the wrong employee, it is difficult to get the change the assigning. You have to go and talk to your supervisor who needs to take it to the manager of the employee that assigned the corrective actions (safety manager 2) which is a bit too complicated and can take a long time. Sometime an incorrect assignment means that the corrective action is not carried out. The employee cannot refuse the corrective action in the system and reassign it to the employee that assigned it in the first place. The only options in the system, in dealing with the corrective actions, are to categorize the action as 'open', 'dealt with', 'currently being worked on' and 'closed'. Safety manager 2 would like if there was another way of doing this. Safety manager

3 is always assigning the corrective actions to the employees that he knows are suitable, and if the guy is not on work, or it is a difficult task, safety manager 3 will wait or call the guy. When the actions are solved, safety manager 3 or the coaches check if the task has been carried out. He always gives the corrective action a timeline, and the assigned employee will report when he is finished. This he can do in the system by closing the corrective action, and then safety manager 3 gets an email. However, safety manager 2 think that it is a problem that there is no approved level in the system which means that nobody has to approve that the corrective actions have been solved. Safety manager 2 thinks that a way of solving this problem would be to have an approve-check-box that super-users could use to approve some of the corrective actions.

An additional problem is that the problem and the corrective actions are not connected in the system (The process owner of MES). The process owner of MES needs to use the incident ID to connect the problems to the corrective actions and opens each report on each incident to see if corrective actions are opened or closed. It is not possible to get a notification when the last corrective action for a problem has been closed. The process owner of MES thinks that this is the cause of most of the reporting problems and follow-up problems.

In this section it has been shown that there are problems with the corrective actions and that the coaches have different approaches regarding how they use the corrective actions. We also learned that the follow-up process related to the corrective actions is not working properly.

3.3.6 Difficult to make accurate statistics

Statistics are used to keep track of the incidents and for learning how to prevent future incidents. We have learned during the interviews that it is impossible to make statistics in a simple way due to the lack of standardization in regards to how the information is reported into the system. The consequence is that the coaches are not getting enough information out of the system, and it is therefore hard to learn from the incidents. Furthermore, it is hard to track the safety situation at the plant.
Problems concerning statistics are important to solve as statistics are a way to get and compare information about safety problems. Accurate statistics could lead to avoidance of future incidents and furthermore it can help compare different shifts, production areas, managers, etc. to each other which can clarify where efforts need to be made. It is also a way to evaluate if corrective actions have had the desired effect. During our interviews we heard about different problems with the statistics, but also that some were satisfied with the statistics.

Some of the coaches find it okay to get the information they want. Potline coach 1 and potline coach 5 say that they can get the information that they need, but potline coach 5 thinks that the system may have options that he is not aware of. Potline coach 4 tells that *"in the beginning of all years, we have to take all of our employees to see how many accidents they have the last year – it is every easy to find that."* (02:11 potline coach 4). Potline coach 2 gets the statistics he needs; however, he is not making the statistics himself as he is getting it from the Health and Safety. He uses it for research on individual employees and he can find information on how the employee is acting and if he might be seeking more danger. Potline coach 1 agrees that it could be easier to get statistics.

The ABS specialist thinks that Alcoa is good at feeding information into the system, but not at getting information out of it. She explains that they would like to get recent information out of the system so the employees could be briefed about recent incidents. They would like to get

information from the system to put up onto the boards, so everybody could get an overview over what has happened and what are the problems. The MES cannot supply reports; it takes a lot of manual work. The process owner of MES continues and says that they would like information out of the system so the employees can see what kind of incidents have happened in their area over the last year or week in a certain area. She thinks starting to use this kind of information will give them more discipline with reporting the information in correctly.

Safety manager 2 thinks that there is a big problem related to how you pull information out of the system. He would like to compare data on incidents and injuries in different areas and different years as he then could e.g. look at certain parts of the casthouse and see all medium or high incidents involving a certain machine. He thinks that there should be a simple way to get this information, but he thinks that *"as the MES is today it is just impossible"* (07:15 safety manager 2). It takes a lot of time and use of Microsoft Excel to sort out the information (safety manager 2). The ABS specialist says that it seems like you have to export to Microsoft Excel which requires crazy manual work. Safety manager 2, safety manager 3, casthouse coach 1 and The ABS specialist also mention that the filtering in the system could be better as the information then would be easier to find. Safety manager 3 tells that he makes statistics every week, however, if it was easier to do, he would let the coaches and the operators do it themselves. We asked the IT employee about why the coaches are using Microsoft Excel, and he thinks it because they are so used to it and know it so well. Potline coach 2 thinks that MES is also good for getting knowledge about the other shifts and comparing yourself to them. But he suggests that it would be more user-friendly if is just take 4-5 clicks to print a list of problems that have happened during the last couple of months.

The problems with the statistics are not only about how to get the information out of the system, but also how the information is report into the system. Safety manager 2 explains that they are reporting all sorts of audits and observations in the system to keep track on how they are doing, and that the information is really hard to sort out e.g. what is PPE, what is mobile equipment, what is crane etc. Also, in the casthouse they sign all of the incidents to the process-category called 500 because if they use other protocols, the reports will disappear. Safety manager 2 therefore has to go through all the reports to be sure that all the relevant reports are found. In potline they have the same problem, and rodshop coach 3 explains that they also report all incidents in the same 'process' as this makes *"it is easy to track"* (07:05 rodshop coach 3). As mentioned earlier potline coach 2 also chooses the same 'process', but he does it because he does not understand the definitions of the other 'processes' in the category.

We have found that there are several problems related to making statistics; it takes too much time, and the information is very difficult to get out of the system. We also found that the different audits and processes make it difficult to make the statistics in an easy way.

3.3.7 Operators understanding and use of the system

As mentioned in the section of "analysis of the processes", Alcoa Fjardaál wants their operators to use the system more, but this subsection will show that the operators do not have the right understanding of the system. The consequence of this is that many of the operators are not currently able to report correctly into the system, and this fact is important to deal with if the management implements their idea about operators being more involved in the system. If the management implements and does not understand the operators' lack of knowledge about MES, problems will arise because the operators are not capable of using the system correctly.

Casthouse coach 1 would like the operators to be more in MES as *"everybody should learn how to use the system more"* (6:32 casthouse coach 1) However the coaches should know what was going on and therefore there should be a timeframe for when operators could report in the system. In rodshop some of the operators are already reporting, however, rodshop coach 1 says they do not always fill out all the boxes – it depends on the person. If he sees a report that is not properly done, then he calls the operator who put it in, and they fill it out together. That way the person will learn from it. The most important thing is to report it, and if the report is not good enough then they fix it.

We found that all the operators are already using the system more or less, and one of them has *"been in one investigation"* (02:25 rodshop operator 1). But we also found that the operators have difficulties understanding the definitions and the use of the system. Both some of the operators from rodshop and potline have difficulties in understanding the system. However three of the operators (rodshop operator 1, rodshop operator 2, potline operator 1) feel they had a good understanding of the system, however, the understanding of some of the definitions in the reporting window e.g. 'subcategory' (rodshop operator 2), 'category' (rodshop operator 1) and 'main protocol' (potline operator 1) can be confusion. Two of the operators (rodshop operator 1, potline operator 2) have difficulties with the difference between the 'text field' and the 'summary'. Potline operator 2 feels he is doing the same thing twice and that he has to enter information into so many places. One of the operators from casthouse (casthouse operator 1) tells us that she is taking e.g. statistics out of the system. She does not think it is complicated to find information in the system, and she thinks it is easy because most of the system is in Icelandic. Three of the operators (rodshop operator, 2, potline operator 1 , casthouse operator 1) find it easy to access the system, but the another operator (potline operator 2) thinks that it takes a long time to access the system, and he thinks that a shorter path will maybe help others to use the system. Rodshop operator 2 thinks that the system is a *"little bit confusion, but I think when I have done, it few times it is good"* (05:59 rodshop operator 2). Two of the operators (rodshop operator 1, casthouse operator 1) do not want to use the system more, on the opposite; casthouse operator 2 thinks it would be good to use the system more. He would like to report medium incidents, but he needs more information and more training. The other operator from casthouse, casthouse operator 1, agrees that more training is needed, but she is not sure what could make her use the system more.

Potline operator 2 tells us that there are maybe four employees (coaches and captains) who can use the system in his production area. Everybody else does not use the system because the operators have to go to their leader and report the incident (potline operator 1). If everybody should use the system there is a need for more computers and training. Rodshop operator1 thinks that the computers are very slow; however, she does not think that it stops employees from using the system. She is patient so she just waits, but she would like the system to be faster. Potline coach 2 agrees and says that they had tried in the potline to get employees to use the system, but within a few days employees had written it off because MES was slow. He also mentioned that there should be enough computers; otherwise the operators would not do it.

In this section it has been shown that the operators' understanding of the system is faulty. The operators are aware that there are things that they are not capable of, and they would need more training if they should begin to report more.

3.4 Analysis of the training: The coaches' training

Problems: Lack of standard training in MES
Lack of standard training in fishbone and 5-whys

We have learned that the training in the use of the system and investigation methods varies. This causes problems as employees are using the system and the methods in different ways. As we talked to the coaches we found that most of the coaches would like more training in one area or another (potline coach 2, potline coach 4, potline coach 5, potline coach 6, rodshop coach 1, rodshop coach 3, casthouse coach 1). The problems related to training can be seen on two levels; the first is that the coaches have no formal training, and the other problem is that there are no formal guidelines for formal training, so not only have the coaches not received any training but the quality of the training is questionable.

The following subsections will present an analysis and comparison of the interviews with the coaches regarding their training in the MES and training in general. Later their training in fishbone and 5-whys will be described as problem in the standardization of the methods was found in the section "analysis of the processes" In order to gain an understanding of how the coaches could be taught, we asked the coaches to tell us their preferred way of learning.

3.4.1 Training in MES

This section will describe the current training that the coaches have received in the MES as this is important in regards to safety management. We found that there is no standardization of the training in MES provided to the coaches. The management has not provided any guidelines for the training and the coaches are therefore taught differently which mean that information is put in the system differently and this leads to difficulties in making statistics. Furthermore, not all the coaches are aware of what the system can do, and also there are things that they are not capable of doing in the MES.

When employees are not reporting things in the system the same way, it makes it is problematic to extract statistics from the system. The process owner of MES says that employees do not always put the information in the system in the right way. Last December she took out all the incident data from the system for the last year, but in her own words she found that the data *"is not really reliable because of the way that people are inserting the information e.g. if it is an injury, damage or near-miss. People are not always putting if it is, in fact, an injury. […] This means that you cannot filter out all the injuries because you will miss probably 30 % at least"* (31.34 the process owner of MES). The fact that not all employees are using the system correctly is a problem that should be dealt with. Alcoa Fjardaál prioritizes safety, and it is therefore important that they are able to extract accurate data from the system. An explanation for the incorrect use of the system is, according to the process owner of MES, that the training is not good enough. She thinks that they need to give employees the proper training in using the system. Another problem with the insufficient training is that the coaches are not sure what the system can do for them (rodshop coach 1, potline coach 5), or they know that the system can give them more, but they do not know how to get it (potline coach 2). The education employee mentions that they would like to have a training document that defines what the persons are supposed to learn. If there were a standard training document, it would save time for the coaches, and it would be more effective.

We learned that coaches do not have a standardized education. Some had a short course, when they started (rodshop coach 2, rodshop coach 3, potline coach 3, potline coach 6), however they point out that the training was short (potline coach 3, potline coach 6, rodshop coach 3) or that the course did not teach all that was needed (rodshop coach 2). This course is a six hour classroom course called Environment, Health and Safety (education employee) and as many subjects are covered in this course, the training is general and is about e.g. safety precautions. Rodshop coach 2 tells that even though he had been on a course, he has mostly taught himself by *"using the system […], maybe I am learning something wrong. I do not know"* (6.24 rodshop coach 2).

Some of the coaches are self-taught combined with a bit of training by a coach or other personnel (casthouse coach 1, potline coach 4, potline coach 5). Potline coach 4 asked people around her to show her how they put things in the system, and she learned from them. Potline coach 5 got a list of things he needed to learn and some training by a technician while potline coach 7 was trained by another coach who would include him when an incident happened. Another coach received a little bit of training from one of the safety managers, but did not mention being self-trained (potline coach 1). This means that coaches are either self-taught or have been taught by another person.
A problem with learning from each other could be that people are different and teach in different ways (education employee) and Alcoa Fjardaál therefore has no control over what is taught.
The education department are working on training documents that define 'what are the persons supposed to learn in this shift'. They are trying to make their methods better so the training will be more standardized and does not consume all of the coaches' time but at the same time is effective. (education employee).

Potline coach 5, casthouse coach 1 and potline coach 6 would all like some more training in the MES. In general rodshop coach 1 thinks that the coaches need more training in the system in order *"to learn what the system can do for you"* (10.20 rodshop coach 1). Potline coach 2 and rodshop coach 3 both mention that there are words or terms in MES that they do not understand, and potline coach 2 thinks that it would be helpful to have more training in what the terms in the system mean. Potline coach 4 would like some more training in how best to do an investigation and what she should put in the system about the investigation. Rodshop coach 1 would e.g. like to have more training regarding pulling statistics out of the system. He knows that the system can do more than he knows how to do.

There does not seem to be a pattern between how long the coaches have been at Alcoa Fjardaál, how long they have been coaches and the training that they have received. Among the coaches that have had a course and the coaches that were mostly self-trained there were both people that had been coaches for a long time and some that were relatively new to the job.

In this section it was shown that there is no standard for what the coaches are taught, and some of the coaches were mostly self-trained. This means that the coaches use the system differently which leads to information being put in the system in various ways, and it is therefore complicated to make statistics. Furthermore, the coaches are unsure of what the system can do and how to use it.

3.4.2 Training in the methods

The following section will show that the training in the methods used in investigations is not standardized. The management has not provided clear guidelines for which methods to use, and this means that the coaches and even the safety manager does not have a standard way of using the methods during investigations. As there is no standard training in the methods used to investigate,

the quality of the investigation will vary. Some of the investigation might not be done properly which means that the same incidents could occur again.

As we showed in the section "analysis of the process" that there are problems regarding the methods used in investigations because there is a lack of standardization concerning the choice of the methods (CEO of Alcoa Fjardaál), and the safety manager 2 says that employees are not using the methods right. Because the CEO of Alcoa Fjardaál told us they would like it if both of the methods were used in combination in the future, we wanted to look into what kind of training the coaches have in the methods. Safety manager 2 also mentions that the coaches have problems with understanding how to use the fishbone and the 5-whys correctly. He more often sees the 5-whys being used incorrect than correct.

We found that some of the coaches have had a bit of training in the methods, however it is not everybody. Rodshop coach 2 had a course, when he started, where among other things they were taught about fishbone and 5-whys. However, he has learned how to use the methods by looking in the system and reading people's reports. Potline coach 1, potline coach 5 and casthouse coach 1 have been taught by safety managers while casthouse coach 1 has been taught by other coaches. Safety manager 2 has taught himself the methods by using them.

In regards to the fishbone method, rodshop coach 1 has had a bit of training, but he says that it was not good enough as he had *"more questions after than before"* (29.18 rodshop coach 1). Potline coach 6 was taught to use the fishbone when he started by a guy from Canada[3], however it was taught in one hour where he also had to learn the system. Both casthouse coach 2 and rodshop coach 3 have not had any formal training in the fishbone, but they have learned by watching others use the method. Rodshop coach 3 would like more training in the fishbone as he thinks that would help him to make the investigations better.

In regards to the 5-whys, rodshop coach 3 was taught the method when he started by the departing coach that he was hired to replace. His experience came through using of the system as he asked to see what was going on when investigations were going on. Rodshop coach 1 has not received any training either in the 5-whys at Alcoa Fjardaál, but he was taught at his previous job, and he has taught some of the coaches to use the 5-whys. Potline coach 2 thinks that he is the only one in the potline that has had some training in the 5-whys, and he still finds it hard. Casthouse coach 2 says that he should be using the 5-whys, but he does *"not really know how to use it"* (6.19 casthouse coach 2). He says that the other coaches know how to use the 5-whys and that they are using it, but he does not know how, because he is new to the coach job.

As some are teaching themselves, and others are learning from reports they have found, it is no wonder that the methods are used in various ways. Some of the coaches have been taught by other coaches, but if they have not received any formal training there is no control of what they are teaching others. It is also mentioned that the safety managers teach coaches about the method, but at least two of the safety managers has not received any training, but has taught themselves (safety manager 2, safety manager 1).

3. When Alcoa Fjardaál started they had help from some people from Alcoa in Canada

All this shows that there is no standard training of the coaches. The lack of standard training in the methods means that both the coaches and the safety managers have been taught differently. In the "analysis of the process" it was presented that the methods are used differently in the investigations and that some used the methods incorrectly. That problem is almost certainly related to the lack of standard training in the methods.

3.4.3 Further training

Training is an important issue, and it was found that there is no standard way of training the coaches and therefore nothing to enable a standardized use of the MES or the methods of investigation. Furthermore, we found that the coaches would like more training, and therefore we wanted to know how the coaches prefer to be taught.

Three of the coaches mentioned that they think that one-on-one training and learning by doing is the best way to receive training (rodshop coach 2, rodshop coach 3, potline coach 3). Rodshop coach 3 thinks that the system has a lot of possibilities which makes it impossible to learn it in a 1-2 hour class. He thinks that *"the best way to learn is to do it"* (29.57 rodshop coach 3). Potline coach 3 and rodshop coach 2 agree point out that somebody should be sitting next to you while you are doing it by e.g. reporting an incident in the system. This means that someone can tell you what to do while you are doing it and tell you, why you are doing it (rodshop coach 2). Casthouse coach 1 thinks that it is a good idea to start the training with a course and afterwards have some one-on-one training.

Learning by doing seems to be the preferred way of learning among the coaches; however it could be combined with another form of teaching.

3.5 Analysis of the training: The operators' training

Problem: The wish to involve the operators more could lead to problems

Alcoa Fjardaál wants to involve the operators more in using the MES. This can be a problem if they are not qualified enough to be a part of the system as the quality of the reporting might be lowered. We therefore found it interesting to know if the operators have had any training in the MES. Furthermore we wanted to know how the operators would like to learn as it could be relevant if the operators at some point will be asked to use the system more.

3.5.1 Training

We found that none of the interviewed operators have had formal training; however all the operators that we talked to have used the MES. This means that some of the coaches have taught the operators or that the operators themselves have made it a priority to learn the system.

Two of the operators, casthouse operator 1, potline operator 1, say that they have taught themselves to use the system and find it easy to figure out. Casthouse operator 1 taught herself by looking and exploring in the system which was *"not so hard; most of it is in Icelandic"* (05:24, casthouse operator 1). Casthouse operator 2 has also taught himself, but he gets help from the coach when there is something that he does not understand in the system. He thinks it is easy to learn.

Three of the operators, rodshop operator 1, rodshop operator 2, potline operator 2, have all been taught by their coach or co-workers. The two operators from rodshop both mention that they have been taught by a co-worker. At the moment rodshop operator 2 is learning about the MES by watching a co-worker while he is reporting an incident in the system.

Two of the coaches mentioned how they taught their operators and team leaders. Rodshop coach 1 has personally taught some of the operators to use MES. When safety manager 3 was a coach, he did send team leaders to a course in MES and in the root cause method so they could to take over when his was not there. In case of an investigation safety manager 3 includes some of the new guys and other relevant persons because he wants to have many eyes on the case. Casthouse coach 1 also mentions that the team leaders have some training, mostly through the coaches, because the team leaders should be able to take over if the coach is sick or away. However none of the operators has any training.

