TPK 5100 - APPLIED PROJECT MANAGEMENT

Product development project: A competence overview with regard to safety in fieldwork at IMO

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1 Introduction

In the course TPK5100 at NTNU, Applied project management, the students were tasked with a semester project. This report describes the semester project of one of the groups who decided to do a project of type A, and produce a digital product.

The chosen product was a digital tool for the Icelandic Meteorological Office (IMO) where one of the group members works as the safety manager. This group member knows that the product is relevant, and has access to the necessary contact persons. The objectives of the digital tool were the following:

1. Keep track of employees´ competence in relation to safety in field work in the Icelandic Meteorological Office (IMO).
2. Give an overview of which employees who have the necessary competence for specific field work.
3. Indicate what courses and training IMO must offer in order for its employees to acquire and/or maintain the proper competence.

The expected benefits of the product were to contribute to improved safety for the employees working in the field, increase the success rate of IMO´s field trips, and make it easier for field trip coordinators to put together competent teams for the specific tasks. Furthermore, the tool depicts what competence individual employees might be missing, and therefore what courses or training they must complete before heading out in the field. The tool should be beneficial when designing IMO´s training schedule, that is planning what courses and training to offer at what time, what should be covered, and who should attend.

The tool was intended to contribute to the following outcomes for IMO:

- Fewer incidents (accidents, almost accidents, dangerous situations and damage to equipment) in field work.
- Fewer field trips turn around before finishing their tasks.
- Reduced overall cost of planning and executing field work.
- Less time used on planning and executing field work.
- Increased satisfaction of employees.

The tool was developed in Microsoft Excel. This program was chosen because it makes it easy for IMO to update and adjust the tool when circumstances call for it, such as when new employees start or old ones quit, or when requirements for competence changes. Microsoft Excel also offers a high degree of user-friendliness, the employees at IMO are familiar with it and everyone has a permit for it. Developing the tool in Microsoft Excel makes it likely that it will be used and maintained after delivery. In the beginning of the project, a more comprehensive program called Python was considered, but after communication with IMO it was clear that they were more familiar with Excel.

In the end, it was decided that the tool should be named Húvi, an abbriviation of 'Hæfnisyfirlit með tilliti til öryggis í útivinnu á Veðurstofu Íslands', which is Icelandic for 'competence overview with regard to safety in fieldwork at IMO'.

2 Evaluation of Project management effort

In the following section the project management is evaluated in several fields. How the management was organized and how effective the management was in its risk and communication plans is evaluated at first. Lastly is the planned success criteria evaluated compared to how the project resulted.

2.1 Evaluation of the organization

The different tasks in this project were distributed based on competence, interests and communication opportunities. The group consists of six students, four of which study project management, one who studies cybernetics and one who studies mechanical engineering. Since the latter two have more programming and software development in their study programs, the group agreed that they were best equipped for being responsible for the digital development of the tool.

As mentioned in the introduction, one of the group members is currently employed by the company that the product is developed for. This members main role was to communicate with the end user (IMO), and relay their needs and information. The remaining group members were responsible for documentation of the work, the final report and video presentation. All group members were collectively responsible for making sure that the progress was inline with the set deadlines, and to put in work where it was needed.

The project organization proved useful. The work load was divided fairly equally, and a clear division of responsibilities minimized the risk of double work. Group members got tasks that suited their skills and interest. The progress of the work was reviewed and discussed in weekly group meetings so all members of the group were involved in all phases of the project. This involvement meant that the members ownership was strong.

However, there is always some room for improvement. In this project, the critical tasks were very dependent on two group members. It would have been hard to progress if the developer and / or the link to IMO got sick or was compromised in a way that they could not continue as planned. Even though this did not happen and the progress went as planned, this was a vulnerability.

2.2 The effectiveness of the risk management plan

When planning the project, four main risks were identified along with corresponding possible causes for the unwanted events and mitigation methods to prevent the unwanted events to happen.

To prevent delivering an incomplete or malfunctional product, the group had weekly meetings to review the progress of both the project and the product. This helped maintaining continuity in the project, as well as having continuous control over the actual progress in relation to the planned project schedule. The product was mainly developed by one project member, but was uploaded and available for every project member at all times. The product could be reviewed whenever and was discussed on a group level in the weekly meetings to ensure its quality and to plan further progress. This was to ensure that any problem were identified at an early stage, and that right expertise was present.

