TALLINN UNIVERSITY OF TECHNOLOGY
School of Information Technologies

Esther Lätte 203992IAAM

Human Resource Management System Implementation Based on the Example of Helmes Group

Master's thesis

Supervisor:	Meelis Lang
	MBA
Supervisor:	Toomas Lepikult
	PhD

Tallinn 2022

TALLINNA TEHNIKAÜLIKOOL
Infotehnoloogia teaduskond

Esther Lätte 203992IAAM

Personalihaldustarkvara juurutamine Helmes Grupi näitel

Magistritöö

Supervisor:	Meelis Lang	
	MBA	
Supervisor:	Toomas Lepikult	
	PhD	

Tallinn 2022

Author's declaration of originality

I hereby certify that I am the sole author of this thesis. All the used materials, references to the literature, and the work of others have been referred to. This thesis has not been presented for examination anywhere else.

Author: Esther Lätte

19.05.2022

Abstract

The primary goal of this thesis is to analyze how implementing a global Human Resource Management system in the organization could improve its internal processes and whether developing the application in-house or implementing a ready-made solution would be more feasible.

Currently, the company lacks a single source of truth in terms of global HR data as the current processes are supported by HR Management systems only dedicated to local markets. At the time of writing this thesis, the company is in the process of opening new two business entities in new locations. In addition to that, the Helmes Group has experienced substantial growth in terms of employee headcount in its existing locations. Both aspects contribute to the necessity of process alignment throughout the group. Furthermore, during the analysis of the current HR processes, it became evident that there are improvement opportunities in the existing processes. This thesis is focused on answering the following research questions:

1) How would the implementation of a global HR Management system improve the current HR processes?

2) Would it be more feasible to build the software in-house or implement a ready-made SaaS solution?

To answer these questions, business analysis that considers the company's strategic objectives, as well as its capabilities, is conducted. The collected business requirements are the input for a more detailed system analysis for the two proposed alternatives. As a result, both options are compared considering their financial implications and other various factors that would support the company in the decision-making. The results of this thesis are based on the example of Helmes Group and the approach could be customized to fit other similar-sized companies looking to improve their HR processes by implementing a new global HR Management System. This thesis is written in English and contains 111 pages, 9 chapters, 24 figures, and 32 tables.

Annotatsioon

Personalihaldustarkvara juurutamine Helmes Grupi näitel

Magistritöö eesmärgiks on teostada ärianalüüs, mis võimaldaks töös käsitletaval ettevõttel juurutada grupiülest personalihaldustarkvara ning pakkuda välja võimalikud lahendused, mida tarkvara juurutamisel kaaluda.

Hetkel on ettevõte olukorras, kus kohalikule turule loodud personalihaldustarkvara ei võimalda saada grupiülest ülevaadet töötajate andmetest. Lisaks on töö kirjutamise hetkel käimas kahe uue üksuse loomine uutel turgudel, kus protsesse toetav tarkvara veel puudub. Ettevõte on viimaste aastate jooksul eelmiste aastatega võrreldes töötajate arvult oluliselt kasvanud ka olemasolevates üksustes. Need asjaolud on loonud vajaduse ühtlustada äriprotsesse ning samuti toetada sisenemist uutele turgudele. Samuti selgus analüüsi käigus, et praeguseid protsesse saaks optimeerida, manuaalsed tööülesanded kaotada ja seeläbi võimaldada töötajatele mõistlikumat ajakasutust. Magistritöö analüüsi käigus soovitakse vastata järgnevatele uurimisküsimustele:

1) Millisel viisil parendaks globaalse personalihaldustarkvara juurutamine olemasolevaid protsesse?

2) Kas ettevõte peaks tarkvara ise arendama või leidma mõne turul pakutava lahenduse?

Selleks, et küsimustele vastata, teostati ettevõtte strateegiast ja võimekustest lähtuv ärianalüüs. Kogutud ärinõuded olid sisendiks uue protsesside kaardistamisel ning teostatud analüüsiks kahele võimalikule alternatiivile. Mõlemat alternatiivi võrreldi, lähtudes nii nende maksumusest kui ka mitmest teisest olulisest aspektist, mis võiksid ettevõtte otsustusprotsessi toetada. Antud magistritöö on koostatud Helmes Grupi näitel, kuid töös kasutatud lähenemine on kohaldatav ka teistele sarnase suurusega ettevõtetele, kes soovivad personaliosakonna protsesse personalihaldustarkvara juurutamise abil parandada. Magistritöö on kirjutatud inglise keeles ning sisaldab 111 lehekülge, üheksa peatükki, 24 joonist ja 32 tabelit.