3.5.2 Preferred way to learn

As there is no standard training for the system, we wanted to know how the operators prefers to be trained.

Two of the operators think that learning by doing is a good way to learn (casthouse operator 2, potline operator 2). Casthouse operator 2 thinks that it would be nice to sit down with one other, but if it is a class training situation there should be time to try things out in the system. An idea could be to have a copy of the system to practice in and if you make some mistakes, the system could tell you and tell you how to correct it. Rodshop operator 1 thinks that one-to-one training is a good way to learn.

An important matter for rodshop operator 2 is that there should be time to learn and if there is not time to concentrate on learning, it will take longer to learn. She is receiving training from a co-worker at the moment and tells that they *"have been trying to find time to do it"* (07:18 rodshop operator 2).

In this subsection we have found that the operators have tried to use the system, even though they have not received any formal training. Some of the coaches were self-taught which shows that they are motivated to be a part of the system. Some of the operators prefer to be taught the system by "learning by doing".

3.6 Conclusion of the analysis

One overall problem we have found is the lack of standardization which was found in regards to the process, the use of the system and the training.

We found that there was no standard way of investigating as the management has not given clear guidelines for the use of the two methods which leads to coaches using different methods. The varied use means that it is hard to learn from each other, and there is no clear way to improve the investigations. As we looked into the training on the methods we found that this also varies. The coaches are taught by different people leading to a dissimilar knowledge of the methods, and some are having trouble using the methods the correct way.

Knowledge sharing is also a problem. The feedback is insufficient, accurate statistics are hard to make because there are problems with a standardized use of the system and furthermore it is hard to get statistics out of the system. As we look into the training in the MES, we also found that it is not standardized, and therefore employees are not reporting things in the system in the same way or at the same places which makes it impossible to get statistics and information out of the system. We have also learned that many coaches have insufficient understanding of the categories in the system. This lowers the quality of the incident reports. It has also become clear to us that the functionality of the system hinders user-friendliness and correct use of the system.

We found that the filling of 'verkeftirlit' is mostly similar e.g. the operator is helping the coaches fill out the 'verkeftirlit', and they are aware that names on the 'verkeftirlit' could cause problems. However when the 'verkeftirlit' are put in the system it is done differently e.g. some are putting all of the 'verkeftirlit' in, whereas others are only putting them in if something is unsafe. This means that statistics are impossible to make.

Alcoa Fjardaál would like the operators to be part of the system and most of the operators that we talked to would like to be more involved. Most of the coaches also think it is a good idea to involve the operators more; however it will require that the operators have more computers as well as time and skills to use the system. Half of the coaches mention that the operators could also put in the 'verkeftirlit' into MES.

CHAPTER 4
DISCUSSION

DISCUSSION

4.1 Introduction to the discussion

Based on our paper about "IS driven process innovation: A literature review based on Swanson's tri-core model of IS innovation" (Dorset, Müller and Purup 2012), we will in this chapter discuss the solutions based on the identified problems found in the analysis. The paper is based on Swanson's article from 1994, and he presents three types of IS driven process innovations. In the paper, we discussed these three types and based on these types, we will in the following find which of the three types are most suited for the solutions.

We learned that Alcoa Fjardaál do not have any standardized process, neither in training of the employees nor in how to report incidents into the system. The solutions will affect the Health and Safety department and the whole plant regarding both the training and the new standardized processes that are needed to improve the daily work. This innovation is going to affect the whole of Alcoa Fjardaál and on all levels. It is going to be a strategic advantage as it would be possible to share knowledge and make accurate statistics from the information in the system. Therefore we find that it is a technical core innovation. As mentioned in the theoretical section type 3 innovation, 'the technical core', is defined as: *"integrates IS products and services with core business technology, and typically impacts upon general business administration as well"* (Swanson 1994: 1977). This innovation potentially affected the whole business

In the following section solutions to the problems found in the analysis will be discussed. The discussion will draw from the theory about type 3 innovation The themes about type 3 from the paper is used to structure the suggestions to solutions as the themes were found to be suitable for the problems found in the analysis. The themes are: strategy, success factors, barriers, knowledge sharing and implementation. For the first four themes, solutions will be found by addressing themes from the theory and the information gathered at Alcoa Fjardaál. Besides finding solutions, we will also examine what it takes to make the solution work as some factors are crucial to enable the solutions. The last theme, implementation, will be used to look into how the implementation of the changes should ideally be carried out. In the end of the discussion we are going to list the found solutions.

4.2 Strategy

This section will be using the theme 'strategy' from the paper to discuss strategy as an important factor when changes are to be organized. The strategy of Alcoa Fjardaál needs to be altered as they need to start focusing on standardization in their work processes as the lack of standardization is causing problems.
In this section we will start off by looking into the MES supporting the business, and furthermore we will present the need for alignment between the business strategy and the IT strategy. The last subsection will address the need for expectations for the improvements to be realistic.

Alcoa Fjardaál needs to be aware of how the IT in their organisation can support the business, but also that the changes in the MES need to be a part of an organizational change because the changes in the system can facilitate getting the operators more involved in the system. Furthermore changes in the system can enable a more standardized use of the system, but this requires that there are standards in place and that the management requires that the standards are

used. Standards can contribute to homogenizing the ways the employees work and report in the system which will make it is easier to make statistics. The system can therefore contribute to the standardization of the processes, but the full potential can only be realized if the organization is willing to make radical changes (Attaran 2004; Mitchell and Zmud 2006). Alcoa Fjardaál therefore has to be prepared to make the necessary changes and commit to them in order to achieve a more standardized way of working.

It is important for Alcoa Fjardaál to align their business strategy and their IT strategy. This is necessary as the IT strategy must correspond with an organizational redesign (Abraham and Junglas 2011; Gorla et. al. 2007). If there is no alignment between the strategies then IT cannot support the business (Holden 1992). If Alcoa Fjardaál decides to include the operators more in the system, this should be mirrored in the IT strategy. The further involvement of operators will require changes in the MES because the system is not intuitive or user-friendly. However the system can with a redesign take part in creating a more safe work environment for the employees.

However, it is not enough to just align the IT and business strategies as these both have to be aligned with the organizational expectations of the outcome of the changes. It is essential that the expectations are realistic as problems can otherwise arise e.g. if the organization has too high expectations with respect to IS benefits (Holden 1992; Whitman 1996). This means that even though changes in the MES and the use of the system can improve the statistics that the system can provide, the expectations in regards to improvements has to be realistic. The statistics do not by themself make improvements. It is up to the management to use the improved statistics to make changes and learn how to best use the information. Furthermore the implementation of standards does not in itself make better investigations as it also requires training to enable the coaches to improve their investigations. In addition, expectations to the time it takes to gain the benefits need to be realistic. This is important as the motivation might decline if results are not seen when expected. Alcoa Fjardaál therefore has to commit to make the changes and keep everybody motivated.

In this section the following solutions were found:

- Alcoa Fjardaál needs to be ready to make radical organizational changes
- Aligning the business strategy and the IT strategy
- Expectations regarding improvements have to be realistic

4.3 Success factors

In this section we use the theme ‘success factors’ from the paper to discuss the issues that Alcoa Fjardaál has to be aware of concerning solutions to the problems that we identified in the analysis. The focus will be on factors that have to be taken into consideration to achieve a successful solution and implementation and furthermore it will be on the conditions for the solution to succeed.

In this section we start by looking at the management and how their mentality and way of thinking can help achieve the changes as well as how employee participation can be beneficial. Additionally it will be discussed how to achieve employee participation and support. Furthermore it will be discussed what factors are helpful in order to make the changes.

4.3.1 Management action and employee participation

The mindset of the management is very important in relation to making a process innovation as it is not merely an installation of new technology, but rather an organizational redesign over a period of time (Gorla et al. 2007; Mitchell and Zmud 2006; Orlikowski 1993). The managers therefore need to change their mindset in regards to how they organize, plan, deploy and inspire their employees (Attaran 2004). This implies a fundamental reshaping of behaviour within the organization (Abraham and Junglas 2011). We learned at Alcoa Fjardaál that the management wants the operators to be more involved in the system. Therefore they appear to be ready to make changes in the organizational structures; however the intention is not enough. If they want to realize the idea, they have to commit to it, and they have to organize and plan according to the adjusted organizational design. A big part of this is that they need to make standardizations in regards to the use of the system as employees using the system, e.g. the reporting of 'verkeftirlit', in the same way, will make it easier to make statistics. However to achieve this training is necessary, and this also has to be standardized as the employees might otherwise not learn the same which will hamper the standardization of the use of MES. Furthermore a standard in regards to the use of methods of investigation needs to be decided upon. The standards will also make it easier for the management of Alcoa Fjardaál to manage as they will have access to make more accurate statistics faster. This will make Alcoa Fjardaál capable of reacting promptly to changes as they will show up in the statistics. This means that Alcoa Fjardaál has to learn a new way of organizing and planning to get the most out of the new standards, and Alcoa Fjardaál therefore has to be willing to change their mindset and therefore their way of thinking as this is critical to making the changes a success.

Standards for investigations, for use of the system and for training will help the coaches and the operators to know what is expected of them. If standards are implemented the behaviour and the roles of the operators, coaches and safety managers within Alcoa Fjardaál will be reshaped. As the introduction of standards will affect widely, the management needs to be in control and take responsibility for making the necessary changes. If the new standards are going to work, the coaches and the operators have to be motivated which is the responsibility of the management.

4.3.2 Motivation

A way to encourage and motivate the operators and the coaches is to communicate the intentions and the benefits of the changes (Atkins 1998; Fichman 2001; Martinsons 1995; Orlikowski 1993). One of the operators that we spoke to mentioned that he was unsure if he wanted to use the system more as he was used to the way that things were and if changes had to be made, the management had to show that the new way would be better (potline operator 1). The operator is onto something essential. To make the entire organization ready to an organizational redesign, people on all levels of Alcoa Fjardaál need to be convinced that it is a good idea. The employees have to be convinced that it is better to work after a standard in regards to making investigations and use of the system. This could be done by telling the employees that a standard in the use of methods of investigation will result in better investigations which mean that it will make the work safer. Furthermore it will be easier for the employees to know how to make a satisfying report, and this could be a motivation factor as the employees know what to strive for. In addition standardization in the use of the system will make it easier for the employees to do their job in a way that they know will help the organization and the safety at the plant. However, it is also important that the management and the employees work together and that the communication is open both ways. This means that the managers have to take the input of the employees seriously and let the employees voice their concerns (Baxter and Berente 2010; Edmondson et al. 2001). Employees that are feeling heard and

secure are more motivated which is therefore important to be aware of. Besides communicating, another way to gain the support of the employees is training (Martinson 1995). If new standards are implemented, it is first of all essential that the employees know the standards and know how to live up to the standards. If Alcoa Fjardaál decides to combine the methods, this cannot be implemented without prior training as the employees are not sure of how to use both methods. Mainly the 5-whys are hard for the employees to use correctly. Second, training is a good way to teach the employees the purpose of the standards. If the employees know the benefits of using the two methods, it will be easier to gain their support. It could be benefits for themselves as they gain more knowledge about the safety process, but it could also be that their work benefits co-workers as incidents are hopefully prevented from being repeated. If the operators should be more involved in the system, they also need to see the benefits. They need to know why they are being more involved, and furthermore they need to know what they are expected to do in the system as well as how they should use the system. Training is therefore necessary. As the training should also be standardized to facilitate a consistent way to use the system, there needs to be some standard guidelines for the training. In addition Alcoa Fjardaál needs to use more resources on training the coaches to avoid self-trained coaches and thereby enable a standardized use of the system. If the standards are to become new routines the management and the employees have to work together. Furthermore the management has to keep motivating the employees to use the new standards (Abraham and Junglas 2011) otherwise the achieved behavioural changes will not last. This also applies if the operators are to become more involved in the system. This has to become a routine and both the management and the coaches have to be a part of making the new routines work.

When the management and the coaches both increase their focus on the standards in investigations and use of the system, it might have a positive effect on the ‘corrective action’. As mentioned in the analysis some of the coaches did not have a suitable respect for assigned ‘corrective actions’ as it was found that they were not always carried out. The intensified focus on investigations might increase the responsibility of the coaches because they would know that their work is significant and is taken seriously.

To sum up there are issues that Alcoa Fjardaál needs to focus on to enable changes, and there are things they need to consider when making solutions to the problems that were analysed earlier.

Conditions for the solutions to be successes:

- Alcoa Fjardaál has to be willing to change their mindset as this is critical to making the changes a success.

Solutions are as following:

- Standards for the methods used in investigation have to be made.
- The management must be in control and take responsibility for making the necessary changes.
- The management needs to work together with the employees to implement behavioural changes and new routines.
- The standards have to be communicated so the intentions and benefits of the changes are understood by the affected parties.
- Training should be used to gain the support of the employees.

4.4 Barriers

In this section we will focus on the barriers that can arise when changes are implemented in an organization. First we will look more closely at how the commitment of the management can affect the implementation process, and next we will discuss the existing cultural barriers that can have importance for the changes. In the end we will discuss how the IT can act as a barrier to changes.

4.4.1 Commitment from the management

According to the CEO of Alcoa Fjardaál, they have been discussing a further standardization, but no further steps have been taking to solve the problem. We also found that the two methods are used differently and that the methods in some cases are used incorrectly (safety manager 2).

From the beginning, Alcoa Fjardaál tried to get both the fishbone and the 5-whys implemented in investigations, but they did not succeed (safety manager 1). Furthermore the management do not agree on which method to use. The management's commitment is essential for development and implementation of changes (Holden 1992; Lee 2004; Martinsons 1995), and the lack of commitment from the management of Alcoa Fjardaál regarding the use of the two methods has created resistance towards the use, especially of the 5-whys. Some of the coaches found it stupid or embarrassing to use the 5-whys (potline coach 4, potline coach 2). The resistance can be avoided if the management can convince the employees about the benefits of the change (Attaran 2004). A solution to the lack of standardization regarding the two methods is that the management makes a decision about how to use the two methods and if they should be combined or used separately. It requires a strong commitment from the management, who need to follow through on their decision and make the necessary resources available. Furthermore has to show the employees their commitment to the standards. This could be shown though clear communication and showing leadership. Furthermore is could be done by allocating resources and prioritizing the training of the operators. Since the CEO of Alcoa Fjardaál has been a part of the decision to involve the operators more in the system, it should not be a problem to get the right resources.

Another barrier can arise from the wish of the management at Alcoa Fjardaál to get the operators to be a part of the system. In order to get this to be a success, the commitment of the management is crucial. None of the operators were opposed to using the system, and only two coaches were against having the operators more in the system. On the surface it therefore seems like there is no resistance towards the wish. But there can be a possible barrier as the boundary between the coaches and the operators would be smaller if the operators are getting into the system. That would change the power balance between the two groups of employees. The management needs to avoid resistance and convince both groups of employees that the changes will benefit them. Since it is the coaches that would lose power, it very important to convince them that this new attempt to get the operators into the system will benefit them; otherwise resistance to the change could be a potential barrier (Attaran 2004). The coaches need to be convinced that the change of the power is not going to affect their position and work in a negative way but that it is going to help them in their daily work.

4.4.2 The existing culture

A psychological barrier can be that even though Alcoa Fjardaál has not existed for many years, there are already routines. The culture surrounding the operators in the production areas is characterized by harmony and stability, as operators and coaches do the same thing every day. A

culture like this will likely favour incremental changes to the organization and may block radical redesign of the organization (Martinsons and Hempel 1998). It would be a radical change for the operators if they had to become a part of the reporting in the system. This is a huge change from only working with machines and this can maybe create some resistance that the management needs to be aware of and find a way to handle. We identified problems related to earlier attempts to get the operators into the system. One attempt failed because there were not enough computers available and because the system was too slow (potline coach 2). Another attempt failed because it led to a war between the operators (potline coach 4). As some of the employees have experienced failed attempts to make changes, there might be a negative attitude towards changes. This could be a psychological barrier that the management needs to be aware of before starting to implement new changes. Furthermore the management has to take measures to avoid the conditions that were responsible for the failure of the other attempts.

4.4.3 IT as an enabler or a barrier

Although IT can be an enabler of re-engineering efforts, it may also become a barrier. Rapid and radical changes require the IT infrastructure to change quickly. However, it may not be possible for IT to accommodate this pace of change. Therefore, IT can become a barrier to implementing redesigned processes when they cannot be put into practice before system has been redesigned (Attaran 2004). This could be a barrier because many of our solutions are based on a redesign as it has become clear that the design of the system is not user-friendly. If the design of the system should be a part of making the use of the system more standardized, there is another barrier that is crucial to be aware of. It became clear that the system developer, Keops, and Alcoa IT had some problems with their co-operation. The ABS specialist mentions that she does not think that Keops is doing the work.

Also, the IT employee mentions issues as he says that it is difficult to keep the contact with Keops as Keops has a high degree of staff turnover, and it is therefore difficult to have a continuous contact with an employee at Keops. The IT employee, however, thinks that almost everything is possible regarding design changes. The redesign of MES is necessary in order to get the operators into the system and for enabling a standard use of the system. The management's commitment is therefore important as they need to find a way to solve the problems with Keops so it does not become a barrier for the redesign. A solution is that the management organizes better communication with Keops management and finds a way to co-operate.

We have found several solutions to the identified problems and they are as following:

- The management needs to make a decision about how to use the two methods.
- There must be a commitment from the management regarding changes to the processes.
- Management must motivate the employees towards the changes in the processes.
- The two groups of employees must be convinced of the benefits of the changes.
- Management must commit to getting the operators more involved in the system.
- Better communication with Keops must be developed.

4.5 Knowledge sharing

This section of the discussion will focus on the knowledge sharing at Alcoa Fjardaál, and it will involve the theme 'knowledge sharing' from the paper. Knowledge sharing across the organization is important as this ensures the newest knowledge to everybody. This section will start off by looking at the lack of feedback that was found in the analysis. Next a problem about knowledge from the operators not being heard will be presented, and thereafter it will be addressed how the

operators should be informed. Finally the knowledge flow across the different vertical levels of the organization will be looked into.

We have identified that there is a lack of feedback between the coaches and the management. This means that the knowledge is not shared as well as it could be. To achieve knowledge sharing, organizations have to change their traditional way of working to accommodate knowledge based working methods, establishing knowledge flows between employees. Such transformation enables both business growth and competitiveness (Chatfield and Bjørn-Andersen 1997; Harkness et al. 1996). A solution to the lack of feedback is that Alcoa Fjardaál changes their traditional way of working in order to establish knowledge flows between employees. MES and the use of it can be an important part of this because if the system is redesigned to make it easier to create statistics, it would be a lot easier to make a knowledge flow among the employees. This will create more shared knowledge that can be used in the daily work to prevent future incidents.
Furthermore knowledge sharing can also enable the management to hear the ideas of the employees as they can have ideas that will improve the plant and its processes. Employees need to actively search for and evaluate ideas that provide new opportunities and abilities to cope with problems (Newell et al. 2000). However it was found that Alcoa Fjardaál has some problems with knowledge sharing and this is important to change. During our interviews we heard many good ideas about changes in the system, however it did not seem like the respondents had a place to go with these ideas. This was supported by the IT employee as he had never heard most of the suggestions that we heard. This means that Alcoa Fjardaál was not using the suggestions from the employees and this could mean missing opportunities. Some of the suggestions may not be useable, but others might be pearls of wisdom. The employees are closer to the actual work and they are the ones that mostly use the system for reporting. This means that they experience problems, but they are not asked about what they think. Valuable knowledge is not being collected and used to improve the system or the processes. If employees feel that their suggestions are being heard, they will be more encouraged to bring new issues up. It is therefore important that knowledge sharing be a part of the new organizational design as this would enable employees to suggest changes or new initiatives.