To develop the product, it was important to get the right input, provided from the customer. One project member was responsible for the communication with IMO and this members connection and insights proved useful to get the right information at the right time. Multiple employees and leaders at the IMO were consulted, something that would have been difficult to obtain for a school project of this size without an inside person. A weakness with this arrangement was that all communication with the IMO was in Icelandic language and between coworkers, so it was hard to include the rest of the group in these conversations. However, for a project of this size and timescale this was deemed acceptable and the residual risk was tackled with open and regular communication within the project group.

The risk assessment presented in the pre-project only included four unwanted events, which were rather general and only addressed the product risks, not the project risks. This is a learning point for the future, to do the risk assessment more thoroughly.

2.3 The effectiveness of the communication plan

A communication plan was created as a part of the pre-project. The communication plan is an overview of stakeholders, communication strategies, the person responsible for the communication, and the minimum frequency of meetings. Proper communication with stakeholders is essential for the projects success. The communication plan is structured as a table where the first column is a list of every stakeholder that are involved in the project. The second column tells the project group which person that are responsible for communication with each stakeholder, and the third column is a classification of each stakeholder. The stakeholder classification is divided into four different groups: G1, G2, G3 and G4. The classification is dependent on the stakeholders influence on the project and interest in the project. Each classification can be described as:

- G1: The project is critically dependent on this group. The group has significant expectations regarding the project or its outcome.
- G2: The contribution of this group is critical, but initially it does not have significant requirements of the project.
- G3: This group includes stakeholders who have marginal influence on the project, but nevertheless have significant requirements and expectations.
- G4: This group comprises stakeholders who expect little and have minor influence on the project [1, p.53].

The fourth column in the communication plan shows which strategy should be used for dealing with the different stakeholders. The most important to note regarding the strategy is that the different stakeholders should be treated differently. Optimally should every stakeholder be treated with the highest attention, but that is not economic beneficial. The communication plan for this project is attached in appendix A [p.6].

A short summary of the strategies that could typically fit each stakeholder classifications [1, p.54]:

- G1: Collaborate
- G2: Satisfy
- G3: Inform
- G4: Monitor

The three last parameters that are included in the communication plan are:

- Necessary to inform when the project start?
- Special meetings necessary?
- Meeting frequency

These three parameters are more dynamic and easier to adjust.

The communication plan was followed almost precisely as planned. The group used the communication plan frequently when working. The stakeholder classification was consistent, and so was the strategy for how to deal with them.

It can be concluded that the communication plan was effective. It was also realistic since every group member was able to be loyal to the plan without drawbacks. A lot of effort was used in the early phase to gather as much information as possible. That made it possible to have a long-term view when the plan was made. The strategy of the group was to put in a huge amount of work and thought into the early phase, since that is the phase where it is easiest to make changes. There was no obvious mistakes done in the execution of the communication plan, the group would probably use the same plan again if they were to do another similar project.

2.4 Evaluation of the project results match the planned success criteria

Five success criteria were set when planning the project to measure if the project was a success or not. The criteria are:

- Project report and video presentation must be delivered on time.
- Project report and video presentation must fulfil the teachers requirements.
- The project team gains increased knowledge of project management.
- The tool proves useful for the Icelandic Met Office, that is the implementation leads to the outcomes described in chapter 2 in the preliminary project, viewed in appendix A.
- An average computer user is able to use the program after 10 minutes of training.

Both the report and video presentation has been delivered on time, so the first success criteria is met. If they fulfill the teachers' requirements is too early to say for certain, but it is considered likely.

Throughout the project, the group has seen the importance of planning and carrying out with continuity, good communication and teamwork. Teamwork involves distributing tasks based on the knowledge and expertise within the team. The project members have multidisciplinary backgrounds, and it is therefore important to utilize each other's strengths. Success criteria three is therefore also met because everyone increased their knowledge about the importance of good project management.

The last success criteria involves that the product is user-friendly and an efficiency-enhancing and improving service. It is too early to decide this because the product has not been taken in use by the customer yet. However, the first testings and feedback from field workers and leaders at IMO are promising. With these five success criteria in mind, the project is at this stage considered successful.

Factors that the group feels contributed to the projects success are proper and continuous communication throughout the project with weekly meetings and more frequent communication through multiple other channels. This ensured that everyone always had specific tasks, which further led to continuity in the work. Everyone delivered on time and kept appointments that were set.