List of abbreviations and terms

AD	Active Directory. Directory service for data objects.
API	Application Programming Interface. Enables connections between applications.
API Gateway	Service that handles requests between APIs.
AS-IS	State of something currently.
ATS	Applicant Tracking System.
Azure Active Directory	Provides a single sign-on authentication.
BPM	Business Process Management.
BPMN	Business Process Model and Notation language.
FTE	Full-Time Equivalent.
HCM	Human Capital Management.
HR	Human Resources.
HRIS	Human Resource Information System.
HRMS	Human Resource Management System.
HTTPS	Hypertext Transfer Protocol Secure. Used for secure communication over a network.
KPI	Key Performance Indicator.
M&A	Mergers and acquisitions.
MoSCoW	Prioritization technique.
NPS	Net Promoter Score.
Open API	Publicly available application programming interface.
PERT	Program Evaluation and Review Technique.
RACI	Responsible, Accountable, Consulted, Informed.
RAM	Responsibility Assignment Matrix.
REST	Representational State Transfer. Software architectural style.
SaaS	Software as a Service. Software licensing and delivery model
SCE	Software Cost Estimations.
SIEM	Security Information and Event Management.
SME	Small and medium enterprises
SSO	Single Sign-On authentication scheme.
SWOT	Strengths, Weaknesses, Opportunities, and Threats. Strategic planning and management technique.
TO-BE	State of something in the future.
TÖR	Employment registration portal in Estonia.
UI	User Interface.
UML	Unified Modelling Language.
UX	User Experience.

Table of Contents

List of figures

List of tables

Introduction

In recent years, Helmes Group has experienced substantial growth due to the increasing demand for IT services and M&A activities that strengthened its global presence in new locations. With the objective to expand to new emerging markets and meet the growing demands of the customers, the company must ensure that its existing internal processes are refined, and all functions have enough resources to rapidly scale up. Each new location adds additional complexity to the internal processes with the laws and regulations the new market presents. Therefore, the company has decided to investigate the possibilities of internal process alignment between the companies within Helmes Group.

The primary goal of this thesis is to analyze how implementing a global HR Management system throughout the organization could add value to the company by improving its internal processes.

The author will first analyze the current HR processes and the internal systems used to support these processes. Moreover, a market, company, and stakeholder perspective will be described in order to streamline the key issues that each layer is currently facing. Next, a set of business requirements will be described to provide input to the alternatives under consideration. The author proposes two possible alternatives for the company to consider. The first alternative would be to custom develop an in-house solution since the company has strong software development competencies and experience in developing internal systems. The second alternative would be to implement a ready-made SaaS solution from the market. Both alternatives will be compared at the end of the thesis together with the recommendations from the author.

This thesis consists of nine main chapters:

1) The first chapter gives the reader an overview of the problem, and outlines the scope and stages completed in the paper. Lastly, the author will describe their own role in the company.

2) The second chapter describes the techniques used to conduct the business and system analysis and the reasoning behind the selection.

3) The third chapter introduces the company and the capabilities that the results of this thesis could affect.

4) The fourth chapter opens the market, company, and stakeholder perspective and outlines some of the key issues the current AS-IS processes experience.

5) The fifth chapter takes a deeper dive into some of the HR processes and introduces the internal systems and files currently being used to support these processes.

6) The sixth chapter summarizes the results of the brainstorming sessions and the gathered business requirements. Additionally, it proposes the new TO-BE processes and responsibilities of the stakeholders.

7) The seventh chapter is dedicated to the analysis of building the software in-house and gives a high-level estimate of the potential costs for this endeavor.

8) The eighth chapter focuses on analyzing the available products on the market and compares them from angles such as requirement fit, user experience and cost.

9) The ninth chapter summarizes the results and presents the author's suggestions to the company.

1 Description of the problem and the goal

In the current chapter, the author will give an overview of the research problem and the scope of the thesis. In the last paragraph, the author will describe her role in the company and her contribution to this initiative.

1.1 Description of the problem

Due to the recent growth trends and M&A initiatives, Helmes Group has a strategic objective to reevaluate and assess its current internal processes. Furthermore, as the opening of new offices in Poland and Georgia are in progress to adapt to the global situation and to expand the market presence, it is rather time-critical to have a calculated plan on how to get them operating quickly. The company is keen on determining whether aligning some of its internal processes would improve scalability and provide better transparency to support the core business activities.

Support functions can often be first in line when a company decides to cut back on operating costs. Being a necessity for the company, their return on investment is somewhat difficult to estimate unless done with methods like balanced scorecards. Regardless of the financial impact, the support functions and their presence are crucial for any organization to support the core processes and bring value to their customers. Businesses that benefit from the use of technology can refine and automate parts of their existing processes and provide work that is more meaningful for their employees.

Helmes Group has a solid portfolio of tools to conduct their core and support processes and some of the internal and non-client facing systems are only functional and usable in their respective local markets. Until now, this has not been an issue, nor has it caught the attention of the top management since it never caused any impediments or affected the core business. Due to the growth and the company's expansion to new locations, the stakeholders have expressed concern that the current set of internal applications limits the overall visibility of some of the key business metrics.

Each group organization has its own fully functioning HR departments responsible for supporting the core business activities. HR processes are supported by local HR Management systems that store employee data and ensure compliance with the laws and regulations of that country. As the data is stored in various systems that are not integrated, HR Managers need to manually report the employee headcount each end of the month to maintain a historical overview of the growth trends. This has sparked an initiative to combine the data into one globally functional HR Management system to improve visibility and align some of the HR processes. This initiative would also support the expansion plans to new countries, as there would not be a need to implement another local solution that would add complexity to the internal systems mix.