In the analysis it was found that most of the coaches and the operators would like the operators to be more involved in MES by reporting more into the system. As it is now, the operators have permits to read in the system with some limitation e.g. names cannot be seen. However, it is not part of their work to actively seek out information in the system. The benefits of the operators being able to look up information could be increased the responsibility of the operators (potline coach 2) which may also mean that they will become more aware of safety problems. Furthermore they would if it was possible to look up certain machines and read about what kind of accidents have happened in relation to that machine since the operator last worked with that machine. This could prepare the operators better for the job that they are about to do. The coaches do not have the time to talk to each of the operators, and it is not possible for the coaches to know what has happened at a certain machine since the operator last worked with that machine. However it would not be possible to eliminate the personal contact to the operators that the meeting before each shift provides because there are concerns about whether the operators will get the right information (potline coach 5). It is therefore important to make sure that every operator has the right information and that the coaches are available to help the operators that need it. If the operators have any doubts it is essential that asking for help is not only acceptable, but also encouraged.

If not only the coaches but also the operators were able to report and were encouraged to read information in the system, it would make them part of the knowledge flow across the different vertical levels of the organization. When they report, they give information to the management and the management could let information flow back to the employees about e.g. the progress and problem of the plant. As it is now, the management is already giving the employees information by setting up statistics a number of places at the plant. Potline coach 2 mentions that there is information that he is not receiving. When bigger incidents have happened and people from Alcoa Europe help with the investigation, the coaches are not told about what happened, even if it happened in their work area. This is a lack of knowledge sharing, and it is hard to encourage the employees to share information, if the management does not set a role model.

In this section the following the solutions were found:

- Establishing knowledge flow between employees
- Establishing knowledge flow between employees and the management
- Establishing knowledge flow between employees and the IT department
- Better communication flow between Alcoa Fjardaál and Keops

4.6 Implementation methods

This section of the discussion will focus on 'implementation methods' of the solutions that we have identified in the previous section. We will base the implementation plan on the theory from the paper. In the first subsection we will go through the theoretical consideration that Alcoa Fjardaál need to be aware of when implementing new standards in regards to the process, the system design and the training. When new processes are implemented into an organization there are different steps that are important to follow in order to gain success. It is also crucial to follow the steps in the right order.

In order to redesign the system and the processes research shows that following a step-by-step method makes implementation easier (Dorset, Müller, Purup 2012), and the sequence of the steps is very important. First it is important to motivate the employees towards the changes. The next step is to link the new changes to the existent work and provide hands-on training that allows the employees to try the changes in the actual work environment. The third step is about building trust related to the system, and the fourth step is about creating confidence to the new processes and way of working, and the fifth step is reviewing the implementation process to ensure learning (Baxter and Berente 2010; Gorla et al. 2007; Edmondson et al. 2001).

Both motivation and allowing the employees to experiment with the system for the sake of building confidence and trust is pointed out as very important (Baxter and Berente 2010; Gorla et al. 2007; Edmondson et al. 2001). It is important that the new processes and the system design are implemented right, and the employees are motivated to use it in their daily work. This is also true for when the operators are going to use the system, by first motivating them for their new work task and thereafter having them try the system in order to learn how it works. Afterward the focus is on creating confidence in working with the new process. It is possible to ensure that they have the right understanding of the new processes and know how the system works. This will prevent the operators from feeling that they have no idea what they are doing and by giving them a thorough training, it is possible to get the system to function right.

The motivation is a crucial factor in order to get the employees to use the system and the new process, and as mentioned in 'barriers' it is very important that the management uses the required resources to convince the employees about the benefits of the redesigned system Confidence is also an important factor. It is necessary to create confidence about the redesign system and that it fits in the employees' daily work. This confidence can be created during the training and as mentioned in "analysis of coaches' training" the employees would like one-on-one training. Alcoa Fjardaál could also choose to educate the coaches to be superusers and provide them with guidelines so they could to train their own operators more effectively than now. One of the operators mentions that it would be good to have a copy of the system to practice in. In that way the operators could practice without the risk of doing something wrong in the real system.

By using the step-by-step method Alcoa Fjardaál would be able to gain a successful "turnaround" in MES and how MES affects the incident management.

We have identified several solutions that would improve working methods at Alcoa Fjardaál, and it is important that they all are implemented in the right sequence in order to achieve the goals of a more standardized work process and more involvement of the operators in the system. As mentioned in the previous subsections, motivation and confidence are very important factors for the success of the implementation. Therefore we recommend that the solutions are implemented one at a time, otherwise the employees could be overwhelmed by the many changes at once. By implementing the changes one by one, the employees get time to adjust and to build confidence in the new way of working. The employees will also see that the new work methods help them in their daily work, and they will be motivated for new changes.

Before starting the process of making radical changes, the management at Alcoa Fjardaál needs to decide and clarify that the changes include the redesign of the system and the standardisation of the processes and of the training. The management needs to fully commit to the changes and work together with the employees to implement the necessary behavioural changes and the new routines which were identified in the subsections 'barriers' and 'success factors'. It is also important to align the business strategy and the IT strategy as the initiatives of each strategy need to complement the other. This has to be done at the beginning of the turnaround in order to keep improving the organization.

When the changes are going to be implemented at Alcoa Fjardaál, we first recommend that the management first clearly communicates the changes to the employees to create motivation for the changes as found in the themes 'barriers' and 'success factors'. The motivation is, as mentioned earlier, very important for the success of the implementation. Next we recommend that a standardized training in the system and in the methods is started for operators, coaches and safe employees as found in the themes 'success factor' and 'barriers'. In that way all employees would get the same and standardized training, and it would be a part of building confidence about the changes. Also, for the operators it would be a good start before they will have to work with the system in their daily work.

During the process of implementing the changes, it is important to establish a knowledge flow between the employees in order to secure that every employee gets the right information and has an opportunity to learn from the shared knowledge. Knowledge flows between employees and management and the IT department should also be established in order to keep design of the system up to date and that it supports the daily works process. In order to get the system redesign

and getting the employees to work in a standardized way, it is important that the management get a good communication with Keops, the designer of the system, in order to prevent that the system is going to be a barrier for the implementation.

After the new changes have been implemented, the management of Alcoa Fjardaál needs to review the implementation process in order to ensure learning in the organization.

Important issues in the implementation at Alcoa Fjardaál:

- Implement the changes one at a time
- Create motivation for the new changes
- Provide standardized training for all employees
- Give the employees' confidence about the changes
- Improve the communication with Keops

4.7 Conclusion of the discussion

We have identified several solutions for the problems found in the analysis. The considerable part of the solutions concerns the need for a standardized way of working and of giving training to the employees. Furthermore it was found essential that Alcoa Fjardaál improves the communication from the management.

Based on the five themes we have found some issues that the management and the employees need to be aware of during the changes. We have looked closely into which success factors are needed to gain success with the changes, and we have discussed the potential barriers that can arise during the process. Knowledge sharing has also been discussed in relation to how Alcoa Fjardaál secures the best way of sharing the knowledge and in that way ensures that every employee has the right information. We also have made recommends for how Alcoa Fjardaál can implement the changes with success which has been based on the section implementation. The solutions that we found can be divided into four main categorizes:

- Alcoa Fjardaál needs to decide and clarify what they want to change and commit to it
- Standardized training for the operators, coaches and safety employees
- Preparing for the implementation of the changes
- Alcoa Fjardaál needs to be better at sharing knowledge and communicating clearly

It is important for Alcoa Fjardaál to make it clear what kind of changes they want to do e.g. define the standards for methods of investigation and how to involve the operators more in the system. Furthermore they have to commit to the decision and make sure that the appropriate resources are available. Standardization of the training is also important for the management to decide on as the standardization is crucial for the implementation of standard work processes.
Preparing for the implementation includes communicating the intentions and benefits of the changes as well as motivating the affected parties. Furthermore the improvement of the system is an important part of the preparation as a more user-friendly system can make the changes easier for the coaches and the operators.
In addition, the knowledge sharing and the communication need to be improved. This includes the knowledge flow on both the horizontal and the vertical dimension.

Besides solving the identified problems, the solutions can also help Alcoa Fjardaál to live up to the ABS requirements from the Alcoa Corporation that were described in the problem field. Alcoa Fjardaál had identified that they had problems living up to some of the ABS requirements e.g. operator involvement and measurement of identified as well as solved problems.
We think that Alcoa Fjardaál by implementing the identified solutions would be able to live up to some of the critical requirements. By implementing more standardized processes in how to report into the system, the follow up process would be both easier to make but also simpler to share.

CHAPTER 5

CONCLUSION

CONCLUSION

Our research question for the project was:

What is the safety processes at Alcoa Fjardaál and how is the system, MES, used regarding the processes? Does this contain problems and if so how can they be improved?

We had identified four questions that led us to our research question and in the following section these four questions will be answered on the basis of what we found out during the project.

The four questions are:

- What is the safety process at Alcoa Fjardaál and does it contain problems?
- How is the system, MES, used regarding the safety processes?
- How can the wish, about the operators being more involved in the system, be facilitated?
- What kind of initiatives does it take to deal with potential problems in the safety process?

5.1 What is the safety process at Alcoa Fjardaál and does it contain problems?

The safety process was explained on the basis of the coaches and the safety managers' description of the current process of a medium or a high incident. In the following the four identified subprocesses and the problems related to each subprocess will be presented.

1. **An incident happens**
   The process starts with the coach arriving to the incident sight, and the injured employee is sent to health care.
   We did not find any problems in this part of the safety process as all the coaches knew how to handle an occurred incident correctly.

2. **The incident is reported into the system**
   This part of the process includes the reporting of the incident and that the information is reported into the MES right away.
   In this part of the process we found problems in the way that the coaches were reporting into the system. This problem will be elaborated upon later in this section.

3. **The investigation is carried out and entered into the system**
   In this part of the process the coach starts to get an overview over the incident by interviewing witnesses and other relevant personnel. Furthermore the coach takes pictures of the sight. The root cause is found by using a method, and corrective actions are formulated to ensure that the incident cannot occur again.

   This part of the process also had problems. The main problem is that there is no standard for which method to use to find the root cause as the management has not implemented well-defined guidelines for choice of method. Some are using the fishbone, some are using 5-whys and others are combining the two methods. This means that the management has no control over the investigations which is a problem as some of the investigations may not be carried out in the best way, and the right root cause may not be found. Furthermore it was found

that the 5-whys was most often not being used correctly which also means that the right root cause may not be found, and the incident could be repeated.
In addition it was found that not all the coaches were capable of carrying out an investigation on their own. This means that the coaches cannot live up to the responsibility that they are given as the coaches are supposed to make the investigation.

4. **The investigation is over**
   In this part of the process, the employees involved in the incident or the investigation will be informed, and the corrective action will be assigned with the right persons.
   We found that some of the coaches would like feedback from the safety managers on their investigations. Currently they only get feedback when they have made an insufficient investigation. The problem is that the coaches are motivated for making better investigations, but they are not given the opportunity. Furthermore the motivation of the coaches to make the investigation as good as possible might be hampered as they know that they will not be credited for it. Perfection in the investigations of the coaches would save time and resources used afterwards to improve the investigations.

Lack of standardized training
An overall problem that was found in both the second and the third subprocess was the lack of standardized training. The coaches have a wish for more training; however it differs in which areas. As mentioned in the fourth subprocess, some would like to know how to make better investigations. As there is no standard training in either the fishbone or the 5-whys, the quality of the investigations will vary. If the investigations are not done properly, the same incident could occur again. In addition it was found that there is no standard for the training in the MES which means that the coaches are taught differently, and some of the coaches were mostly self-taught. The coaches are therefore using the system differently which leads to information being put into the system in various ways. It is therefore complicated to make statistics. Furthermore this means that the coaches are not sure about what the MES can do and how to use it.

5.2 How is the MES used regarding the safety processes?

We found that there were several problems with the use of the system, and that the MES lacks user-friendliness. In general, the coaches find that the system is working fine, but we found some different problems with the use of the system. We identified that the system is used very differently; some of the coaches are only reporting into the system, and others are also trying to learn from the reported incidents. We also found that the system is too slow which means that some information about incidents is not put into the system. This lowers the quality of the investigation as some of coaches do not have the time to wait and information is therefore lost.

The lack of user-friendliness means that some of the coaches find various categories in MES difficult to understand and that affects the way of the reporting because the coaches are reporting different things in the same category. The Lack of standard of the reporting has the consequence that the coaches and the management have trouble with making statistics which means that it is difficult to learn from previous incidents and in that way prevent future incidents.

We also identified that the operators are using the system more or less frequently, and that most of the coaches would like to have the operators more in the system. But we also identified that the operators found MES confusing and that some of them had problems with understanding the

different categories and having to report into the system. Their understanding of MES is therefore insufficient.

5.3 How can the wish, about the operators being more involved in the system, be facilitated?

We have learned that all the operators that we interviewed would like to be involved in the system; however one mentioned that he would have to be convinced of the benefits. The management therefore has to communicate the benefits of the operators' bigger responsibility and ability to search for information. However, it is important that the operators are confident, and it is therefore essential that asking for help is not only acceptable, but also encouraged. Both the safety managers, but also the coaches need to be ready to help and motivate the operators.

The operators do not have a suitable level of understanding of the system which is required for reporting. Training is therefore necessary which is also the opinion of the operators. None of the operators had received any kind of formal training; however they had all tried to use the MES. The interviewed operators therefore need to have a standardized training in order to gain an understanding of the system and of how to use it. We would recommend that the training includes "learning by doing" as this would make the operators more confident in the system before they have to use the system.

Furthermore it is important that the coaches are equipped to help the operators which mean that there needs to be guidelines for what the operators should do, and these should be communicated to the coaches. In addition the coaches need to have a standardized training, and the coaches also need to be informed about what the operators have learned as it is important that the operators are taught consistently to avoid them being confused.

5.4 What kind of initiatives does it take to deal with potential problems in the safety process?

In the end of the discussion the solutions that we found were divided into four main subjects and these will here be used to structure the solutions. The solutions can also help Alcoa Fjardaál live up to the ABS requirements.

1. **Alcoa Fjardaál needs to decide and clarify what they want to change and commit to it**
   First off Alcoa Fjardaál needs to make sure that they want to make changes, and thereafter they must be clear about what kind of changes that they want. They have to commit to the decision and make the appropriate resources available. This means that they have to define standards for the methods of investigations and for how they want to involve the operators more in the system. The management has to take control and responsibility for making the necessary changes, and they need to work together with the influenced employees to implement behavioural changes and new routines.

2. **Training for the operators, coaches and safety employees**
   The management also has to decide on standardized training as this is important in regards to gaining standard work processes and providing guidelines for the training. In addition more resources have to be used on the training of the coaches to avoid self-taught coaches. If the coaches are taught from the same guidelines there would be a basis for a standard work process.

3. **Preparing for the implementation of the changes**
   When the management has defined the changes, the intentions and the benefit of them needs to be communicated as the affected parties need to understand them in order to gain support for the changes. The employees need to be motivated as they otherwise can become a barrier for the changes. Besides communication, training is also a way to gain support of the employees as training can be another way of teaching the purpose of the change and teaching what the changes will mean for them.

   In addition, an important part of the preparation is making improvements of the MES. The system needs to be more user-friendly as this will facilitate a more standardized way of using the system. Improved user-friendliness could be easy access to the system and more appropriate definition for the category in the system. This will also be valuable if it is decided to involve the operators more in the MES because a redesign of the system will make it simpler to use and understand, and it would therefore be easier for the operators to use and report correctly.

4. **Alcoa Fjardaál needs to be better at sharing knowledge and communicating clearly**
   It is important to establish a better knowledge flow. This could facilitate usage of the knowledge that the operators and coaches have as they have information that can help improve the plant. An improved knowledge flow could also help the operators and coaches to be more informed about the decisions of the management. We think that Alcoa Fjardaál can create a better knowledge flow by ensuring that the employees are reading their emails every time they are at work, and that the coaches gets the latest knowledge from the management, so the coaches can shared it with their operators The management needs to encourage the employees to share knowledge should therefore be a role model and share their knowledge with the employees. It is furthermore important that Alcoa Fjardaál improve their communication with Keops even though Keops has a high degree of staff turnover. It is important to find a way to deal with this as it is important for Alcoa Fjardaál to have changes made in the system.

On the basis of the above section it can be concluded that we through the project and its analysis as well as the discussion have fully succeeded in answering our research questions.

CHAPTER 6

NEW PERSPECTIVES ON THE THEORETICAL FOUNDATION

NEW PERSPECTIVES ON THE THEORETICAL FOUNDATION

We have in this project used the paper "IS Driven Process Innovation: A Literature Review Based on Swanson's Tri-Core Model of IS Innovation" (Dorset, Müller, Purup 2012) as the theoretical foundation for the discussion. In the discussion we identified categories of solutions that is needed in order to obtain success with the IS enabled process innovation.

1. **Alcoa Fjardaál needs to decide and clarify what they want to change and commit to it**
2. **Training for the operators, coaches and safety employees**
3. **Preparing for the implementation of the changes**
4. **Alcoa Fjardaál needs to be better at sharing knowledge and communicating clearly**

These categories of solutions are not only relevant for Alcoa Fjardaál but also for other enterprises facing a type 3 process innovation. In the following chapter we are going to see how these categories of solutions can add new perspectives or nuances to the existing theory on IS driven process innovation. In the following we will first present nuances to the perspectives and second new perspectives will be presented.

The paper includes several advice and theoretical based themes that are important to gain success with an IS enabled process innovation. The practical advices regarding the type 3 process innovation includes that commitment and involvement of the management is necessary (Holden 1992; Lee 2004; Martinsons 1995; Ravichandran 1999; Ravichandran 2000). Commitment was also relevant in relation to our case study where it was clear that commitment is critical as a lack of it can course problems for the organization and lead to dissimilar work processes. It is clear that the management needs to show that the new changes are based on an agreed decision and that they are fully committed to it. Furthermore they need to define the way to achieve the goal and provide standardized guidelines. So it is not only a question of how to do it but also a question about how to reach the goal of the new changes and this is a nuanced perspective.

The paper points out that alignment between IT and business strategies is important. To achieve its objectives, the whole organization needs to pull in the same direction (Holden 1992). This we recognized in the case study, but we also found that it is not enough to align the two strategies. A nuance perspective on the theory is that we on the practical level found that a system needs to be user-friendly in order to support the standardization of the processes which on a higher level means that both the IT and the business strategies have to be defined, have commitment from the management and be put into effect before it is possible to align the strategies. If even one of the strategies has shortcomings, it will hamper the benefits of aligned strategies.

A perspective in the theory is that training of the employees is a very critical issue, however through our project we found that this perspective could be more nuances as it is important the training is based on the employees' skills. Also, the training should be based on which job the employees have and if they are working with IT or if IT is new to them. The management also needs to be aware of what kind of training is must suitable for employees. This can be done by listening to the wishes of employees, and we have found that the employees have a clear definition of how they like to be taught. This underlines the importance of the employee involvement when implementing radical changes and this could make them feel heard and make the attitude positive and to be motivated towards the changes of the management.

The paper advices that resistance to change is an issue that all practitioners should take seriously (Attaran 2004; Ravichandran 1999) and that communication is an important ingredient in preventing and overcoming resistance (Atkins 1998; Fichman 2001; Martinsons 1995; Orlikowski 1993; Orlikowski 1996). These themes were also essential for our case study. It is important that the communication from the management is clear and easy to understand, but a new perspective regarding the theory is that it is important to identify which groups of employees are going to be involved in the implementation of the new changes. It is important to know the characteristic of the employees e.g. do they have experienced with IT and how they are educated.