Communication with stakeholders at IMO could have been improved by bringing the main developer closer to the end users. This constitutes that the group feels that the project was successful, but maybe not entirely.

3 Evaluation of the impact

Although Icelandic people are known to be tough, it has become important for them to have more focus on safety and control during their fieldwork. With new generations, the risk tolerance at work has become lower, and good experience from a zero accident vision in the fishing industry has set the example for other sectors. On top of this, the changing climate is making field work conditions more extreme. Glaciers are melting, rivers become larger, heavier rain and stronger winds are examples of changes the fieldworkers have to deal with. Parallel with climate change the need of climate research increases, which leads to more fieldwork and exposure to the harsh environment.

Along with an increased demand for standardized safety measures, technological devices used to make field work safer are in constant development. Those are e.g. telecommunication devices, navigation tools and avalanche beacons. To be proficient with these tools, regular training and knowledge update is required. The same applies for specialized vehicles, glacier rescue equipment and other things that many people do not use much in their daily life.

All of this gives IMO a good reason to start using a comprehensive, yet effective, digital competence overview tool. As competence overviews for companies are nothing new, the focus for this project was on specializing the functionalities for IMO. To do that, it was necessary to gather information about how IMO wanted to interact with the product, along with all requirements for field qualifications. Product interaction is discussed in more detail later in this section. Requirements for field qualification however is more like lookup. It is determined by IMO which courses and competence is necessary to be qualified for the different types of field work and a list of these requirements is included in the product.

During development of the product, the focus was on how the user will interact with the product. The result is an intuitively and quick to learn data program. Such a program will unlikely lead to resistance among users since it does not require a major change in their work routines because the program is highly user friendly and does not require resource-intensive training to learn. However, the tool could still be be improved, and the end user may choose to continue with the development after delivery. Particular the user interface could be further development to actually achieve the very most ease of use. This development is easiest to implement after a while of use, and the project group took this into account by making the tool easy to develop further after delivery, hence the use of Microsoft Excel.

It will take some time after start of use before final conclusion of the impact can be made. The intended impact is in general an increase in safety and efficiency internal at IMO. Use of the product will ensure competence overview with regard to safety in field trips. It will be possible to easily figure out if the fieldworkers are suited for the designated tasks. If they are not, is it also easy to figure out which courses they require to be qualified. If the product is used properly prior to each field trip, it will lead to that no workers are sent out without proper competence. Consequentially, fewer accidents will happen, and the consequences of residual accidents will be reduced due to proper reactions. An example is avalanches, where avoidance of avalanches is highly possible by adequately planning and correct field decisions. If an avalanche was to occur, proper training will increase the likelihood of successful rescue. Similar examples can be made with glacier passages and crevasse rescue, also snowmobile driving and recovery. All these examples are situations fieldworkers might face in their work day.

When it comes to efficiency, the product is created to quickly give an overview of employees competence in relation to safety in field trips. This competence can then be compared with requirements for specific types of field trips. This is time and resource saving due to quick access and automation in the program that indicate if competence is valid, outdated or must soon be renewed. As the fieldwork tasks evolve, new requirements will probably surface. It will then be important for IMO to react proactive and train their employees accordingly ahead of time. This will reduce the risk of delayed tasks.

The final point to mention in this evaluation of the impact is the satisfaction of end users. It is highly assumed that the fieldworkers will get more satisfied as their safety is increasing. They will no longer be worried about their competence or their partners' competence before and during fieldwork. The success rate of field trips will probably increase due to fewer mistakes and better reactions to unexpected events and they will then feel they are doing a better job. The leaders at IMO will also be happy because they save money and tasks will be finished more easily. Summarized, the product should give IMO a safer and more efficient workday without adding to the work load.

4 Reflection

During the project period the group has learned a lot. In addition to knowledge accumulated from lectures and assignments, the different group-members have learned a lot from each other. In this section, the reflections the group has built up over the project period are presented.

4.1 Factors that have contributed to success

In order to achieve success in a project it is important to set some success factors. 'Success factors' refers to a set of factors that the project must fulfill in order to be successful. The group did this early in the project phase. The success factors are listed in Section 2.4. Even though listing a set of success factors is not a guarantee for success, it is a good way to lead the project in the right direction. As described in section 2.4, the project group set five success criteria whereas all five have been fulfilled or will most likely be fulfilled. Therefore, among other things, the group recognizes this project as a success. Projects are usually evaluated along two clusters [1, p. 83]. These are listed below:

- Project management success: The ability to comply the three constraints; time, cost and scope requirements.
- Project success: An expression of the value of the project when the result or product is put into operation.

The group decided to make a product for the project assignment. For this reason, the project success was dependent on the product success. The product fulfils all desired specifications, and is therefore considered successful and possible to use for IMO.

The key factors for the project management success are listed below:

- Continuity: The group had continuous progression and everyone were updated on each other's progress throughout the semester. In addition to productive work meetings, each individual group member has done their assigned work in between each meeting. The group have met every week consistently since the project started. Therefore, the group has done some work on the project every week.
- The group members sense of ownership: Each individual group member had assigned roles and tasks of responsibility based on their professional expertise and area of interest. The burden has been evenly distributed among the members. This has led to consistent motivation throughout the semester. This has also led to everyone having an affinity for the project.
- Communication: The group had consistent communication both on social media and physically, at least on weekly basis. This meant that everyone was constantly updated on the project's progress and could provide input to further work. Communication has also been proper as the group met physically every week, and communication was unavoidable at the meetings. Despite very different schedules, almost all group member where present at every meeting.

Only one of the group members has previous experience as a project manager. The other members therefore had a lot to adjust to, and learn. However, the further into the project, the smoother the management went for all members [1, p. 79]

Several methods describe and classify the success criteria in a project. "Project success is an expression of the value of the project when the result or product is put into operation, whereas project management success is the ability to comply with the tress constrains ; time, cost and scope" [1]

All the points mentioned above stem from the fact that the group has had very good communication. In addition, the group has without exception held meetings every week throughout the semester. This meant that everyone felt included and had ownership of the project. In addition, the group is interdisciplinary, which has led to the group complementing each other's strengths.

4.2 Learning

The group is multidisciplinary and together has the technical knowledge that was needed to carry out the project. It was decided to use Microsoft Excel to make the product, which several team members had great knowledge and experience with. This made it easier for everyone to understand the product, how it was structured and how it works. The team member who was responsible for making the product, also had the opportunity to ask the group for help or assistance.

When carrying out a project, there is more knowledge needed than only the technical. It is important to know how to cooperate in the best way, which involves communication, finding the right person for the right role, and distributing tasks based on knowledge and expertise. The group learned several things during the project, both about project management and knowledge that was acquired:

- It was important to have meetings every week at the same time. Everyone had different schedules, so the set meeting time made it possible for everyone to attend.
- Good communication is important when working as a team. Everyone encouraged the good conversation from the start by getting to know each other and allowing the conversation to slide over to something other than just the project.
- Icelandic Meteorological Office is the customer and main stakeholder of the project. The majority of the group did not have any prior knowledge of the institute, which was necessary to acquire in order to understand their needs and wishes, and develop the right product for them.
- Early in the planning phase, one project member became unavailable for a couple of weeks due to health reasons. The group therefore learned the importance of preparing for unforeseen events, and to not be too dependent on one specific person.
- While developing the product and seeing the output, everyone learned that digitization can contribute to increased security and efficiency.
- Early on the group created a preliminary project, which helped setting limitations early on in terms of time and resources. This taught the importance of setting limits to make a project realistic and achievable.

4.3 Unlearning

The whole project team has a technological study background. Team members have bachelor degrees from Mechanical Engineering, Renewable Energy, Electricity and Civil Engineering. This technological background turned out to be a bit challenging. In the beginning of the project, when the brainstorming began, the team quickly ended up in discussing solutions on a low level. Instead of discussing the important topics on high level as what is the outcome, impact and benefits of the project, small parts of the ideas were discussed. These small parts should of course be discussed at a much later time. As a team we understood that we had to turn our minds around, and start thinking as project managers.

Gradually as the project manager mindset appeared, the project entered a better flow. The emerging problems were considered first from a high manager level, and then later taken down to a lower level when the technological solutions were about to be discussed. The project evolved more continuously, and project tasks were even dealt with more parallel. This made the project more efficient and structured.

The challenge described in this section got amplified as the team members were both managers and product developers. It was difficult not to think about detailed solutions, when that is what the team has been training for in recent years. Over all the challenge gave the project team a very valuable lesson, that will be be taken further in the career. This lesson will probably give the next project one of the team members attend to a better start. It will be easier to find one's role and its tasks in the project management.