The paper also includes that the practitioners need to understand that IS driven innovation involves organizational process changes and that organizational readiness is required to achieve success when implementing radical changes (Attaran 2004; Gorla et al. 2007; Mitchell and Zmud 2006; Orlikowski 1993). In addition we found that standardization of the processes is critical to gain success. This is a new perspective in relation to IS enabled process innovation, which can supplement the existing theory. We identified that it is important to ensure that the standardization of the processes is in place before starting to implement process changes in order to clarify how the goal of the changes is going to be achieved. It is important to have a standardized way of achieving the goals, otherwise it can cause trouble.

We also identified that the way systems are working can be a barrier for the implementation because we found that it was an important factor in getting the employees to e.g. use the new systems. If the IT is not working in a proper pace, e.g. if the system is too slow or too difficult to use the employees might stop using it and will automatically go back to the previous work processes. This could mean wasted efforts in the implementation and this is a new perspective on the case, but a critical perspective since it affects the work of the employees if the IT is not working.

We have found both new and more nuances perspectives regarding the theory. These perspectives along with the advices from the paper should also be considered any enterprise that faces a type 3 process innovation.

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APPENDIX

APPENDIX A

Extract from the "ABS OpEx ASAT" (p. 58)

OBJECTIVE:	**ABS 3.1**	**Problem Solving** A common, structured, visual system is functioning to restore flow and solve problems using the scientific method. Problems are regularly solved to the root cause, close in time and location to the occurrence by people who do the work with built-in tests embedded. An effort is made to coach each person involved in problem solving.

Minimum Expectations
Mark **Y**es if in place today, **N**o, **N**ot Reviewed or **N**ot **A**pplicable

1. Standards have been developed for critical activities. The work group identifies problems by recognizing deviations from standards associated with:
   • people (standardized work, safe work instructions),
   • processes (daily management, process management),
   • equipment (autonomous maintenance),
   • customer requirements and
   • work environment (5S).
   They gather data to define the problem.

2. The location has a standard problem solving process (e.g., problem solving A3s, corrective action requests, improvement activities) which follows the scientific method and is used to document problems and implement solutions. The process is used by the help chain and made visible to the work group. Problems are solved to root cause.

3. At least one operator/person on each crew/ team and all first line supervisors/group leaders have been trained in practical problem solving designed for solving problems on the floor.

4. Appropriate resources are assigned to the problem based on skill requirements and business importance. Coaching is used to develop problem solving skills.

5. Nonconformance to any standard establishes the basis for a problem to be triggered. When triggered, problems are recorded, and to the extent that problem solving resources are available, they are investigated at '"Point of Cause", and systemically solved to the root with effective corrective action measures.

6. Metrics are maintained and posted in the work area for the number of problems identified and solved. The goal is most are solved in 30 days or less. Verification activities can be ongoing, but should be concluded with a specified time period.

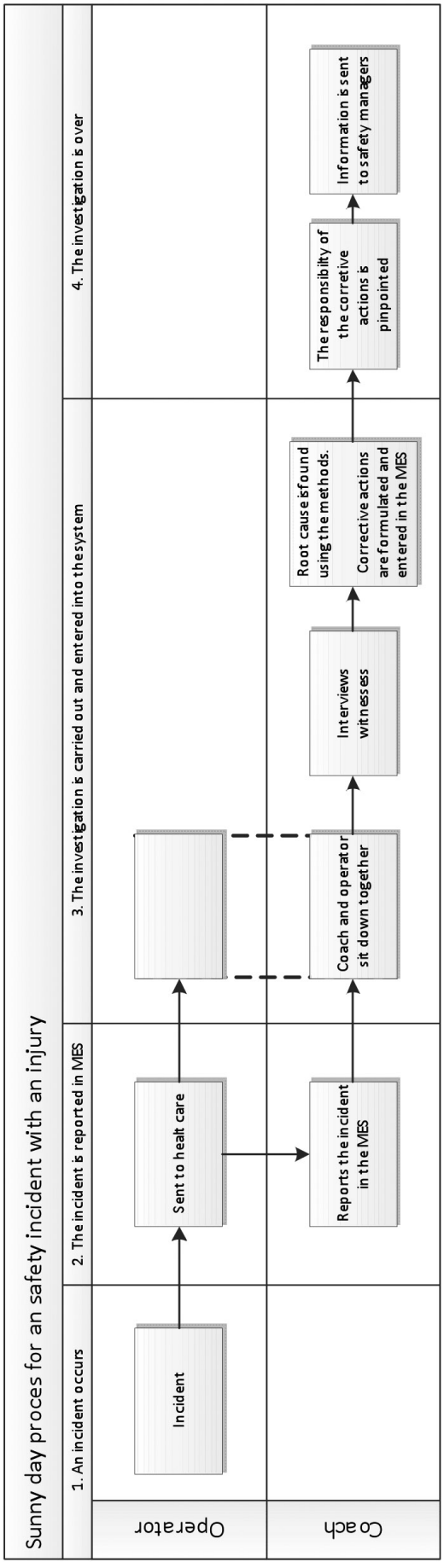
7. Operators verify problem solving effectiveness whenever possible. Verification is accomplished using data.

8. Work standards are updated to incorporate solutions.

9. The location measures the number of problems identified and the number solved to root and those measures are trending up.

APPENDIX B

Sunny day process for a safety incident with an injury



APPENDIX C

'Verkeftirlit'

ALCOA

Dagsetn:_____ Eftirlitsmaður:_____
Ferli:_____ Verktaki ☐
Hve mörgum starfsmönnum fylgst með:_____
Vakt:_____ ☐ dag / nætur ☐ Helgarvakt ☐

Aðgerð nr.	Vinnusvæði: _____	Öruggt ✓	Óöruggt ✓
1.0	Notkun öryggisbúnaðar		
1.1	Hanskar / skór		
1.2	Öryggisgleraugu / andlitshlíf		
1.3	Öryggishjálmur		
1.4	Fatnaður		
1.5	Heyrnarhlífar/öndunargríma		
2.0	Verkfæri / tæki / efni		
2.1	Val og notkun		
2.2	Ástand		
2.3	Læsing / vinnuleyfi		
3.0	Líkamsstaða		
3.1	Líkamsbeiting		
3.2	Staðsetning við vinnu		
3.3	Einbeiting við vinnu		
4.0	Starfsemi / aðstæður		
4.1	Vinnusvæði		
4.2	Vinnuferli		
4.3	Farartæki		

Safe

Unsafe

Safety equipment

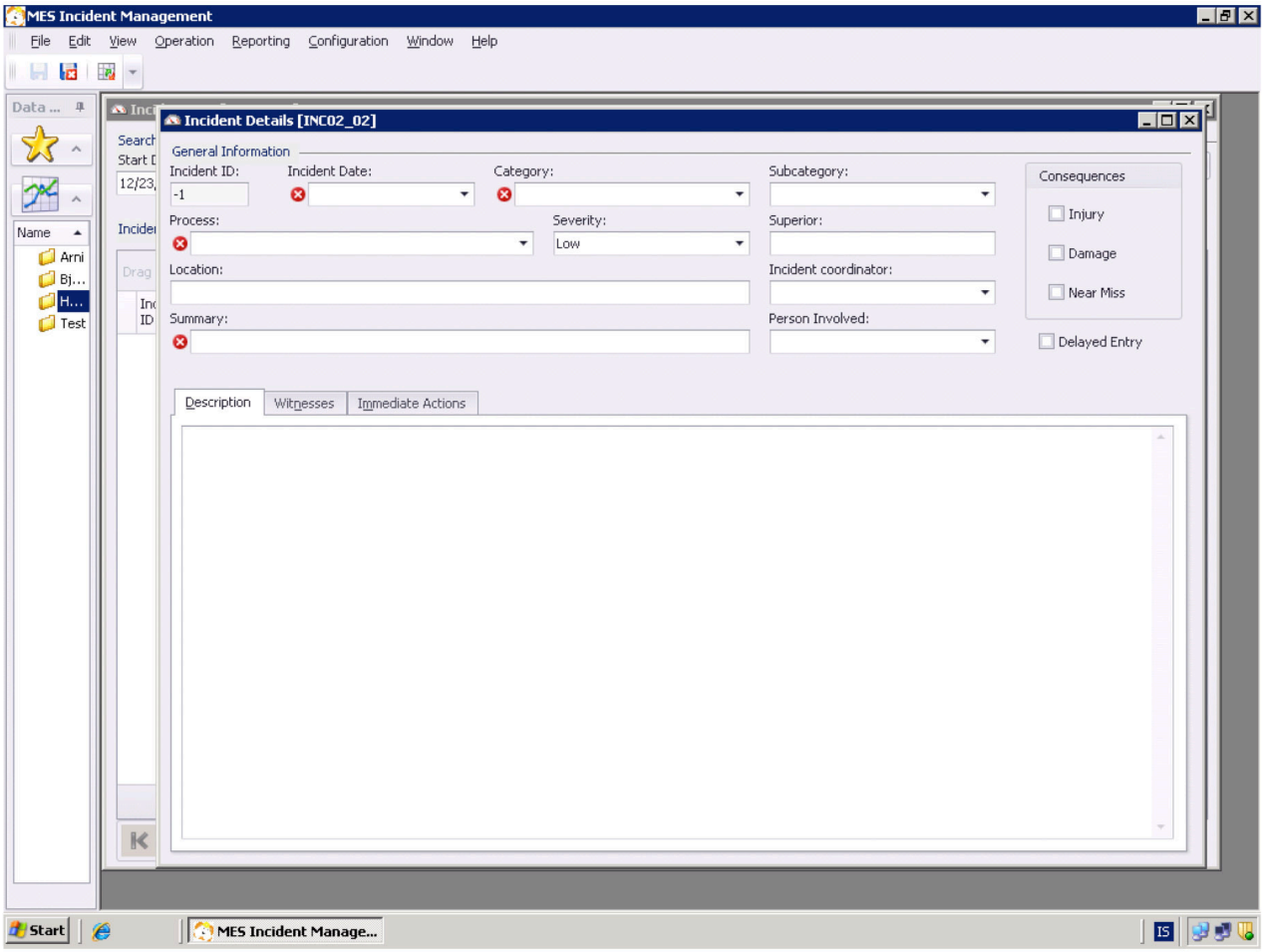
Tools/devices/chemicals

Body position/Work position

Activities/conditions

APPENDIX D

This is a screenshot of the report window in MES.



APPENDIX E

Questions to the coaches

- **Profile:**
  - Age
  - Work
  - Experience
  - It-competence on a scale from 1 to 10.

- **The safety process**
  - The incident process

- **The opinion about the system**
  - What are working well?
  - What are not working so well?
  - Do you have any wishes for the system?

- **The methods (5-why´s/Fishbone)**
  - Which method are you using and why?

- **Training:**
  - Have you arrived formal training?
  - Would you like more training
  - Wish to improve the training
  - Does any of your employees need more training

- **Operators in the system**
  - Would you like that the operators was more in the system?
  - What could they do in the system
  - Would it help you if they was doing more in the system

- **Verkeftirlit**
  - How are you using it?

Questions to the operators

- **Profile:**
  - Age
  - Work
  - Experience

o It-competence on a scale from 1 to 10.

- **Use of the system**
  - Are you using the system?
  - How are you using it?
  - Do you think the system is easy to access?
  - Is it easy to find the right information in the system?

  - Do you want to use the system more?
  - What things do you think you could do in the system?
  - Are there any things that you cannot do in the system?
  - What could make you use the system more?
  - In what way can you imagine more involvement of the operators could give the employees?

- **Training:**
  - Have you archived any kind of training in use of the system?
  - If you should use the system more – would you need more training?

- **Verkeftirlit**
  - How are you using it?

APPENDIX F:

Appendix of the interviewed employees at Alcoa Fjardaál

Summary account of the talks and the mail correspondence with CEO at Alcoa Fjardaál

In an effort to at least get something to work, they decided to try to get involvement in either one of the methods. At that time there was more agreement on the fishbone. So they used the fishbone as a focus and made some effort into teaching the coaches how to use the fishbone. Now they are basically stuck there and they have not taken the next step, which would be combining the two methods. Safety manager 1 agrees and hopes that the combining will happen at some point.

There has been some discussion about a further standardization. When they have problems in the production or in other areas, they always use the 5-whys. This could raise the question of why there are two possibilities. Personally she likes to identify where to dig in by using the fishbone. When she has identified where to dig in, then she will use the 5-whys.

Training
They have talked about training in regards to SOP´s. They talked about that everybody is not receiving the same training. But they did not change it.

The operators into the system:
It is a strategic decision to have the operators more involved in the system, however it has not been accomplish for more than maybe 5-10%.The dream is that if an employee sees something that is not OK, he would register it himself. Today all the employees are also filling the audits but the audits also need to registered. The idea is that when an employee observes something that is not OK then both he and the employee that did something wrong can learn of it.

Summary accounts of the interviews with the three safety managers

Summary account of the interview with safety manager 1

EHS team
The EHS teams gives coaching advices and assistance with investigations. They sometimes run critical investigations and they are also responsible for training It is mainly the coaches who are putting the incidents in the system. They also mostly do the investigation. If it is not a critical incident they usually run it alone, but they may phone the EHS team and they will give advice over the phone.
EHS teams are also reviewing the incidents. Every morning the team is going over what has happened the last 24 hours and talk about the incident and who is responsible for running the investigation.

There are five managers that are mostly involved in the health and safety: CEO at Alcoa Fjardaál (head of everything, and also responsibly for the production, potline manager, casthouse manager, rodshop manager and the head of Health and Safety department. They are reading the information, evaluating the situation and reviewing preventive measures and reporting incidents to the governing body. The safety team is the head of Health and Safety department, the safety expert at Alcoa Fjardaál and safety manager 1 (mostly responsible for the potline), safety manager 2 (casthouse) and safety manager 3 (rodshop). Even though they have their own area, they are mingling around with their expertise on certain areas and helping each other.

Different groups that are using the MES system
Coach: Main user of the system and they are the ones who have mostly reports the incidents in the system. There are eight coaches in the potline, four in the rodshop and four in the casthouse. If there is a high

incident, the EHS team will help. The coach calls the one from the safety team that they know the best. That has not been clearly identified which one of the safety managers the coaches should call to get help. At one point they had some sort of chain of command in callings, but usually the coaches call the individual who is mostly there. In every shift there is a coach that is responsible for his team and he has a team leader to assist him. The team leader can vary from time to time. If the coach is sick an experienced team leader takes over. There are four coaches in both the rodshop and the casthouse and eight coaches in the potline (one for each line, A line and B line).

Team leader: Sometime they also put incidents into the system, but this is mostly low incidents. The coaches are usually reporting the medium and high incidents because when you are putting in high or medium incidents you are kind of responsible for running the investigation. The number of team leaders varies in the areas.

Workers/Operators: They have permit to put incidents into the system, but not many do it; only some that are enthusiastic. But mostly they report to a coach or a team leader who puts it in the system. They have a limit access to the system.

Maintenance team: They are not active in the MES; however the EHS team wants them to be.

A major incident

Safety manager 1 is explaining a page that is called a safety flash. It is one of the end products of an investigation. The example that he shows is a major incident and therefore it is sent to the global directors of Alcoa, the European leaders and safety teams all over the world. They sent it to all EHS managers of all smelters in Alcoa. Safety manager 1 gives us example on a major incident: The incident happened on a Saturday at 23:31 p.m. The performances mode of the worker is knowbase, which have something to do with human behaviour. It was a fall from a PTM crane due to an open hatch and there had been the two mechanics on it doing a lot on the same time. The hatch was not closed by the one of the mechanic and the other fell down. The worker ended up with bruises on his arm and leg because he landed on both his feet and did not need health care. There were two witnesses (mechanics) to the incident, and they called the coach and gave attention to the one that fell down He was sent to health care, but because it was at night, he was checked by a trained health care person who called the doctor and they decided to send the worker home.

The coach was not sure about that to do, so he called safety manager 1 and discussed the case. Safety manager 1 phoned the head of Health and Safety department to inform him and then safety manager 1 decided to go to Alcoa Fjardaál to help the coach. Safety manager 1 called the coach and asked him to get the witnesses together to get a good storyline. They talk to 4-5 people. The scene had been removed, but they put the crane back on the spot and talked about that happened and what to do. Then they were written the information into the system. The coach had already put something in to the system, so they changed it together. They informed the relevant persons though the system. The investigation took all weekend. The employee, who fell down, was part of the investigation the day after. Safety manager 1 was there until 3 a.m. that night. He was in contact with Geir, Kristine and Johone (coach in the maintenance). He talked with them about the incident and basic information. He also talked to Johone about the worker, so the worker was taken care of and not forgotten, because his wife was in Reykjavik the whole weekend.

They were all in contact to discuss and talk the case together. They finished about 3 a.m. The day after the same four people discussed the classification,. CEO at Alcoa Fjardaál was not involved because of a vacation. The day after they all meet on the plant, and they found that the incident was a major incident and inform everybody in the company. They made a lot of paperwork to fill out for the organization. The notifications were sent out Sunday morning. The safety team met Sunday to make the safety flash and inform CEO at Alcoa Fjardaál, so she could call her boss. The investigation led to the root cause and they started eliminated the causes. This was mostly done through phone meetings. The coach finished filling into the system, safety manager 1 helped leading the process. They investigated as a group. In the process there

was a lot of phone calls and email. It was a weekend of talking, writing and deciding. It was not an easy case. The cranes are now fixed and the solution is to connect the hatch to the horn of the crane so now when the hatch is open the crane makes a lot of noise. Everybody was informed, signs were put up. The system does have tools to work with during investigations, Fishbone and 5whys. The 5whys was not filled out. Even though safety manager 1 is not using the 5-whys, the why-question is his most valuable tool.

Personal information in the MES
It is important only to put in unbiased descriptions and not to put in personal feeling. Never assumed what people were thinking; you have to talk to them. They will maybe have to review the incidents and the investigation in two-three years, if the employee gets problems with his back and wants to say that is because of the accident. There should not be sugar-coating in the information. They have to watch out that the information is in a professional wording.

Safety manager 1's way of investigation
Safety manager 1 never opens the system while he is investigating. Instead he has white pieces of paper with him to take notes. After the investigation safety manager 1 puts the stories into the system in the right timeline. He says that is his handicap. He thinks that the computer sometimes forces you in one direction. Safety manager 1 remembers better if he has written it down. It is important for him to understand the whole situation, the mindset of the people and get as far back in time as possible to get a good understanding of what really happened. Sometimes it is good to act a bit stupid and ask a lot of why's. Many times he investigates equipment he does not understand. Some investigations can take 15 minutes, while others can take all of the weekend or week. Safety manager 1 says: "for me the piece of paper, the pen and my questions is my most valuable tool "(59.00)

'Úttekt' is basicly a translation of the word audit. 'Verkeftirlit' is what they call a job observation, which is a form of audit.

Summary account of the interview with safety manager 2

The MES system
Safety manager 2 finds that the biggest problems with the MES system today is how the system is build up, e.g. when he is reporting an accident, he would like to be able to put it on the head protocol like metal transformation and then add a second protocol for example a certain casting machine or certain area. Today they are cannot do that. They have to sign all of the incidents on one protocol that is 500 because if they use the other protocols, the reports will disappear, which would mean that safety manager 2 would have to go through all the reports to be sure that all the relevant rapport is found. That is not working very well.

They also have problems with the audits. They are putting all sorts of audits and observations in the system just to keep track on how they are doing. However it is really hard to sort; what is PPE, what is mobile equipment, what is crane etc. That is something that could be better.