5 Most important lessons from your project

Based on our experience after working with this project we have some advise to give to students that will take this course in a later semester. First of all you should identify the learning objective of the product you are going to make, before you decide the type of product. Also, the time is limited so you must be realistic when you decide which type of product. Make a product that you are confident that you will be able to complete within the deadline. When developing a new product there will always occurs some unexpected pitfalls, therefore it is important to have some extra buffer or slack when creating the time schedule for the whole project time.

Our advice is to start a with brainstorming where you identify problems that you think you can solve or needs that you can help fulfill. Speak with companies or think about the places you have worked yourself. After you have identified several needs, start to think how these needs can be covered. Involve the end-user continuously, especially in the early phase. It is important to use enough time in the early phase, because it is so much easier to make contextual changes in that phase rather than in a later phase of the project.

We learned that it is very important to involve the end user of the product early. It is cheaper and easier to make changes in the product in an early phase of the product development. We have learned that the planning part is extremely important in product development, not just the physical development itself. Good communication is also vital for success, we would recommend that the person responsible for communication with the external end-user or customer has at least a decent degree of technical competence to understand and communicate what is possible and what is not. It is very important that the person can "translate" the end-users need to the programmer/developer. The product should be user friendly and as easily understandable, if you want to make a successful product it is an advantage if as many as possible can manage to use it.

Our experience suggest that you should have a backup-plan, on the different responsibilities. In our team it was one out of six that was responsible for the developing. We where vulnerable on that field because of that, if that person got sick or could not work we would have a problem. We should have involved more people in that task and shared knowledge internal in the group. To have weekly meetings with the project team is also important, make a good communication and progress plan and stick to it. If your plan is good and the group members are loyal, the probability for success is very high.

6 Summary

Húvi is a product that was developed for the Icelandic Meteorological Office (IMO). This report concludes that the product is a success. It is a tool where the purpose was helping IMO to succeed in the following criteria:

- Fewer incidents (accidents, almost accidents, dangerous situations and damage to equipment) in field work.
- Fewer field trips turn around before finishing their tasks.
- Reduced overall cost of planning and executing field work.
- Less time used on planning and executing field work.
- Increased satisfaction of employees.

Based on the experiences so far it can be concluded that Húvi can help IMO meeting all these critera.

Húvi would not have been a success if it wasn't for the good project management effort. The project was well organized and the group consisted of students with different competence that came in handy. Communication and Risk management plans were created at an early phase in the project, and used throughout the whole process.

During the development of Húvi the focus was on making its´ use as easy as possible for the end user. This involved delivering a data program that is intuitively and quick to learn.

The project group did a reflection when the project was completed, and the outcome of this evaluation was a list of key factors for the project management success. These are:

1. Continuity
2. The group members sense of ownership
3. Communication

An aspect of unlearning was also a part of the reflection. The most important outcome of this part was that they all agreed that the mindset of a project manager is vital for succeeding in a product developing project. It is unproductive to use too much time on engineering details in the early phase.

All in all, both the product and the project are considered successful. All deliverables were finished and delivered on time, the project group gained knowledge in project management and the product will most likely increase the safety of field workers at IMO.

7 Acknowledgements

The group wants to give a huge thanks to all the involved persons in the project. Especially thanks to the Icelandic Meteorological Office, their collaboration made this project possible.

We would like to thank the professor Bassam Hussein for interesting and informative lectures throughout the semester and for quickly responding to inquiries.

The group also wants to thank each other for a good cooperation and friendship.

References

[1] B. Hussein, *The road to success*. Trondheim: Fagbokforlaget, 2018, ISBN: 978-82-450-2444-9.

A Pre project

See next page.

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Group 29 - Pre-project

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1 Type of product that will be produced

The intended product is a digital tool where the objectives are the following:

1. Keeping track of employees´ competence in relation to field work in the Icelandic Meteorological Office (IMO).
2. Give an overview of which employees have the necessary competence for specific field trips.
3. Indicate what courses and trainings the IMO must offer in order for its employees to acquire and/or maintain the proper competence.

The main benefit of this project is improved safety for employees working in the field. The tool will make it easier for field trip organizors to select a competent team. Furthermore, it will depict what competence individual employees might be missing, and therefore what courses or training they require before heading out in the field. The tool will be beneficial when laying out the IMO´s training schedule, that is planning what courses and trainings to offer at what time, what should be covered, and who should attend.