Filtration
He also thinks there is a big problem related to how you pull information out of the system. He wants to see data on incidents e.g. from a certain part of the casthouse that included an injury, and he would also like to see all incidents in medium and high for a certain machine, but today he cannot do this in a simple way. He has to look through them all. He thinks that a better filtering would be good. Safety manager 2 has seen many different incidents systems and he thinks that the only problem with the MES system is the filtering. He has been working more with quality system in other jobs before he started at Alcoa. In order to be able to focus more on one area, he would like to compare injuries and accidents in different areas with each other from year to year. It is impossibly in the MES system. One of the problems with filtration in MES is that safety manager 2 cannot give his process owners the information they need in a simple way. The only way today is that he uses a whole night at home with the computer to sort out the information by exporting

to excel to be able to work with it. But otherwise he thinks the system is pretty cool, e.g. the contractors (groundfloor and basement), that he works with, have shared the system with them to share e.g. quality and safety problems that are related to their problems.

On the reporting window the main protocol is difficult to use and is barely used because people do not understand the different categories. One of the reasons is that the system was translated from English by a Canadian/American company.

The system is really slow; it depends on the internet connection and how many people those are online. The name on the involved individual can only be seen by the people with investigation's permit, which all the coaches and managers have. The names of the involved persons should not be visible to everybody.
Safety manager 2 thinks that the dissolution of the pictures in the system is very bad and that the picture function is not use often.
He likes the opportunity to enclose files to the investigation report e.g. attach reports done by a contractor or reports from meetings about incidents.

In the description field safety manager 2 does not want too much text. As long as the basic information is there then it is fine. When they are doing the investigation, they have the opportunity to write more. But he does not think that a limitation on amount of the words would help. Some incident does not offer you to write more than a couple of words.

Corrective actions:
Corrective action is a list of action that will be taken after an incident to insure that it does not happen again. When one person is assigned to an action that has to be solved before a certain date, the person receives an email to inform him about the assignment. A problem is that if safety manager 2 gets an action that is not his responsibility, he has to go and talk to his supervisor, who needs to take it to the manager of the person that assigned the corrective actions. That is a bit too complicated and can take a long time. Sometime a wrong assignment means that the corrective action is not carried out and the problem is therefore not solved. It would be good to find another way of doing this. He cannot just refuse and reassign the action to the persons that assign the action in the first place. The only options in dealing with the actions are open, dealt with, currently being worked on and closed. Another problem is that there is no approved level in the system, which means that nobody has to approve that the corrective actions have been carried out. Safety manager 2 would like a have an approve-check-box that super-users could use to approve some of the corrective actions. In the beginning the Canadians had a different way of closing the corrective action and there the supervisor should approve the actions. The corrective actions are an important tool to improve the processes and making the machines and equipment better and safer to work with. Their goal is to insure that one accident do not happen again. "If the same incident happens twice, it means that we are not doing our job"
Today they have a lot of actions put in the system that is assigned to people that do not do anything about them and when the date have expired, they just do something to get it closed. They are closing actions that have not been carried out. He thinks that is a plant wide problem. He would say that 90% percent of all the investigations are put into the system by the coaches. But the participation varies from case to case and if it medium or high incident.

When an accident has happened, all the relevant persons gets email with the information that the accident has happened. Safety manager 2 would like have the classification in the email to know what to do about the accident as this information is not currently in the email. More information in the email would be good e.g. because they have to report accidents with treatment to rest of Alcoa in Europa within 24 hours. This would specially be nice in the cases where safety manager 2 is at home and when he gets the email, he would know whether he has to react now or if it can wait to the next workday. The witness function is used to inform relevant employees about the accident, but they do not use it for witnesses. That could be improved. The witness of the incident can also be put there, but that is not used because a witness can be

hard to define. If you are related to an incident, it is not clear if you can also be a witness. The question is if the names of the witnesses and the people you want to inform should be in the same column or they should be in different columns.

Methods
Safety manager 2 thinks that the fishbone method is not the best, but it is used a lot. He would like to challenge the use and the training of the fishbone. The categories are not clear enough e.g. the category 'material' and he therefore wants to find better names for the categories. 5-whys is a good tool to get down to the root of the incident by asking five "why is that" -questions. Toyota says that you have to ask "why this is like that", and if the answer was because "it was there" you have to ask: "why was it there". "People are not using it right". Sometimes you see diagrams that have not connections e.g. "why is the sky blue" and then "why is there no biscuit in the cafeteria". This is not giving them anything. He sees that the 5-whys is more often used in the wrong way instead of the right. They also use the root cause analysis to talk about the incident. He thinks that teaching could help on the problem. They have not been doing some formal training, however his own training has been that he has done it several times. The safety team should provide the training and they have been talking about giving the coaches more training in using the tools, but they have never had the opportunity to do it. Safety manager 2 likes to use both the fishbone and the 5-whys. If you start with fishbone, it helps you with the 5-whys and it helps you to find the root cause. But it depends on the kind of incident you are dealing with. You learn from experience. Many of the coaches do not have much experience with investigation.

A question could be: Are there other methods that are easier to use than the fishbone and the 5-whys? They are using the Appolo method for bigger problems especially with equipment. They can put it into the system, but they attach it to the report. He does not know where the two methods are from, but he thinks that the French/Canadian came with it. The system is partly designed for the plant on Iceland. He thinks all of Alcoa is using the fishbone. But now there is an option to complete an investigation by using either the fishbone or the 5-whys, however there are no criteria in the system, so you can complete an investigation without doing either of the methods. He thinks that most of the employees are using the fishbone. There should be a requirement that they have to use one of the two methods to complete the investigations.

Summary account of the interview with safety manager 3

The MES system
Safety manager 3 likes that he gets an email from the system when he is late on doing an assignment. When he is taking the weekly (Monday to Sunday) statistics out of the system, the time needs to be 23:59 in order to get the whole day. The shift is from 8 p.m. – 8 a.m., so it is going past midnight. It could be easier and he needs to use excel to make the statistic.

Safety manager 3 does not want subcategory on the incident page because he does not think the category and the subcategory have anything to do with each other. He is writing a detailed description into the text field. He thinks that the headline is working fine. Safety manager 3 is also using the 'consequence'-check fields. It is always a medium when people are deliberately breaking the rules. Low incident can be that there is no preflight on the anodes (checklist for the machines before use). It could also be if a worker is not wearing his glasses.

Safety manager 3 is not good with computers and he thinks that if the workers and coach need to use the system, it should be easier because the coaches do not find the system easy to use. Some of the employees do not like the system and some of the employees have never worked with computers. Safety manager 3 thinks it would be easier if there was only one bottom on the desktop to access the MES system.

When safety manager 3 needs to find an employees to solve a corrective action, he is choosing from who is the must suitably. If the guy is not at work or it is a difficult task, safety manager 3 will wait or give the guy

a call. But it also depends on what is wrong and if it is something about teaching as he will give that to one of the blue guys (the workers with a permit to teach others). When the actions are solved, safety manager 3 or the coaches check if the task has been carried out. He always gives the corrective action a timeline and the assigned person will tell when he is finished. This he can do in the system by closing the corrective action and then safety manager 3 gets an email. If safety manager 3 is not there during the investigation of an incident, he will be informed by the witness functions that are used for both informing relevant persons and for actual witnesses. The one that gets the investigation is the one that filled out the fishbone. It can be himself, the coach or the team leader on the floor. The team leader had learned the fishbone from the coach or safety team.

Training
Safety manager 3 has been a coach for 5 years in potline. Before he was a member of the safety team. Doing that time he sent team leaders to a course in MES and the root cause analysis in order to take over when his was not there. The worker does not have the permit to investigate; however there is always at least two in every shift knows how to do it. When safety manager 3 is investigating, he also brings some of the new guys and other relevant persons because he wants to have many eyes on the case. The course is not there anymore and it was just there two times. At the moment the workers that have been there more than three years or longer go to school 8 hours two times a month. After two years they get a diploma and more payment. They are taught a bit about the system all the time. There are three coaches in the rodshop. One during the day shift and one from 12 a.m. to 12 p.m. Between 12 p.m. and 8 a.m. there is only a team leader. But it is always possible to phone a coach. There is a call list, so the team leader knows who to call. Safety manager 3 will also be contacted and will come and help if needed. Safety manager 3 thinks that they have to make it as safe as possible. It is not allowed to make shortcuts. If the coach sees someone taking a shortcut, the coaches decide the proper action – or he assigned someone to find the proper action. Every week they have a big safety meeting (Monday) about what has been put in the system during the last week. It is all the coaches, the management and the safety team. They discuss the case and they can all comes with new ideas and solutions to the case.

The meeting paper:
They are calculated for this area and they have to do at least two on every shift. There have to be 28 papers per shift. They get a bonus if they filled 100% of them out. They also calculated if the paper is filled out correctly. When the workers are done in the shift they have to sign the paper. They have one hour rotation. It is the same in both the casthouse and the potline.

'Verkeftirlit'
When 'verkeftirlit' and other forms are put into the system, safety manager 3 has put them into the category "obsevations (uttekt)". The clock does not have to be put into the system. Safety manager 3 thinks that the uttekt category is too wide and would like to have one category for safety observations. It would make it easier to make the statistics. There needs to be a policy about how to do it. It is too difficult to sort out because too many different forms are in the same category. It takes a lot of time to find what he is looking for – sometimes he has to look through them one at a time. The 'úttekt' is for the whole plant.
People are doing it differently; some are doing it once a week, some once a month. He makes statics every week, however if it was easier to do, he would let the coaches and the workers do it themself. E.g. he looks into how many people forgot their gloves in a certain area. All this safety observations are done on the whole plant. It would be nice to be able to make statics for specific things, like the use of glasses. He is always using the category called "rodshop" which is number 400 as process. He has many different processes that each has a number. If he needs some special process, he uses the other numbers which is a different location in the rodshop. He puts the 'verkeftirlit' in the system for a whole week at a time.

'Verkeftirlit' is always put into low category. But if he sees something that is not safe, he put it in the MES as a medium or a high right away. 'Verkeftirlit' is anonymous as it is not allowed to put the name of the person that was inspected. There is no form in the system that looks like the 'verkeftirlit'. But safety

manager 3 would like to have a window just for the 'verkeftirlit' and it could look like the 'verkeftirlit'. There was talk about a touch-PAD in the beginning, but it was not realistic because of the dust. If it was easier to put the 'verkeftirlit' in the system, others could do it. It should be easier to open the system (just two or three clicks) and then you would know that you are putting the right in the right place. This should prevent that the 'verkeftirlit' is put into the system in different ways.

Summary accounts of the interviews with the coaches

Summary account of the interview with Potline coach 1
Profile

- Work: 4,5 years.
- Experience: Coach for 4 years at Alcoa Fjardaál.
- It-skills: Rated on a scale from 1 to 10, he would say that he is a 7 in working in the MES system.

Opinion about the MES system

- What works well in the system?
  He uses the system to pull out information such as statistic. He can get the information he wants, but the system could be easier.

- What is not working well in the system?
  Sometimes the system is slow.

Investigation
The window in which you report incidents:
He fills out all the fields. He sometimes uses the subcategories and 'witnesses. The later is for both witnesses and people he wants to inform.

Investigation window:
The picture feature could be better. There are too many steeps. You have to take the picture from the camera and put it on the computer – and then you can put it in the MES system. It would be good if he could take the pictures from the camera and put it directly into MES

He uses the fishbone. He cannot explain why. He has previously used the 5-whys, but he liked the fishbone better. The coaches can choose which method they want to use.

Training
He has had a little bit of training which was from safety manager 1. He was taught to use both the MES and the methods by safety manager 1.

Operators in the system
Now it is only the coaches who put things in the system. He would like the operators to go into the system and put things in. It would be good for both the operators and for the coaches. But the operators need more time, if they have to use the system. They do not have time to use it now. The coaches would have more time to do other things, if the operators put things in.
He uses the 'verkeftirlit', but it could be better. They are good for everything about what people do. But he would like some other papers for different things e.g. paper that is more specific to cranes and machines.
The operators, the coaches and the manager fill out the 'verkeftirlit'. The number of filled out 'verkeftirlit' varies, but they have to fill out at least 4 'verkeftirlit' per shift. It is the coach who puts it in the system.

The operators could put the 'verkeftirlit' in the system. However it would requires more computers as the about 30 operators currently only have access to one computer. The operators are not using the computer, only to check the weather, e-mail or something like that.

Summary account of the interview with Potline coach 2

Profile

- Work: Coach
- Experience: 2,5 years as coach
- IT-skills: He works with the MES system every day; however he does not consider himself good with computers.

Opinion about the MES system

What works well in the system?

- The system is good when you want an overview of how things are going and when you want to know where you need to focus in regards to where you might be performing less than optimal. This gives them the opportunity to react. MES is also good to get knowledge about the other shifts and compare yourself to them.

What is not working well in the system?

- The system is slow, which means that not all information will be put in because he does not have time to wait. This means that information is lost and the investigation will therefore not be as good. Maybe he will put the information in later, but then he might have forgotten some of it. Therefore he thinks that it is important that the system is working in a proper pace.
- There are words in the MES system that he does not understand. Some things do not apply to his work and this can make him confused. An example can be some of the categories and subcategories as he does not understand them and he feels, he is missing training in order to use them correct. So he might put it all in one category.
- He gets the statistic from the Health and Safety people so he is not making the statistic himself. He uses it for research on single persons and he can find information on how the person is acting and if he might be seeking more danger.

Is there something that you want the system to do that it cannot do?

- The system could be simplified a lot. There are too many subcategories and this means that some things can hide in the system when you make a search. It could be more user-friendly.
- He mostly uses the categories 'Health and Safety', 'Environment' and 'Production'. He has trouble using the 'Main protocol'. He thinks that the window where you report incidents is alright.

Investigation:

He is doing both medium and high investigations, however he finds that there are problems in the MES regarding investigations.
The access to the system is okay now, which he thinks might be because he is used to using the system.

The 5-whys is never used, which he thinks is mainly because it is found a bit embarrassing to investigate like that. People might think it is embarrassing because they do not know how to use it. If for example he was going to investigate why a person was not using a seatbelt in a car and the person said that he forgot it. Then you would have to ask: "Why?" And the answer might be that the person was thinking of something else and the next question would then be: "Why were you thinking of something else?" People might then be thinking: "What are you? Are you retarded?". Thus it will be embarrassing for both the coach and the person that he is investigating.
It needs a little technique to do it. He is the only one who had some training in using the 5-whys and he still finds it hard. The other coaches have no training. In the system he usually does not see that the 5-whys has been used in investigations, except for his investigations in the past and when the health inspector/boss uses it. The 5-whys is the past and the safety team do not usually use the 5-whys either.

They have all including the operators had training in Human Behaviour and he thinks that it is more appropriate to use in investigations than the 5-whys. Human Behaviour is both a method and an overall view. They were taught some terms that they use and try to implicate in their research. Some keywords from Human Behaviour can be used.
A paper called 'working meeting' is used when they are about to go work with something that they have not worked with before. It is basically something from the Human Behaviour. Some of the keywords are there. What can go wrong and what can be done to prevent things from going wrong?
He thinks that Human Behaviour should be used instead of 5-whys, if they use Human Behaviour in their daily jobs. Human Behaviour can help prevent new incidents if it is used the right way.
However it is not everybody who is using it. He has been a teacher in Human Behaviour and he finds that Human Behaviour could be used more. If it was put in the system, it would come more naturally to use it.
Human Behaviour is used before the work starts, however it can be good to use in an investigation. It does not give a structure, but it has some useful keywords.

He is not using the fishbone. It has not usually been used in their investigations, and he has not witnessed it in used. He knows the terms and what it is all about.

Instead of fishbone and 5-whys he is using questions and common sense. They get a feeling and they know the workers and know, who is responsible and who is not. They know when it was a mistake and when it was somebody who was careless. The investigation takes you there. If he knows that it is a highly responsible person then he writes it off as a mistake. If you are investigating a person who is yawning and is on the phone then you take the investigation that way and assume that the person was careless. It may not be fair as accidents and mistakes happen and you might think that they were careless but actually they were not. The 5-whys might be fairer and give a more accurate result.

He thinks that it would be helpful if the system would give them a more structured way to investigate and at the same time allow them to work with the Human Behaviour terms. A structure in the system would help them to use the terms and may force them in a positive way. It would be a good way to get people to use it faster.

He usually takes pictures of incidents and he puts pictures in the MES. He feels that the system is slow at night and then it might be a pain. It can take up to 15 minutes to upload one picture. This means that putting pictures into the system might be skipped even though it could lead to a worse investigation. If it takes too much time, they do not bother and then they lose opportunities. It should be a top priority that the system works fast and that it is user-friendly.

When he has made an investigation in the system it automatically goes to his supervisor and to the safety manager 1. They will check if the investigation is satisfying. He only gets feedback if the investigation is bad. In regards to feedback he would like there to be more. In cases with bigger incidents everybody is on their toes and trying to fix it. People from Alcoa Europa are running around and trying to figure out what happened. When the investigation is finished then he never hears about it again even though it happened in his work area. He would like to have some feedback about what happened.
Sometimes the coaches print out the results of the investigation for each other and put it in mailboxes. The other coaches can then talk to their workers about it.

Training
He does not need more training in the system itself. However he would like more training in what the terms in the systems means e.g. subcategories.
He thinks that everybody has been using the system. There are some things that you can get out of the system that he does not do. Maybe because he has not done it or maybe because he does not know that it is possible, so some more training may be helpful.

Operators in the system
He would like the operators to use the system, but he does not think that it would be wise to let any worker look up names and stuff like that. They could use it for accidents and for Health and Safety. If you are going to work a certain job that you have not done for a couple of months then you could look up in the system if something has been happening. The system should be more user-friendly e.g. just four-five clicks to print a list of problems that has happen the last couple of months. If it is going to be a hassle or if there are not enough computers, then they will not do it. They have tried it before, when they tried to get people to print out the SOP´s, but within a few days people had written it off because it was slow.

It would be good if the operators could get the information from the system themselves. This would help him. It would both prevent accidents from happening and get the operators to take responsibility of the work, they are doing.

A lot of the operators do not work with computers and some are afraid of computers. It should be very easy and simple e.g. the desktop could have a bottom called 'Health and safety' and when you click on it you get a window with different bottoms. This means that a few clicks can get you what you want.

'Verkeftirlit'
He is ordered to do at least four per shift. He is trying to get the operators to do one each day and get the operators to check each other.

He puts them in the system. Often it is low incidents. He will put them under 'úttekt' and the subcategory is 'safety'. He puts them in the system one at a time as he has been told to do so. In the past he has put them in together, but the safety guys did not like it. He feels that it is best that he is the one that is putting them in the systems as he is the one in the potline that is dispensable. If there is an operator with a minor injury e.g. broken finger and he cannot be in the potline, then he could do it.

He thinks that 'verkeftirlit' is used too much. It is going to have weaker and weaker effect. It is too much of a routine. For now it could be cooled down, but it is necessary with the new workers as it allows you to keep an eye on them. In the summertime they have a lot of kids around 18 years that have summer vacation and then it is necessary.

Summary account of the interview with Potline coach 3

Profile
- Work: Coach
- Experience: 5 years as coach at Alcoa Fjardaál
- It-skills: Rated on a scale from 1 to 10, he would say that he is a 5-6 in working in the MES system. He does not use the system every day.

Opinion about the MES system
What works well in the system?
- He works in the systems when there are high or medium incidents. If he has a high incident, he needs help and he will call help. He needs help with the investigation, but he can fill the form out on his own. He can also do all the low incidents and most of the mediums alone.
  It is easy for him to fill in the low incidents in the system.
  Most of the mediums are also okay. He uses the subcategory and the consequences – if it is necessary.
  For low incidents the following is filled out: Date, category, process, summary, location and then the longer description.
  If it is a medium or a high incident you also fill out the consequences (injury, damage or near-miss).
  He puts in his name and the name of the operator.

What does not work so well in the MES system?

- He finds it easy to do the low and most of the medium incidents. But he needs help with high incidents or injuries.

Training

When he started, he got a little bit of training in the MES. MES is a big system. It is mostly safety manager 1 who is teaching him the system. To learn more he needs to have an incident to put in the system. He will learn by doing it with help from safety manager 1.

Investigation

He is using the fishbone, but he is not using 5-whys. He does not know why. He has been told that he should only use either fishbone or 5-whys.
He does not find the fishbone easy to use, but he chooses to work with it. He has been taught both methods. He likes the fishbone better and finds it useful to find and look at the problem. If he has a high incident and needs one of the methods, then he will call help from safety manager 1. Together with safety manager 1 he will use the fishbone.

Operators in the system

He would like the operators to use the system. He thinks that it will be good if more of the operators can put things in the MES as it might lead to less paper. At the moments the team leaders can also put the low incidents in the system.

They fill four 'verkeftirlit' out per shift. They are putting them in the system one at a time. He can imagine that the operators could put them in the system. He thinks that the operators need to show more responsibility with 'verkeftirlit'.

Summary account of the interview with Potline coach 4

Profile

- Work: Almost 6 years at Alcoa.
- Experience: Started as an operator, but has now been a coach for 4 years.
- It-skills: Rated on a scale from 1 to 10, she would say that she is around 8 in working in the MES system. She uses the system daily and knows the basic.

Opinion about the MES system

What works well in the MES system?

- The system is okay, but it is not great. It is good to have everything in one place. You can search for things e.g. the names of the coaches and of people from 'Health and Safety' or from 'Environment'.
- In the beginning of each year they have to look at all their employees and see how many accidents they have had the last year. That is easy to make – the statistic is easy to make.

What is not working well?

- When they have a new employee, they do not know who should put him in the system. It can take a long time before the new employee is in the system. She is not sure if she is supposed to do it or who should do it.
- The system is often down (maybe once per week) because something has to be fixed. The coaches are not told about changes in the system.

When she opens the system, it is supposed to open in 'Health and safety'. She can choose other areas in the system if she needs to. It is always in low, when 'Health and safety' opens, so she might have to change it the medium or high depending on the incident.

The report sometimes has to wait if she has to do something else. But whether it can wait or not depends on the incident. If it is a serious incident, she puts it in right away.

Investigation
She uses fishbone because she thinks that the 5-whys is stupid. It seems stupid to ask the same question again and just change the question a little bit. The fishbone is easier and she will get more out of it. She has been told by her boss that she could choose to use either fishbone or 5-whys. She does not have to use both.

She sometimes puts pictures in the system, depending on whether pictures are necessary. If something breaks then she takes pictures. It takes a long time because she has to put the pictures in the computer and then put them in the P-drive, and then it is possibly to get them in the MES . It is easy to upload the pictures, when they are on the P-drive. She thinks that the long process makes her put fewer pictures in the system. They have a lot of things to do, so sometimes she skips the pictures, but she knows that the safety guys will be happy if she puts pictures in. If something bad happens she tries to put pictures in.

Training
Her training was a long time ago and it was maybe half an hour of training. She did not receive any training when she started. She just asked someone to put it in and in that way she learned more and more. In general she does not think that she needs more training, but she would maybe like more training in how best to do an investigation. Not how to use the system, but more about how to do a good investigation. She would like to know more about, what she should put in the system about the investigation. At the Monday meeting they will take an investigation and talk about it and she would like if she did not get any negative feedback. But she is not sure how to achieve that. She does not know what exactly should be put in the different fields. She does not think she needs more training in fishbone, just how to do the investigation best.

She thinks that the other coaches have had the same training as she does. But two coaches have been hired since she started and she thinks that they have had more training. She thinks that they are trying to put higher standards in the training.

Operators in the system
She does not think that the operators should use the system more. They tried it two years ago where they asked some people to help put things in. Things like if they saw someone not using a mask. It turned into a war. One guy reported another guy, who saw that he had been reported and then tried to find something wrong with the first guy so he could report him.

They are using the ‘verkeftirlit’ and here they do not have to let them know. They tell the person if he e.g. forgot his mask. The ‘verkeftirlit’ is put in a box without names. This way they can avoid a war between the workers. They fill out 8 ‘verkeftirlit’ per shift. Everybody helps to fill them out. She does it and she will ask some of her employees to fill some out. The ‘verkeftirlit’ is put into the system under ‘uttekt’ – not ‘health and safety’. There will only be names, if she has done the ‘verkeftirlit’. The names are otherwise left out because people take it very personally. She hopes that the operators will respect when she reports it – they have to listen to her because she is the coach. They have to know that she is watching. She does not ask the operators who fill out the ‘verkeftirlit’ to write their name or the name of the person they watched.

Summary account of the interview with Potline coach 5

Profile
- Work: Coach
- Experience: 4 years at Alcoa and 1 year as a coach. He has always been in potline.
- It-skills: He uses the system a lot.

Opinion about the MES system
What works well?

- He is using the system for incidents and it is working fine. He puts in reports on accidents. He finds it hard to talk about a system that he uses so often. He can get a lot of information out of the system about the production e.g. measurements.

What is not working well?

- He cannot think of anything. He cannot remember a day where he could not get what he wanted or what he needed. There might be some options that he is not aware of. He says that he might not know enough about the system.

Training
He has had some training which was provided by the technician when he started. He got a list of things he needed to learn and some training from the technician. Some more training would be good. Now would be a good time to get some more training. Maybe there are some things that he does not know about the system.

Investigation
If his manager is not satisfied with his investigation they will tell him and he will re-do it.

There are a lot of low incidents e.g. somebody is not using the right gloves. He will put it in the system, but they do not have to do anything about except tell the person to get other gloves.
Medium and high incidents are investigated.

The window where he reports incidents:
He does not use the 'subcategory' so much, but he is using the 'main protocol'. Here he can put e.g. if it was wrong gloves, vehicle or a crane.

The investigation window:
He normally uses the fishbone. He uses the fishbone to tell himself what has happened. It makes him think about every angle. He uses all the fields under the fishbone. However something has gone wrong in the case that he is showing. Some of the categories are missing text, even though he is sure that he had filled it out.

If there are two employees that could be responsible, but they both say that they did not do it then you will be at a dead-end. He stops if he ends up having to guess.

He has not had any kind of formal training in fishbone, but their safety manager 1, is helping him. He has used 5-whys a few times, but he finds it difficult and it irritates him because he might get to the third "why" and then he finds himself at a dead-end and he does not know what to ask about. Fishbone is easier and therefore he uses it more.

He always tries to take pictures if it is an important accident or there is damage. He puts the pictures in the system. The problem with the system is that you do not know how slow it is when you start using it. When you know that it is slow then it is not a problem. You have to know that you press one time and then wait. It takes a few minutes.

Corrective actions:
If he does not know who should be responsible for the corrective action, he asks. In the daytime there is always someone to ask.

Operators in the system
He would like the operators to use the system more. He would like them to be able to put in low incidents. They should use the computer in his office. They would have to have some training. It is not so complicated

to do it, but the first time it would be good if safety manager 1 or somebody like him would help them get started.

He is not sure if he wants the operators to go in the system to find out whether there have been some incidents in the different areas. He usually tells the workers. When there has been a medium or high accident or incident the report of the incident will be printed and put in a box. A coach from every shift takes it out from the box and reads it to the workers in the beginning of the shift. They do not put names of the involved employees on these papers.

'Verkeftirlit'
They have operators fill them out and it would be good if they could put them in the system. It would make the operators feel a part of the process.
It would mostly benefit the operators if they could use the system. It will not help him much as it does not take him long to put the 'verkeftirlit' in the system. For the operators it would be an important job and they will have more responsibility.
He is putting the 'verkeftirlit' separately in the system one at a time.

Summary account of the interview with potline coach 6 and potline coach 7 (teamleader)

Profile
Work:
- Potline coach 6: Supervisor/coach, 5 years at Alcoa
- Potline coach 7: 3,5 years, operator and sometimes Potline coach 6´s assistant
- It-skills: Rated on a scale from 1 to 10, Potline coach 6 would say that he is around 8 in working in the MES system, while Potline coach 7 says that he is a 7 as he does not have the same experience in MES system as Potline coach 6.

Opinion about the MES system
What is good about the system?
- Potline coach 6 says that it is okay and Potline coach 7 agrees.

What is not working so well in the system?
- Potline coach 6: In the investigation window the description box (where the detailed summary is put in) is too small. Also the review box is too small.
- Potline coach 7: If you have a big incident there is not enough space for the description.
- Potline coach 6: You have to know the last name of a person to be able to search for the person. If you do not know the last name, then you cannot search. It could be good if you were able to search after the first name. You can see in the system where people work.
- Potline coach 7: They usually just know each other's first name, so it can be hard to search.
- Potline coach 6: Another thing is that you cannot copy in the investigation. You have to write the same things more times. The corrective actions cannot be copied.
- Potline coach 7: If you want to send it to different people you have to put it in again.

The window were incidents are reported
Potline coach 6: They are not using the 'subcategories'. But safety manager 1 uses it. Potline coach 6 cannot explain why they do not use it. It is not difficult and sometimes he does it. But mostly safety manager 1 puts it in later.
Potline coach 6: They use 'consequences' and 'main protocol'. 'Witnesses' is used for both witnesses and for people who should be informed.
Potline coach 6 would like if the system was able to send mails to a group of coaches and so he would not

have to write the email addresses of all the coaches every time. The group could also include the manager and the safety guys.
Potline coach 6: They put the instant actions into the system. The coach puts this in the system.

Investigation
Potline coach 7: Usually the coaches do the investigation, but if he is not there, then a team leader takes over. The coaches usual sit down with the witness or involved persons.
Sometimes they have to wait to make the investigation e.g. if they need more information and the involved persons or witnesses are not available. Or maybe they need others persons to help them e.g. if equipment has been broken, they have to talk to people from maintenance. If it is the nightshift, there might be some people that are not available.
Potline coach 7: If there has been an incident you usually try to finish the investigation before you go off. If you have three shifts and then go off, you will try to finish before you go off.
Potline coach 6: The target is to finish within the same shift or within 24 hours after the incident occurred.

Potline coach 6 uses fishbone. The 5-whys is not used because they have been told not to use it. They have been told to use either the fishbone or the 5-whys. The fishbone is okay to use and it normally gets the wanted information. When he started, he used the 5-whys and it worked well, but someone told him to use the fishbone.
Potline coach 7: In the fishbone some of the fieldsare not used. The definitions can be hard and they are not completely sure what to put in the different categories. Sometimes some of the categories are irrelevant.

Potline coach 7: They sometimes put pictures into the system e.g. a major incident or damage on equipment. The system is slow.
Potline coach 6: It is not easy to put pictures in the system. He has forgotten how to put pictures in, so he will need help to do it as it is too difficult.

Training
Potline coach 6: He had some training when he started by a guy from Canada. He had about one hour of education. He has not had any training since, but he would like more training - maybe to learn how to put pictures in the system. In the hour with the guy from Canada he was also taught to use the fishbone. He watched the Canadian guy do it and later he tried himself. If he is having problem he will call his colleagues.

Potline coach 7: He was trained by another coach/supervisor. He has not had any formal training, but the coach would involve him when incidents happened and he learned that way.
He only uses the system, when he steps in for one of the coaches, but he has no trouble remembering what he is supposed to do in the system. The reason according to him is that he is good with computers. He can find out, but he could imagine that it would be a problem for others.
If you know nothing about the system then you cannot do anything. The system requires training. The system could help you more e.g. fields with tips or if you could fill it out in steps.

Operators in the system
Potline coach 6: It would be a good idea for the operators to use the system because it would give more information, maybe something that would otherwise be missing. The operators could put the low incidents in the system.
Potline coach 7: He knows how to use the system even though he is an operator, but that is because he is an assistant to the coach. The normal operators do not use it. Some would probably be interested and some will not be – that is probably 50-50.

Potline coach 6: He uses the ‘verkeftirlit’. He puts them in the system and they do audit with it. The category is audit, which means just-checking. He is putting them in one by one. They have to do four per shift.

Summary account of the interview with casthouse coach 1

Profile
Work: Coach

- Experience: 5 years at Alcoa and has been a coach for four years.
  It-skills: Rated on a scale from 1 to 10, he would say that he is around 7-8 on the scale in working in the MES system.

Opinion about the MES system
What is working well in the system?

- The system is very good for the most parts.

What is not working well?

- Sometimes the system is down and it is not possible to access it. He quite likes working in the system.
- There could be an easier access to put in pictures. First you have to save it in the computer, then you can save it in MES and then you can put it in the incident report. There are too many steps. It would be better if the pictures could be put directly into the report in MES. If you report low incidents he does not think that it is possible to put pictures in. The low incidents do not have to be investigated, but sometimes it could be nice to have pictures to show to the other shifts or people. The pictures could show exactly what you mean. Usually they just print the pictures out because it is easier than putting them into MES. They do put medium or high incidents into MES with pictures as much as they can.

Wishes to the system:

- When you put things in the system it could be good with more dropdown menus e.g. locations could be prepared. It would be good if more options where already in the system so that you could choose from them. There are of course things that cannot be in dropdown menus as they require text.

Investigation
He uses the subcategories in the window where they report incidents.

Investigation window: He has at least once experienced that he ran out of space and it was not possible to put in more letters. There is room for only maybe 1000 letters that you can put in. This means that sometimes you cannot put everything in the system.

He is using a little bit of both the fishbone and the 5-whys. He tries to gather as many people as possible and get their point of view on the incident. Usually he writes everything down on the paper first and puts it in the system later.

He thinks that the fishbone is better. He always tries to ask and maybe use 3-4 why´s. He prefers the fishbone. Somebody printed something out on a paper and gave to him. On the paper there are some questions that you can have in mind when you do an investigation. Some are about training, motivation, physical, equipment, strategy, both chemicals and tools. Questions about those things help them go through the incident. It is pretty old, but it works.

Training
He is mostly self-trained in MES. He has not had any formal training, but he has learned from others coaches and figured it out by himself. He would like to have more training.

He has not had formal training in fishbone or 5-whys. He was taught by being with the safety managers and other coaches. It would be okay with more formal training in fishbone and 5-whys – more is better.

The captains in his shift mostly do not have any training. They can go in the system and see what is going on. But putting in the system is not good.
The operators do not have any training. Usually the coaches have back-up coaches that take over if the coach is sick or away. The back-up coaches have some training – mostly through the coaches.

Operators in the system
It would be good to have operators use the system. He thinks that everybody should know how to use the system. Now it is mostly the coaches who put incidents in the system. Captains in each area could also do it. A culture where things are put in the system needs to be created.
The training could start with a course and after that the coach or safety guys could teach the persons one-on-one before they have to start using the system.
In the system he thinks that the operators could report mostly the low incidents because the medium or high incidents require investigations. The person who reports medium or high incidents is the only one who can make changes in the report – in addition to the safety inspector. But the coaches cannot change the report. If the operators should use the system more, the coaches need to be able to change their reports.
Some of the operators could use the system e.g. the captains. There would need to be a deadline for when things have to be put in the system e.g. before 4 o´clock in a shift. Otherwise the coaches cannot know what is going on. If they have something to report after 4 o´clock, they could come and talk to the coaches. It will depend on the incident e.g. if a forklift drives into something the driver has to take an alcohol test. The captain and operators cannot take the person to the alcohol test – that is the coaches´ job.

'Verkeftirlit'
They are supposed to do four 'verkeftirlit' every shift, but it depends on the time and what else is going on. Sometimes they do one-two and sometime seven-ten.
They would like the operators to start doing the 'verkeftirlit' by themselves. The captains have a task about making one of the 'verkeftirlit' per shift – if they have time. The captains on his shift have not started doing it yet because they are still going through 'human performance' training. When 'human performance' has been implemented in the shifts then he will start on getting the captains to fill the 'verkeftirlit' out. When the operators have filled the 'verkeftirlit', they put them in a box. He would like if they could put them in the MES system – that would save time for the coaches.
In the moment the 'verkeftirlit' is put in the system one at a time. The 'verkeftirlit' with no problems on it, he puts in as an inspection in 'úttekt'. But if there is something wrong, then he puts them in 'health and safety' e.g. if someone did not use the seatbelt, it is an incident. He has never used 'úttekt' if something was wrong. He does not put the 'verkeftirlit' in both places. There are too many things going on in the MES about the 'úttekt' and everything else. He thinks that he has to put too many things in the system because a lot of people are making the 'úttekt' – he has to do at least four per shift, the potline has to do around four per shift and the rodshop maybe two. That makes something like 10 per shift and if people are doing extras then there will be a lot of them in the system.
It would be okay if it was in a different area or windows. Incidents and loss of production could be in one window of MES and inspections and small stuff like the 'verkeftirlit' could be in another window.
If you have been on holiday, you can get the incidents or lost production that has been going on – without getting everything as that would be a lot of things.

He sometimes makes statistic if he has been away for a while. Then he goes in the system and sees what has been going on. Usually the coaches in the casthouse make everything ready for the next shift. When he finishes tomorrow then he will make everything ready for the next shift, which is the B-shift. He prints out every incident that matters from the last time B shift was in (three-four days ago) and prepares for the B-shift´s coach. The coaches are helping each other. It is easy enough to get the information out of the system and make statistics. In the system he goes through what has happened since B shift was last in the plant and what kind of safety incident have there been. Then he prints out what really matters. He makes everything ready on paper.

Summary account of the interview with casthouse coach 2

Profile
Work: 4,5 years at Alcoa

- Experience: He is a coach for now. He has been a coach for 3 months and will by until July. However he had been a temporary coach for his coach for some time.
- It-skills: Rated on a scale from 1 to 10, he would say that he is a 6 in working in the MES system.

Opinion about the MES system

- What works well in the system?
- He only uses the MES system for incident reports and it works well for these reports.

What is not working so well?

- The system is easy to use.

Investigation
In the reporting window he has been told to fill it all out so he uses all the fields.
The “witnesses” includes the safety manager from casthouse, the manager of the casthouse but also the actual witnesses.
If something can be done right away, it is put in the system.

Sometimes he makes the investigation by himself and sometimes the safety manager from the casthouse takes over. If it is a high incident then the safety manager takes over, but sometimes Andrés does do the high. The safety manager may help him out.

When he makes an investigation he puts in the system while he is interviewing.
When his shift is done, he will give the report to the coach after him and that coach will talk to the new shift.

He sometimes takes pictures of the place where the incident happened and these pictures are printed and put in the incident report. He is not putting the pictures in the system because it is slow. He thinks that none of the coaches are putting pictures in the system because the server is too slow.

Fishbone and 5-whys:
He is using the fishbone in investigations. He has not had any training in the fishbone, but he has seen how others use it.
He does not use 5-whys, but he says that he should be using it, but he does not know how to use it. He has been told by the safety managers that the coaches should be using both fishbone and 5-whys. He would need training in order to use it. He is new to the coach job and therefore he does not know how to use the 5-whys. The other coaches know how to use 5-whys and they are using it.

Operators in the system
It is only the coaches who are using the system, but he thinks the operators could use the system. It could be good if the captain (the person that is in charge of an area in the casthouse) could put low incidents in the system.

Verkeftirlit
He uses 'verkeftirlit'. He asks the operators on his shift (23 persons) to do at least one each per shift, but they do not always do it. The reason for this is that they do not always have the time e.g. because of a lack of people.
The 'verkeftirlit' is put in a box and the safety manager from casthouse puts them in the system.
He thinks that the operators could put them in the system. He says that there is no problem with getting the operators to check each other.