2 The expected benefits of the product (the outcome)

The expected outcomes of this project:

- Fewer incidents (accidents, almost accidents, dangerous situations and damage to equipment) in field work.
- Fewer field trips turn around before finishing their tasks.
- Reduced overall cost of planning and executing field work.
- Less time used on planning and exuting field work.
- Increased satisfaction of employees.

3 Stakeholder assessment

Stakeholders within the Icelandic Meterological Office (IMO):

- The safety manager: She has professional responsibility for occupational health and safety in the IMO. She may use the tool to ensure that the IMO is offering relevant courses and training. She is also one of the members in the project team and the link from the project team to the IMO. She can be defined as the project owner.
- The director: He is responsible for all employees at the IMO. If he disproves of the project it cannot be implemented. He should be satisfied as long as the IMO´s workplace culture is respected, and the project does not require excessive resources.
- Department managers with subordinates who work in the field: They are responsible for their employees. They will have to provide information about their subordinates´ competence and use the tool to ensure that their subordinates have relevant courses and training. They must therefore be included in the project and allowed to have opinions.
- Department managers without subordinates who work in the field: They do not have to use the tool unless the organization chart changes.

- Team leaders with subordinates who work in the field: They will have to provide information about their own and their subordinates´ competence along with using the tool to select field teams. They must therefore be included in the project and allowed to have opinions.
- Team leaders without subordinates who work in the field: They do not have to use the tool unless the organization chart changes.
- The human resources manager: Has a professional responsibility for employees' welfare and the utilizing of humans resources within the IMO. He should be kept informed and allowed to have opinions.
- Employees who work in the field: They will have to provide information about their own competence. Some of them will use the tool to help selecting field teams. They can use the tool to keep track of which courses and trainings they should participate in. Representatives of this group should be included in the project. The project will be presented for the group at a meeting the 24th of October, and then they will have the opportunity to influence it.
- Employees who do not work in the field
- The IT department: They are responsible for data security and data storage. They might also in time become operators or advisors regarding the tool. They should be consulted if the tool will be based on a program that is not typically used at the IMO. When the tool is ready, they should be consulted regarding where to store it.

Stakeholders outside of the Icelandic Meterological Office:

- The members of the project team: The students working on the project. They want the project to succeed but will not use the tool directly (apart from the project member that also is a employee at the IMO).
- The teacher, Bassam Hussain. He has decided the conditions of the projects, the deadlines and deliverables.
- Other students in Applied Project Management: They are working on similar projects on their own.

The stakeholder identified above are here classified along the influence-interest dimensions. The plan is to involve the stakeholders in group 1, satisfy the stakeholders in group 2, inform the stakeholders in group 3 and monitor the stakeholders in group 4.

Table 1: Stakeholder mapping

		Interest	
		Small	**Large**
Influence	**Critical**	*Group 2:* - Director [IMO] - Professor [NTNU]	*Group 1:* - Safety manager [IMO] - Department managers with subordinates who work in the field [IMO] - Team leaders with subordinates who work in the field [IMO] - Project team [NTNU]
	Marginal	*Group 4:* - Department managers without subordinates who work in the field [IMO] - Team leaders without subordinates who work in the field [IMO] - Employees who do not work in the field [IMO] - Other students in the project [NTNU]	*Group 3:* - IT department [IMO] - Employees who work in the field [IMO] - Human resources manager [IMO]

4 Risk assessment and mitigation methods

When planning a project, it is important to identify unwanted events that might threaten the project and the associated consequences. This is to minimize uncertainty, and also to identify methods to avoid the unwanted events or to minimize the consequences of them.

If unexpected events happen during the project implementation, the cost and duration of the project may increase by a large margin. The unwanted events can also be serious and at worst fatal. Risk assessment early in the planning phase can increase the likelihood of project success.

In table 3 below the main risks of the project are identified, assessed and mitigation measures to address them are presented. The probability and consequences are evaluated as either low, medium or high. These two factors combined give the risk index as demonstrated in Table 2 (Hussein 2018).