Summary account of the interview with Rodshop coach 1

Profile
- Work: He has been working since Alcoa in Iceland started. He has always been a coach.
- It-skills: Rated on a scale from 1 to 10, he would say that he is pretty high on the scale in working in the MES system. He feels comfortable with the system.

Opinion about the MES system
What works well in the system?
- He only uses the system for reporting incidents and things like that. He uses it for 'production' and for 'health and safety'.

What is not working well in the system?
- He cannot think of anything. There is too much downtime, but when it is up, it is working pretty well. He is not sure what the system can do, but the things he wants it to do, he can make happen.

Later he thinks of something else
- The use of the system should be the same for the whole company. The use should not vary from e.g. the rodshop to the casthouse.
- You should be able to go in the system global. This would make you capable of seeing what was going on in rodshops in other places of the world. He would like to see what they are reporting and how they investigate. Maybe you do not understand the language of all the places but some of the languages he does understand e.g. Norwegian.

Investigation
The window in which reports are entered:
He uses all the fields, also the 'subcategory' and the 'main protocol'. He thinks that filling out all of the fields makes a better report.

When operators report, they use the same window, but they do not always fill out all the fields – it depends on the person. If he sees a report that is not properly done, he calls the person who put it in and they fill it out together. That way the person will learn from it. The most important thing is to report it and if the report is not good enough then they fix it.

The witness box: They have been told to use it for people who they want to inform.
They always fill out 'what happened' and 'what was done right away'.

Investigation window:
He uses pictures when the pictures say something and means something. He finds it easy to use

He uses the 5-whys as he finds it easier. He sometimes uses the fishbone for bigger investigations. But most of the times he uses the 5-whys. Sometimes 5-whys can lead you to a dead-end. If that happens, he gathers some people and they talk about it and ask a lot of questions. Sometimes it leads to the use of the fishbone. Then they can ask the 5-whys on each of the fishbone´s categories. He might combine the two methods, when the investigation is big and complex. He also combines the methods if it can be hard to get to the root cause or if he does not feel that he have found the right root cause.

Training
They had a bit of training in the fishbone, but it was not good enough. He had more questions after than he did before.
He has not had any training the 5-whys at Aloca. He has used it previously to his work at Alcoa so he has had some training. The other coaches have not had formal training, but he has taught some of the coaches how to use the 5-whys.

There is no formal training in MES. The training has been someone showing some of the things that the system can do. The training has not been good and therefore there might be things that he does not know that the system can do.

They need more training in how to pull statistic out of the system. For team meeting they should be able to go to the system and pull out the e.g. downtown. It would be nice to see the downtime on each machine on each shift. He has heard that you should be able to do this, but he does not know how.
In regards to 'health and safety' it would be nice to pull out low, medium and high incidents per month and compare the different shifts. Do some shifts have more accidents?

The operators have been taught to use MES by him. The coaches need more training in the system in order to learn what the system can do for them.

Operators in the system
If you want the system to work then they need the operators to use and understand the system. Every morning they have a shift meeting and they take all of the incidents out and discuss. So they need the operators to put things in the system. It needs to be a system that can be used for something.

Operators use the system.
On each shift they have two-four or even 5 operators who use the system for downtime. In regards to 'health and safety' they can put the low incidents in the system themselves. The operators also put in the medium and high incidents, but they do not investigate themselves. Sometime that is done by the safety guys and sometimes maintenance guys in order to explain how the machines work.

If a medium incident is investigated by him, he will go and talk to the person who put it in the system. You could see something and another person could put it in the system. He will involve the person in the investigation. He will call all the people that is needed e.g. safety specialists.
It is not all the operators who are able to put in the system. Some have not learned how to do it.
When they hire employees they do not need to speak English or know anything about computers. Most people under 45 have used computers and it is often easier for them to learn to put things in the system. He tries to get as many as possible to put things in the system.
If you can get most of the people to use the system then they read what is going on all over the planet. They get a more information and a better understanding of what needs to be put in the system.
The operators have easy access to computers because computers are placed a couple of places in their surroundings. The operators also use the same system for to 'lock-tag-verify'.

When you have a system like MES, it needs to be owned. If the system is only for a few coaches and safety specialist then no one can see the point of using it. It is important.

Operators report each other – sometimes. It is a question of culture. It will always be hard to get employees to report that they did something wrong, but he has told them that they should put things in the system, and that they do not have to write a name. For 'health and safety' the system asks for a name, but you can put "anonymous", which is acceptable. The important thing is to get it in the system so they can talk about it. They have not had problems with people fighting each other by reporting each other. He thinks that it comes down to how you do it. If you train people into a culture of: "I caught you!" then you have trained them wrong. The culture should be that if you see something wrong, then you put it in the system so that everybody can learn from it. This is the culture that he has taught his employees. When he sees something he tells the person that he will put it in the system, but that it will be anonymous. On the next shift meeting they will talk about the incident. If someone breaks the rule then it may not be put into the system anonymous. If someone is always doing something wrong then the name will be put in, but it will not be visible on the shift meeting. Only the coaches will see the name. There are different rules and the consequences of breaking them are different.

'Verkeftirlit'
He thinks that 'verkeftirlit' is too much. Even though something is really good, more of it may not be better. It is good to use sometimes. The operators are forced to do at least four per shift and the coaches are supposed to make at least two (they are forced by the safety team). It is a good tool, but sometimes you do not need it. You do not have to document everything. If you see a person without their mask, then you can go and tell them – maybe they just forgot it. But the tool is good. If you let one employee do it all the time then it is useless. The coaches try and get as many employees as possibly to do the 'verkeftirlit'.
In the rodshop the coaches do not put 'verkeftirlit' in the system. The 'verkeftirlit' is given to the safety manager and he gathers them and puts them in one MES report. Siggi makes a report once a week and includes how many was made on each shift. He also includes what was wrong in each shift.

Summary account of the interview with Rodshop coach 2

Profile
- Work: Coach
- Experience: Has been at Alcoa for 5 years and has been a coach for 1 month.
- It-skills: Rated on a scale from 1 to 10, he would say that he is a 5-6 in working in the MES system.

Opinion about the MES system
What works well in the system?
- He thinks that the system is working well. They try to learn from the things that have been put in the system and they try to teach the operators what they have learned.

What is not working well in the system?
- For him the system is working fine. There are probably things that could be done better, but he is not aware of any thing at the moment. He has used the system before he became a coach. He started to use it about three years ago. He does not use the system to make statistics. He mostly puts incidents into the system and they try to learn from the incidents.

Investigation
He does investigations, but he has only had two-three incidents that needed investigation since he started as a coach. They were all medium. For one of them he used the 5-whys and for the others he used the fishbone. The fishbone was used because of what happened. This method is better if e.g. something was wrong with a machine. This was the cause, when he chose to use it. He only uses the categories from the fishbone that are appropriate. Sometimes it is easy to use, but it depends on what has happened. But he thinks that it might get easier when you get used to it.
In one of the incidents it was easier to use the 5-why´s.
He is not sure of the definitions of the fishbone and the 5-whys.

Investigation window:
He is using the 'category' and sometimes the 'subcategory'. He is using the 'location' and the 'consequences' (when appropriate), but not the 'main protocol'. He is not using it because it does not look like he needs to use it. Also he is not completely sure of what the definition of the different categories in the 'main protocol' means. Sometimes he does not have the time to put the information in the system.

In 'witness' he puts the coaches and the manager.
He puts in information about action taken immediately after an incident if some has been taken.He has never put pictures in, but pictures are used, if they can help the investigation.

Training
He has had some course about the MES around the time he started at Alcoa. Most of what he knows, he has learned by using the system. He might be learning something wrong, but he does not know. He has taught himself to use the MES. Fishbone and 5-whys were also taught at that course, but he has not had any training since then. He has learned how to use the methods by looking in the system and reading other's reports.
He thinks that you learn more if you are taught one-on-one than you would at a course. Someone can tell you what to do, while you are doing it and tell you, why you are doing it.

Operators in the system
He thinks that they are planning to have the operators put more things in the system by themselves. He thinks that in the future the operators should put low, medium and high incidents in the system. This means that shortly after the incident the information should be in MES. He thinks that the operators have time to put things in.
He is not sure if it would help him to have the operators use the system, however the operators will hopefully gain more experience and learn more from the incidents.

'Verkeftirlit'
He uses 'verkeftirlit'. How many 'verkeftirlit' that are filled, depends on how active people are. For each shift there are maybe between four-seven people who are filling them out. Potline coach 6 puts them in the system or at least he looks at what shifts and how many per shifts. The 'verkeftirlit' is not usually put in the MES system – at least not yet.

He has never tried to put 'verkeftirlit' in the system. Operators could probably put them in the system, but whether that is a good idea or not, he is not sure.

If there is a safety incident then they want to have the name of the involved in the system. But there are no names in the 'verkeftirlit' – only the name of the person who did the inspection. You tell the person that you are inspecting that his name will not be put anywhere. He is not sure why the 'verkeftirlit' is filled out without name of the person who was inspected.
He knows that some inspections in potline have been with names on. For him is looks like they use names in some cases.

Summary account of the interview with Rodshop coach 3

Profile
Work: Coach
- Experience: 4 years. 1,5 years as coach
- It-skills: Rated on a scale from 1 to 10, he would say that he is an 8 in working in the MES system.

Opinion about the MES system
What works well in the system?

- The reporting of the incidents and the investigation tools.

What is not working well?

- At first he cannot think of anything. He uses all of fields in the reporting-window in MES system, when it is necessary. Some of the categories are however hard to define e.g. the secondary protocol. Something may be missing in the secondary root.

Investigation
He writes on paper when the investigation is going on and later he puts it into the MES system.
It is always best to put things in MES right away. Then you do not forget to put it in. A PDA or an iPad could be a good thing.

He starts by putting in the date and time (of when the problem started). Then he puts in the 'category' and a 'subcategory' if it is needed. He puts in his own name and the name of his boss will show up automatically. In the 'process' they always put "400" as it makes it easier to track.

Witnesses: Now he only puts names in the system when it is a medium or high incident as no one gets emails about a low incident. He puts the names of other coaches, safety guys and the management of rodding. If it is a high incident, everybody will get the information including the casthouse and the potline.

Fishbone and 5-whys
He uses 5-whys and not the fishbone because he is not good at the fishbone. He thinks he needs more training. The 5-whys is easier. He has not been taught the fishbone, but he has been in investigation where the fishbone has been used. He has only seen it in action, but he has not received any training. He would like to have more training and learn how to use it as he thinks that it will help him in the investigations as he would get a better understanding.

The corrective actions
He has put in a time on what has happened and when it happened. E.g.
21.30: …..
22.00: …..
23.00: …..
01.30: ..…

When everything is in the system (and the investigation is over) the corrective actions is usually given dates. The corrective actions have to be carried out before the given date.

When he shows an investigation, he has done previously; some of the things that he has put in the system are missing. He says that this is not the systems fault, but his own.

Training
When he was taught about the system he was also taught to use the 5-whys. He was taught by the departing coach that he was going to replace. The 5-whys is working for him and he thinks that it is a good method to get to the root cause. The experience came through using of the system. When investigations were going on, he asked to see what was going on.

He got a crash course in the beginning in everything when he started (e.g. MES, 5-whys), but he would like to learn more. The system has a lot of possibilities that it is not possible to learn in a one-two hour class. The best way to learn he thinks is learning by doing.

When it is appropriate, he is putting pictures in the system. Usually he does not do it because it is not necessary. If there e.g. is a crash, then he will take pictures. It is not easy to put the pictures in the system. They have to be put the pictures in the P-drive to be able to put them into the MES. Not everybody knows how to put pictures in the system. At the moment it is too much trouble to put pictures in – and it should be easier.

The MES is easy to use. If you start by putting in low incidents it gets really easy. It only takes a minute to put low incidents in.

'Verkeftirlit'
'Verkeftirlit' is only put in the system if something is wrong in the safety area e.g. someone is not using goggles or the right gloves or earplugs. But if it is something else e.g. if somebody is not using their body right, he just talks to the person. If it happens repeatedly then he puts it in the MES. The 'verkeftirlit' are put in one at a time. Some coaches say that it takes a lot of time, but that is defiantly not true. It does not take a lot of time. If you have gather 10 small incidents then it takes 10 minutes to put them in separately, but if you put one in every time you make one then it will take a long time.

Operators in the system
During the last year he reported 90% of the incidents, however they are trying to change that so everybody will put the incidents into the system. However not all incidents can be put in by anybody. If person involved might have caused the incident, he is not the best to put it in the system.
Before the operators would call him when they saw something e.g. vehicle was not at the right place or somebody almost tripped, but now they are trying to change it so everybody will put it in the system. Everybody has access now and the operators also have time to put things in the system during their shift. He thinks that the operators can put everything including medium and high incidents in the system. However a problem can be that people have different definitions of low, medium and high incidents. Another problem can be that people use it to get things fixed e.g. a fan has been broken for a long time and someone will put it in medium. If they want something dealt with now, they may choose to put it in medium.

The incident pyramid: For every 1000 low incidents (e.g. injury without treatment) there are 10 medium incidents (e.g. injury with treatment) and 1 high incident (e.g. death or seriously injury). The 1000 low incidents are in the bottom and the 1 high incident is at the top of the pyramid.
They try to put as much into the low and fix the low problems so they do not cause medium incidents. By putting "near-miss" in the system they try to prevent incidents from happening.
The design of the system is okay. It is easy to know what to put in and where to put it.

For every shift they have a safety representative who takes care of the safety things for that shift.
In the future this safety man/woman has the responsibility for things being put into the MES. It might not be put in by the safety person himself/herself as he/she can delegate the task to someone else. The task could be given to more than one person.
They are working on getting this going. It may result in that he will start working at the dayshift.

The safety representative and the people who have been given the task of putting things into the MES are not the only ones putting things in the system. Everybody can report, but somebody has the responsibility. The purpose of the self-managed teams is to lower management cost.

Summary accounts of the interview the operators

Summary account of the interview with the potline operators

Potline operator 1

Profile

- Work: Take turns here, which means that he is one month here and there. Now he is in the control room.
- Experience: 2 years at Alcoa
- It-competence/Experience: Rated on a scale from 1 to 10, he would say that he is around 8 on the scale in working in the MES system.

The MES system

- He has reported the 'health and safety' incidents into the system.
- He does not know if he would like to use the system more. He is used to the way it is at the moment. He does what he knows how to do and then he is done. . He thinks if the managers want to make changes they have to convince the operators by showing them a better way. The coaches in the potline use the system many times a day and they can do it with their eyes closed. When you are too used to something, it is hard to see ways to changes it.
- He thinks that he can put in how bad it is, as he has seen both very high and low incident. If it is very low they do not check it out. When it is high the safety guy comes and takes over. He would not mind going into the system and report.

Training:

- He has no formal training, but he has taught himself and finds that the system is very simple. Everything is in the window, where you report is simple. To report an incident or some else that is simple, you do not need training. He thinks training should be used for more technical stuff. He thinks it is easy to access the MES system. It is put up so that it is easy to use.
- He finds some word difficult to understand (e.g. mainprotocol). Right now the operators go to the coaches and report incident.

'Verkeftirlit'

Right now he is putting the 'verkeftirlit' in a box, but he thinks that he could put them in the MES. At the moment everybody is doing the 'verkeftirlit'. He does not put the name of the person that he is inspecting, but he puts his own name on the form. It is a checkout for you work friends. If it the 3th time the friend has unsafe shoes on, then you go to the coach and report itHe thinks that if they report each other it would make a war. If everybody is using the 'verkeftirlit' then everybody would have shoes that are okay, gloves that are okay, glasses are okay and so on. But he thinks the forms are important to keep safety up. Two persons are making two-three 'verkeftirlit' per shift. A month ago they wwere pushed to use the small forms more because they had had a lot of incidents during the last year. The 'verkeftirlit' automatically makes the safety better.

Potline operator 2

Profile

- Work: He is an operator –Experience: 4 years at Alcoa Fjardaál.
- It-competence/Experience: Rated on a scale from 1 to 10, he would say that he is in the middle of the scale in working in the MES system.
- He knows the system at Alcoa but he is not computer person.

The MES System:

- He has been in the control room and has used the program in there. He has not used MES a lot. He is in environment group at the moment and they are starting the use the system more. He is using the system from time to time because he is taking over for the coach when she is not there. He does not record incidents like people not wearing their seatbelts, but accidents he has been reporting. He has done mainly low and one medium. The system is mainly used by the coaches. It sounds complicated, when you start, but when you have done it 3-4 times it is not hard anymore. The operators do nothave time to get to the computer and there is only one computer for everybody. More computers could be a solution if they want operators to put things in the system.
- To get access to the system he has go to a couple of places in the system. It is a pretty long way to access the system. A shorter way will maybe help others to use the system. When you do not do it often, it is a long way to get in the system.
- He does not know why there is a big text screen and a summary. He feels he is doing the same thing twice. He only uses the fields that are used for low incidents.
- You have to put into so many places. The window is the same for the other places e.g. casthouse. He does not think that design change would help but more training would. There are maybe 4 people (coaches and captains) who can use the system. Everybody else does not use the system. If everybody should use the system, there is a need for more computers and training.
- The low incident does not ring any bells and nobody sees it. If you put things in medium, all the bells are ringing, and they will get calls. He thinks that nobody is looking at the low, but somebody should at least look at them.
- There is a rapid replacement of the employees, which may be the reason for not training everybody in the system.
- A problem is that you need to know the last name in the system to be able to put people's name in the system.

Training

- The coach has showed him, but he needs to do it himself to understand it. He had half hour training in relation to the environment group that he is in now. If he has to put more than low incidents in the system he needs more training.

'Verkeftirlit'

The operators are mainly using "verkeftirlit" to e.g. check the seatbelt. He is reporting the 'verkeftirlit' into the system. Each coach has to do about 4 'verkeftirlit' in every shift. When the operators are filling the 'verkeftirlit' out, it increases the responsibility. But it would be important that they have the time to put things in the system and that they also have access to computers. Now there is only one for all the operators. He thinks that a lot of the operators do not use the computer at Alcoa and they do not check their mail on work. People do not know when mails are sent out. It is not because they do not know how to do it as everybody knows how to use computers to e.g. check the news. He is always checking his Alcoa mail, also from home.

Summary accounts of the interviews with the operators from the casthouse

Casthouse operator 1

Profile

- Work: Captain and she is working in the same spot
- Experience: 5 years at Alcoa
- It-competence/Experience: Rated on a scale from 1 to 10, she would say that she is around 7 on the scale in working in the MES system.

The MES System

- She sometimes uses the system to look at incidents and "lock and verity", when she has time because the machine is running. She takes e.g. statistic out of the system.
- She thinks the system is all right to access.
- She does not thinks it is complicated to find information in the system, she thinks it is easy.
- She could imagine writing the incidents and put them in the system. It would give more involvement and responsibility but later in the interview she is in doubt about if more involvement would give responsibility.
- She does not think there are incidents that she cannot put into the system.
- he is not sure what could make her use the system more but she thinks she would need training if she had to use the system more.
- There is not always time to go into the system because she is on the same working spot.

Training:

- She has no training, but she has taught herself by looking and exploring in the system. She did not find it hard to figure the system out as most of it is on Icelandic. Sometimes she will have time because the machines are broken, and then she goes to the computer.

'Verkeftirlit'

- She needs to do more of this.
- She does not know how many they have to fill out per shift. She fills them out and puts them in a box.
- She thinks that is would be nice if she could put them in the system by herself, however she does not think that it would make her more active in using them.
- If everybody had to put them in the system, then they would need the time to do it. The time is important and if the time is not there, they forget. She thinks that if the operators are supposed to put the 'verkeftirlit' in the system, there should not be critic if they do not do it. But they know that they are supposed to do it.