Table 2: Risk matrix

Probability	High			
	Medium			
	Low			
		Low	Medium	High
		Consequence		

Table 3: Risk analysis table

Type of risk	Unwanted event	Possible cause	Probability	Consequenses	Risk index	Mitigation method
Product risk	Incomplete product	-Unforseen personal issues - Bad planning - Overestimating - Project team abilities - Bad communication	Low	High	Significant	- Be realistic in planning phase - Weekly meetings - Do not make project to big
Product risk	Product does not work properly	- Project team does not have the right competance - Not enough resources - Not enough time	Low	High	Significant	- Discover the problem early - Ask for help if required
Product risk	The right deliverables not handed in at the right time	- Project team does not know the requirements - Bad planning	Low	High	Significant	- Read the requirements - Stick to set deadlines
Stakeholder risk	The relevant stakeholder does not corporate	- Bad communication - Stakeholders not interested	Low	High	Significant	- Perform stakeholder analysis - Early involvement of critical stakeholders

5 Necessary skills and how to acquire them

- Project management skills. We will use the skills we learn in the course Applied Project Management together with the skills we already have gained through several years of education and work.
- Information gathering skills. We already have sufficient skills to gather the information that is needed for this project. The internet will primary be used to gather the necessary information along with communication with the IMO.
- Communication skills. We will primary use physical meetings and internet for communication.
- Cooperation skills. Here we will try to use the theory we are learning in the the course when cooperating with stakeholders. Internal in the group we will use skills gained in previous courses together with this course.
- Programming skills. Due to relative short time deadline for the project, we will used our already gained programming skills. That is, we will not start to learn any new programming language for this project.

6 Project breakdown structure

A project breakdown structure is one of the most important elements in project planning. It is a tool that takes a step-by-step approach to complete large projects with several moving pieces. It gives a structured overview if the tasks of the project. Figure 1 shows the project breakdown structure, indicating major deliverables (the first level), sub deliverables (middle levels) and work packages (the lowermost level).

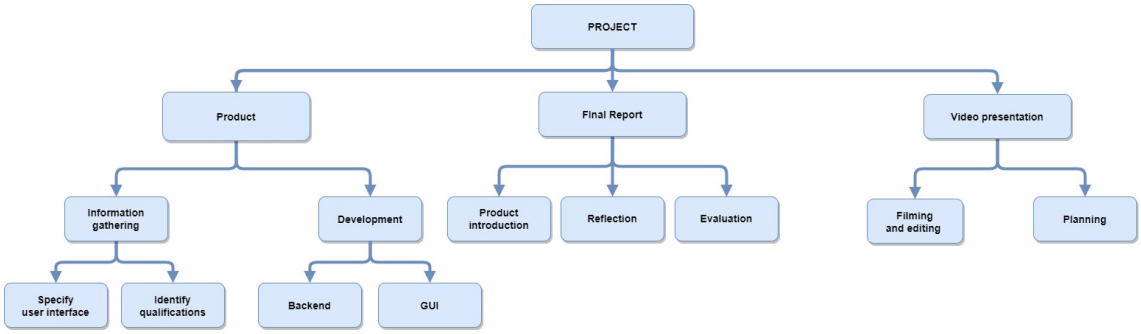

Figure 1: Breakdown structure of the project

1. **Identify qualification**
   This work package involves identifying the different courses, qualifications, regular training and other competence that the IMO wants to have an overview over. This is done in cooperation with the appropriate department managers, team leaders and representatives of the employees who work in the field. This will be done either by talking to them one on one or in brainstorming meetings.

2. **Specify user interface**
   This work package involves identifying how the the IMO wants to use the tool, that is how they want to be able to view the data, filter information, get notification in certain instances etc. This is done in cooperation with the appropriate department managers, team leaders and representatives of the employees who work in the field. Either by talking to them one on one or in brainstorming meetings.

3. **Develop backend program**
   Develop program for accessing and editing database of employees in IMO and their competences. Resource need depends on the needs of the client. Excel is a valuable tool when it comes to data-handling. The database structure would be a table containing all relevant employee information, such as employee name, worker ID, etc. Estimated time: 4 weeks.

4. **Develop GUI**
   Develop the actual graphical user interface (GUI) that have been specified in work package 2. This is the data window the user is working in for using the program. From experience, development will be done iteratively until satisfaction. This require data and programming skills, and a computer with a appropriate IDE.

5. **Product introduction**
   Introduction and description of the product that has been developed. Resources that is needed for this work package is a computer with installed LaTeX.

6. **Report evaluation**
   Evaluate if the product is successful or not in relation to the success criteria. Resources that is needed for this work package is a computer with installed LaTeX.

7. **Report reflection**
   Reflect on the project execution. For the report reflection it is necessary that a task are completed. It is also necessary to involve every group member, for making a reflection that cover every part of the project.

8. **Planning video presentation**
   Planning and organizing the production of a 5 minutes long video summarizing the groups efforts and reflections. To plan this it is necessary that the group meets. Estimated time : 2 hours.

9. **Filming and editing video presentation**
   Develop video presentation of project team holding a presentation of the product, experiences gained during the project, and reflecting on project success. This requires access to recording and presenting software (for example PowerPoint) and hardware (videocamera, microphone, etc.). Estimated time: 1 hour.

7 Project schedule

To easily get a visual overview of the separated tasks we made a Gantt-diagram as shown in figure 2. To the left are all the tasks listed and numbered. Every task got an responsible person that has to follow the tasks progression and cooperate with the other task responsibles. It is important to inform the others about the progression, especially those who depend on the work done in another task. Furthermore, the diagram shows the time period the task is planned to be completed within. If the task got a deadline, the diagram is labeled with the date.

The Gantt-diagram is an easy and quick way to plan the project schedule. It is easy to see the order of the task execution, and when the specific tasks is intended to begin. The diagram also gives the opportunity to easy see how the project sticks to the initial schedule. However it is possible that the diagram has to be revised, due to change in the project.

		Responsibility	Weeknumber							
Activity #	Task		37	38	39	40	41	42	43	44
	Project meetings	Eirik	14.09	21.09	28.09	05.10	12.10	19.10	26.10	02.11
1	Identify qualifications	Heidur								
2	Specify user interface	Heidur								
3	Develop backend program	Herman								
4	Develop graphical user interface (GUI)	Eirik/Rebecca								
5	Report: product description	Christine								DL: 03.11
6	Report: evaluation	Eirik								DL: 03.11
7	Report: reflection	John								DL: 03.11
8	Planning video presentation	Christine								
9	Filming and editing video presentation	Rebecca								DL: 03.11

Figure 2: Project schedule shown in a Gantt-diagram

8 Success criteria

These are the success criteria that indicate project success:

- Project report and video presentation must be delivered on time.
- Project report and video presentation must fulfil the teachers requirements.
- The project team gains increased knowledge of project management
- The tool proves useful for the Icelandic Met Office, that is the implementation leads to the outcomes described in chapter 2.
- An average computer user is able to use the program after 10 minutes of training.

The success factors are the risk mitigation methods listed in chapter 4.

9 Roles and responsibilities in the project

- **Project Manager** - Heidur
  Responsible for the project as a whole, having an overview of the different tasks and stakeholder cooperation.
- **Amusement manager** - Rebecca
  Responsible for creating and keeping a good atmosphere on every meeting. This is lifting the mood by bringing food or arrange social gatherings for example.
- **Meeting manager** - Eirik
  Responsible for organizing meeting rooms according to meeting schedule, and have an overview of who attends meetings.
- **Product Developer** - Herman
  Main programmer and user interface developer. Responsible for assurance that product requirements are functional.
- **Human resources** - Christine
  Responsible for ensuring that people are comfortable in the workplace, and that everyone is satisfied with their work tasks. HR must be available to contribute with planning, and facilitate value creation.
- **Quality manager** - John
  Responsible for that every part of the project consists of a quality that is performed at a high level. Continuous evaluation of every task and sub-tasks. The quality manager must have a critical view on the different work packages.

10 Communication plan

A communication plan describes the purpose, goal and the tools for all communication in a project. The communication plan should be developed in a early phase in the project. The communication plan should be made in corporation with the key stakeholders.

Table 4: Communication plan for the project

Stakeholders	Responsible for communication	Stakeholder classification	Strategy for dealing with stakeholder	Necessary to inform when the project start?	Special meetings necesarry?	Meeting frequency
Safety manager [IMO]	Heiður þórisdóttir	G1	Collaborate	Yes	Yes	When necessary
Department group [IMO]						
Team leaders [IMO]						
Project Team [NTNU]	N/A				N/A	Weekly
Director of [IMO]	G1 from IMO	G2	Satisfy	No	No	No
Proffesor [NTNU]	Whole project team			Yes	Yes	When necessary
IT department [IMO]	G1 from IMO	G3	Inform	No	No	No
Field workers [IMO]						
Human resources manager [IMO]						
Department manager [IMO]	G1 from IMO	G4	Monitor			
Team leaders [IMO]						
Employees [IMO]						
Other students in the project [NTNU]	Whole project team					

B Link to product and video presentation

Link to product:

Click on this link to see Húvi

Link to video presentation:

Click on this link to see the video presentation of Húvi