Casthouse operator 2

Profile

- Work: Operator.
- Experience: He have been at Alcoa Fjardaál for almost 5 years
- It-competence/Experience: Rated on a scale from 1 to 10, he would say that he is around 6 on the scale in working in the MES system.

The MES system

- He is using the system to print out lock system, looking on problems with the machines and if problems has emerged. He does not think it is complicate. He is one of the few operators who know how to go into this part of the system. He thinks the system has to be complicated and he thinks it that the system is easy to access.
- He has reported low incidents. He would also like to report medium incidents. He would like to report if he sees something that could maybe lead to damage and help to manage and prevent things from happening. He would like to follow it through all the steps and he would like to be more involved in, the management part.

Training

- He thinks it would be fine to use the system more, but he needs more information and therefore more training would make it easier for him to understand the more complicated parts of the system.
- He would like to learn more about the processes. He thinks that more training will get him to use the

system more, and more training will give people a better understanding of how the system works and what it can do.
- Some things he has taught himself, but he gets help from the coach, when there is something that he does not understand in the system. He thinks it was easy to learn, because he had some earlier training. He has an understanding of how the the system works as hehad learned how to follow the steps. More training would be nice.
- In order to learn it is nice to sit down with one other, but if it class training there should be time to try it in the system. It would be good to have a copy of the system to try to do it in and if you make some mistakes, the system will tell you and show you how you should correct it. He is captain of the machines, so he has to find the time to use the system.

'Verkeftirlit'
- He likes the 'verkeftirlit' and how it works now. It is good to go down on the floor and see if the use it right. He thinks it would be a good idea if the operators could put them into the system as this may give them a better understanding of how all safety is used and why they are filling out these forms. It would also help the people, who usually go through the papers.
- Furthermore it is good for the new people to see that you are using 'verkeftirlit', so that they can feel safe. Some of the new people are scared when they see the liquid metal. He is telling about meeting paper: They have to fill one out per shift, they go through the group and inform them about how to do it right. This is a way to inform people.

Summary account of the interviews with the rodshop operators

Rodshop operator 1

Profile
- Work: She take turns and is doing a little of everything.
- Experience: One year and one summer
- It-competence/Experience: Rated on a scale from 1 to 10, she would say that she is around 8 on the scale in working in the MES system.

The MES system
- She is using the MES system to reports incidents and she has been in one investigation.
- She thinks that the system is easy to go into.
- She does not want to use to system more as she thinks it is fine as it is now.
- She is happy about using the MES system. It is good to have the operators in the system because it keeps them involved and give them more responsibility and it makes them grow in their jobs.
- She cannot report high incident or medium, so when that is needed she calls the coach but she reports the low incidents by herself.
- Using the system makes her feel more involved and it gives more responsibility to be able to use the system. She thinks that is would be good for operators all over the plant to use the system. She finds time between the shifts (between the different turns) or when the machines work well. They have access to two computers that everybody can use. She checks the email on every shift. It is a part of the job.
- She thinks the computers are very slow, but she does not think that it stops people from using the system. She is patient, so she just waits. She would like the system to be faster. She thinks the system is easy to use. She uses most of the fields in the reporting page in the system, but not the things that she does not need. She uses "witness" to inform mostly the coaches.

Traning
- She has no formal training in the system, but her coach taught her. Sometimes her co-workers teach each other. She finds it was complicated at first and the definition of e.g. 'category' was sometimes a bit confusing but she has a good understanding. She thinks that she will need more training to report

medium. She does not know what she is missing but she want to learn to do it right. She thinks that one-to-one training is a good way to learn.

'Verkeftirlit'
Everybody fill it out and the safety manager puts it into the system. She thinks with more training, she would be able to put it in the system. It would give more responsibility if everybody would have to put them into the system. It might be more encouraging.

Rodshop operator 2

Profile
- Work: She is making the anodes. She is like second coach.
- Experience: 2, 5 years
- It-competence/Experience: She is learning and she does consider herself good at computers. It does not interest her that must.

The MES system
- She is learning about the MES at the moment, but she can report incidents. She has learned most of the fields and knows how to use them, but she has not yet reported by herself. She thinks that the system is okay to access.

Training
- A co-worker is teaching her. This co-worker has had some training and is teaching others. It is a bit difficult to find time for the training. When there is an incident, the co-worker will teach while she is putting it in the system. To find time for the training can be a problem. She thinks that the time is takes to learn the system depends of the number of incidents. If she had the time to do it, it would not take a long time. She does not think that it would take long to learn how to put things in the system, if she could concentrate on learning.
- She has never reported in the system on her own. She says that it is important to have the time to put it in. She will be taught to do report all the incidents – or at least they are supposed to teach her. She thinks the textbox and the summary is the same - almost. Now when she is learning it, it is a bit confusing, but she thinks it will be easier after she has used it a few times. She thinks that the subcategory is confusing.
- She thinks that everybody should learn to use the system and be able to report if somebody is sick. Some people are trying to avoid be trained in the system– it is always the same people that are trying to get out of it. She thinks it would help people to take more responsibility.

'Verkeftirlit'
She thinks everybody should be able to put the 'verkeftirlit' into the system. At the moment she is learning to put them in the system. It would be good if everybody could put them in, so they would not have to ask another person to do it. She would like to teach the others so they would not come to her. She thinks that it might increase the feeling of responsibility.

Summary accounts of the interview the employees from the administration

Summary account of the interview with the IT-employee

MES
The IT-employee is responsible for the IT part of the system. The system is based on a SQL database. He thinks that the system's functions are all right. There are not big problems in the system, but if many large reports run at the same time, then the CPU have a little problem with processing the data and the system

gets slow over a period of time. He thinks that is the only problem in the system as it is very reliable. He confirms that the time period where the system is slow is between 11-15 a.m. He explains that complicated reports are hard for the CPU and that is why the system is slow

Filtration
The system developer, Keops, will be able to develop some extra functionality, if the request from the users is well defined. He has not heard about the problem with the filtration before, but underlines that it should not be a problem to solve if the request is well defined.

Design
It is possible to change and add bottoms and windows as long as it is within the existing design. . If an employee finds that something is wrong with the system, he can come to the IT-employee, and he will help with the description of the problem and then take the problem to Keops. He tells what the problem is and what the solution could be. This way both he and Keops will have a good understanding of the problem.
It is Keops that makes the design so if there are some ideas, he would talk to Keops and see if it is possible and make sure it does not break some design rules.
At the moment the page can be confusing for the users, especially for users that do not use computers much. It would be better to limit the options.
They are trying to develop an email in the system that tells you that your corrective actions are close to deadline. A better search function could be a good idea.

The level of computer skills is very different on the plant. He has met some user that lifts the mouse to click physical on the screen. All the workers should be a part of the system. Keops
They have problems with their employees. Alcoa has over the last half year had four different contact persons. They are good and know their stuff. They want to co-operate with him.

The IT-employee thinks that the employees use excel because they are so use to it and they know it so well.
The IT-employee and safety manager 1 are working to improve the health and safety part of the system by making it possible to specify where the worker has been injured, for example burned. It could be with a checkmark
It would make the filtration easier in the system. The IT-employee thinks that it would be possible to make approval/accept functions in the system.

He has thought about how ‘verkeftirlit’ could be incorporated in the system. The closest to a translation of uttekt could be when a worker filled out a form. It is too difficult to make statistics on ‘verkeftirlit’ and the super-users of the system are not agreeing on if ‘verkeftirlit’ should be in the system or not. Potline coach 6 would like to have the forms in the system.
The IT-employee thinks that the conditions on the plant are very difficult in order to use PDAs. As it is now the computers are having breakdowns all the time because of the fine dust that can get in everywhere. He says that there is some kind of PDA (industrial PDA) that could manage the fine dust but they are expensive. Potline coach 6 is using the forms more because his workers have more direct contact with the machines and the risks are therefore bigger.

MES:
The IT-employee thinks that the way into MES could be shorter. He has not heard about the problem before. The IT-employee thinks that the reason, behind the way it is now, is that there should be a central homepage that everybody knows that has all the most used icons. This was supposed to make things easier. He is able to change the policy (different for the different groups of users) so the MES icons could be directly on each employee’s desktop. He thought it was easy to get into the system. In the central homepage there are many icons and in the MES system there are many different kinds of systems e.g. “lock and verfy”

and “health and safety”. Internet Explore causes the windows that shows up when you are accessing the system that requires you to accept and connect

The feedback
Almost every day he hears from the employees that the system is too slow. They have just moved the system to a more powerful server and they are also trying to optimize the SQL. He also hears wishes about improvements of the screenshots. Employees are coming to him about their wishes and he tries to understand their problem. Then he is trying the write the specifications down. When Keops has developed something new, they are testing it in a test environment before releasing it. This does not happen very often, maybe 4-5 times a year.

Training
There is not any training in MES from the IT-department It is the coaches that have that responsibility. New employees get a course in working on Alcoa and it is the education department that is responsible for all the training. But it may be a bit superficial as the course does not go very deep into the many systems like MES. When you are starting at Alcoa, it is not decided yet where you are going to work. So an idea could be that some extra training is given after your workplace has been decided. The coaches are more experienced and they have maybe been taking extra courses. There is not a standard training.

Summary account of the interviews with the education employee

The education employee s job
Her job is about planning the education e.g. the IT-department could call and say they want a course in MES and then the education employee and her colleagues invite the relevant people and book a classroom. When the course is done, the participants have to write their names on a piece of paper and the education employee then puts the names into the system. In the system she can see which of the employees have the right education to work in a specific area. She does not use the MES system in her job but she thinks the biggest problem is that she cannot search in the system as it is today. She would like to be able to write “hand” and then everything regarding hand injuries pops up. It should work like Google where you can search after a song by only knowing one line. There should be a possibility to use a tag function in the system e.g. a burn tag. If it was categorized in a simple and easy way, this could benefit you when you are searching. She thinks it would be a good idea to invite the persons that have an interest in the system to a half hour course.

Training
The educations department does not make training in the MES. The education employee has for a long time been thinking about making a study of the relation between the training and the numbers of accidents. So if they change the training or change the focus of the training, will that affect the number of accidents? This has not been done yet. They are still in the start-up phase. They have been training many workers during the last two years. At the moment she is talking about making this study with her training manager, but there has not been made plans to do the study.

When you are new at Alcoa, you need to take a 6 hours course called EHS which stands for Environment, Health and Safety. They also need a course in electric safety, which takes 4 hours. This course is an addition to the safety and is mostly for potline and the generator. The course about etic and values is two hours. This is the minimum you need to take. All the courses are classroom training. The education department has been talking about online courses, but they are waiting on the Alcoa Learn (a computer system). This would make it possible to make refreshment courses where a person would be told by an email that he has to take a refreshment course online. This could be 10 minutes reading about a certain subject.
The first time you are at work, after you are done with the classroom training, you will be shown around your department and then one person will show you your new job. A problem with learning by each other could be that we are different people and teach in different ways. It is the coach that decides who is going to

take care of the new and they know who is the best person to train other people.
They are working on training documents that defines "what are the persons supposed to learn in this shift" and then it should be possible to make checkmarks when the person has learned it. They are trying to make their methods better, so it will be more standardized and does not consume all of the coaches' time but at the same time is effective. The training sheets are a step towards standardization of the training processes. This should also make the employees more responsibly for their own training. First you have to be willing to learn and willing to read all the SOP's. The coach cannot be responsible for everything as that does not work. People have to be accountable and responsible for their own education.

Summary account of the interview with the process owner of MES and the ABS specialist

The ABS investigation form
Alcoa's management system is based on LEAN. They have eight tools; one of them is problem solving. It is required that they use the ABS investigation form in the production to record all problems, not only safety but also problems regarding process, quality and environment. Everything that is out of the standards needs to be recorded. They use e.g. ISO 9000,ISO 9001 and ISO 14000. These standards are supposed to be used by Alcoa for at least operational problems. The ABS investigation form is crossing the MES incident management system; so the question is when should they record in the MES, when should they use the ABS investigation form or should they just do both. The ABS investigation form is useful because it is always left by the information boards which are all over the plant. Every time Alcoa is out of the defined goal, they should use the ABS investigation form to identify the problem and find the corrective actions. This is generally the same thing as MES and the ABS investigation form is built up very similar to MES.
The process owner of MES and Agnes would like to look into how the paper can fit into the system – how can the two be combined in a smart way. But right now the process owner of MES thinks that the basis thing for the operators is that the ABS investigation forms are on the board and they can just go through and see all the open problems and maybe recognize some new ones. Agnes agrees and says that the operators are complaining about that they do not know what is happing and who is working with what.
Agnes points out that it is not possible to do a root cause analysis from your desk. You have to do it on the floor, where things have happened and that is why you use the ABS investigation form. You can have the ABS investigation form in your pocket and write notes on them. Maybe there should be some sheets to print out of the system as a way to combine the things that they need to use. If you use paper, it should look like the system so it is easy to transfer into the system. They do not know how good they are at root cause analysis and solving problems today as they do not have that the information. The operator should record all quality problems into the system. The coach should take care of the health and safety problems and report them. They are working on a project about self-management teams and giving the operators more responsibility. They will get different roles with different responsibilities. This means that more operators will get access to the system even investigation access so they can investigate themself. The safety role in the self-management teams should have the responsibility for the audits. This means that some of the audits will be taken away from the coaches.

The MES
Agnes thinks that they are good at feeding information into the system, but they are not good at getting information out of it. An example of what they want to get out of the system is, when people are coming to work, they have maybe not been here for a couple of day and then they could just go and see what has happened since last time. What incident has happened, are they investigated or are they being worked it. They would like to get information from the system to put up onto the board, so everybody could get an overview over what has happened and what are the current problems. The system (MES) cannot give reports which means that there is a lot of manual work. Thecontinuies and says that they would like information out of the MES so the workers can see what kind of incidents that have happened in his area over the last year or week in a certain area. She thinks by starting to use this kind for information will give them more discipline in putting the correct date of the incident into the system. Today the date is often put in automatically by the system, which means that it will be 00:00.

They bothpoint out that the system is very slow.
The process owner of MES does not think that people are using the “location”-field in the report window correctly. She thinks that they should give people the proper training in using the system. People are not using the system right and therefore you cannot use filtration because you will miss a lot of them, at least 30%. E.g. if people are reporting an injury, they do not always put in that it was an injury. If you then search for injuries, you will miss some. The consequence box should disappear when you do not need it. The list in main protocol is not a good enough. The main protocol is not used right or not used at all. It should be a required field. There should be a more specific list in the main protocol. The checklists need to be customized for each protocol. They need good procedures and good training and the system should be used in the right way to get the right thing out of it.

The follow up process
The process owner of MES’s main concern is the follow up process. She thinks that it is easy to find the right information in the system but difficult to get up on the board. The ABS specialist says that it seems like you always have to export into excel – it is crazy manual work and nobody should do it. The filtration is not good enough regarding areas. One of their collages, that are working with one category of the lost production problems on the rodding machines, had to go through all reports from the casthouse. They have made the request to have this fixes and to have a main process and a sub process. Another problem is the communication with Keops, they asked for this one year ago, but nothing has happen. So The ABS specialist does not think that Keops is doing their work and they have talked to the IT-department that has the contact with Keops. There are still the questions about the ABS investigation form and how to combine it with the system. All the information that they put in the system is not helping them a lot. They are not getting anything out of the system. It takes too much manual work to get things out of the system.

The process owner of MES says that there is no status in the system for each incident and the incidents are either investigated or not. That is the only status they can see and they cannot see if the actions are in process or have been closed. It is not possible see if the issue has been evaluated or not. They cannot see the individual incident. They can also not see the status of the whole incident, but only see the individual action. Each incident can have many corrective actions and they cannot see if all the actions under one problem have been closed. They have to evaluate the whole problem and see if they solved the problem, which is a standard requirement. But that is not possible so today they evaluate each action instead. The system should just give an email when all the actions are done. They need the status of the whole problem. They need to know when the last corrective action has been closed. Then they will wait for a period of time and then evaluate if the problem has been solved.
The actions should just be open or closed.
The process owner of MES does not like the investigations tab because it is possible to put some rubbish into the required fields. It is possible just to click that this “has been investigated” without anything being done. Instead the process owner of MES would like to have the four eyes principle (two persons have to look at the investigation and approve that is has been done appropriately).

It is the follow up they need to improve and the system needs to help them, the process owner of MES would like to have a simple report that tells that a month ago or 90 days ago the last of the corrective actions for a problem has been closed. This would then be a list of all the problems that she needs to review to see if the problem has been solved. There should be a timeframe and the system should tell when the timeframe is past. At the moment the problem and the actions are not connected in the system, which means that it is not possible to get a notification that the last corrective action for a problem has been closed. You can only see the problem (if it was investigated or not) and then you can see the actions. It is hard to figure out which actions go together with a problem. She needs to know when the last action was closed in order to review the solution of problem. At the moment she needs to go through the system each 1-3 month manually to find the investigated problems and see if all the corrective action for each problem have been closed. She needs to use the incident id to connect them to the corrective actions and opens each rapport on each problem to see if corrective actions are opened or closed. The process owner of MES thinks that this is

the cause of most of the reporting problems and follow-up problems.
The ABS specialist thinks that it is a quality problem that you can investigate a problem without doing any corrective actions,You just have to fill something into the required fields. The process owner of MES agrees and thinks that you need to be accountable for the investigation. This would mean that if they find an investigation that is not done properly (e.g. a high incident with no corrective actions) then they can go to the person that made the investigation. This means that they can ask if he e.g. needs more training. Now they can only see the last person that edited the report. That makes it difficult to find the ones that need more training. They both think that the 'verkeftirlit' are a total waste of time in the way they are being put into the system.

The employees in the ABS team each have their category to follow up on; the safety team are following up health and safety and the safety manager in each area also follows up on all the categories and sees if his people are doing as they are purpose to.
Different groups need different information from the system. The ABS specialist thinks that it should be easier to get statistic out of the system. It would be good to fit the ABS requirement into the system. Alcoa has a standard for lean called ABS OpEx ASAT. A3 is an ABS tool that is used to record their strategy and it is done for each area and for each project. Re-training the operators is not a good corrective action. It should be used seldom, but they see a lot of that in corrective actions. It is because they are not good at root cause analysis. The requirements are from the mother ship Alcoa and it is the same standard for all Alcoa plants in the world. One of the requirements from the ABS is that they need to keep track of identified and closed problems each month in each area. They are not doing that because they do not have an overview at the moment. ABS has a lot of focus on the lost production, but right now the system cannot give them the right information because of the filtration.

The Methods:
The 5-whys is a requirement from the ABS and Alcoa are good at recording the problems in the system but not at as good at solving the problems. They are also using the fishbone to descript the problem, but they are missing the why; why did the problem happen and what can be done to prevent it from happening again.
The process owner of MES thinks that the ISO is very simple. It is just about having a system where you can track or identify problems, find the root cause, make corrective actions and follow up on if the corrective actions worked. The ABS specialist explains that every new employee gets a course in ABS and safety. They also talk about solving problems. But not all the coaches are good at doing it which is something that they should look into. In The ABS specialist' opinion it should be a requirement in the ABS that 5-whys is used every time. She thinks that fishbone is not a good tool for root cause analysis as she thinks that it is a brainstorming tool and a way to find the possible causes.
Their boss was just sending out an email a few days ago. The email was about that they need to fix the use of the 5-whys. They should be use the 5-whys. Their departments are aware of the problem; however it has been there for a long time.