In the light of the growth the company experienced in recent months as well as global events, there have been several indications that the workload will no longer be maintainable for the HR team. Before hiring additional workforce to the team, it is worth investigating whether technology could eliminate some of the workload and free up valuable time. As seen on the figure 1 below, an employee's lifecycle in the company generates a lot of HR data that needs to be processed by the HR department. Capturing this data in a meaningful and efficient way has potential to support key objectives such as employee satisfaction, customer satisfaction and financial efficiency by improving visibility and decision quality.

Onboading → Time-off → Benefits → Role change → Compensation → Offboading
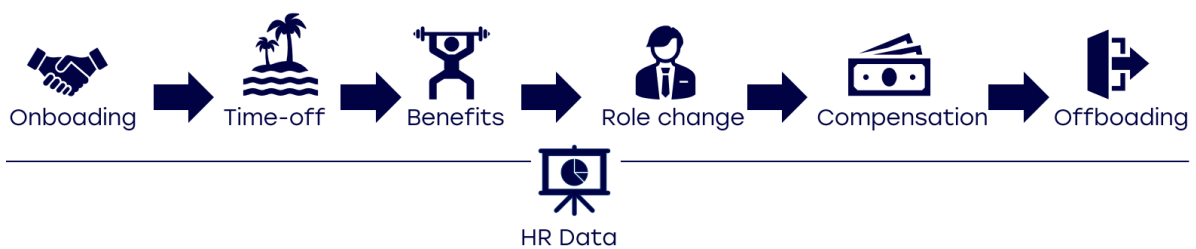
HR Data

Figure 1. HR Data generated, (Source: Author)

The goal of this thesis is to analyze how implementing a new global HR Management system would improve the current HR processes and be integrated to the existing internal systems used throughout the Helmes Group. Above all to identify gaps and propose new solutions that would enable process improvement and support the strategic goals of the organization.

The author will set out to find answers to the following questions:

1. How would the implementation of a global HR Management system improve the current HR processes?

2. What alternative would be more feasible for the company – building the software in-house or implementing a ready-made a SaaS solution?

1.2 The Scope and stages completed

The scope of this thesis will cover the management of CORE HR data within the employee's lifecycle. Processes such as payroll management, recruitment and competence management will out of scope. The thesis will include mapping out the most time-consuming or manual HR processes related to CORE HR data and streamlining potential improvement areas. Moreover, the author will analyze the existing internal systems that support the HR processes and how they integrate to one another. Two alternative solutions to either buy or build the software will be examined considering the financial implications and time efforts.

The scope of the thesis includes:

- An overview of the company value stream and capabilities.

- An overview of the problem from the market, company, and stakeholder perspective.

- AS-IS process mapping using BPMN.

- AS-IS responsibilities within the processes using the RACI Matrix.

- Description of all the internal systems and files used to support the HR processes.

- AS-IS data relations between the internal systems.

- AS-IS component diagram for the internal systems.

- Business requirements for the TO-BE processes.

- TO-BE process mapping using BPMN.

- TO-BE responsibilities within the processes using the RACI Matrix.

The scope for Alternative 1 – Development of a new HR Management system includes:

- Business rules and entity relations.

- Functional requirements and their priority.

- Non-functional requirements.

- TO-BE internal system data relations.

- TO-BE component diagram.

- High-level expert cost estimations.

- SWOT analysis.

The scope for Alternative 2 – Implementation of a SaaS solution includes:

- Introduction to HR Management systems and their functionalities.

- Overview of the products in the market.

- Comparison of the products.

- Financial impact analysis.

- TO-BE internal system data relations.

- TO-BE component diagram.

- SWOT analysis.

1.3 Role of the Author

The author has worked in Helmes Group for the past several years as a Team Lead managing a team of software developers. In writing this thesis, the author took on the role of a business architect and uses the knowledge gathered from the completed university courses as well as academic literature to support the analysis process. The results of this thesis will support the company in their decision-making by giving an overview of how

the implementation of a global HR Management system could support and improve their current HR processes and what the respective financial implications would be.

2 Analysis methods

This chapter will give the reader an overview of the theories and techniques that will be used to conduct the business and system analysis for both proposed alternatives in this thesis. The author will also include some of the research that has been done on "buy or build" decisions and HR Management systems.

2.1 Introduction to HR Management Systems and Analytics

HR Management System or HRMS is a collection of software tools for managing human resources and HR related processes throughout lifecycle of an employee in the company. HR Management Systems enables businesses to have an overview of the workforce and remain compliant with evolving tax and labor laws. [1] HR Software functionalities give HR departments and their employees a more structured and process-focused way of managing administrative tasks that are repetitive. Additionally, it can support automating such administrative tasks and result in time and cost savings. [2]

Employees can use HR Management tools to support them with recruitment, employee onboarding, payroll, HR analytics and many other functionalities. Organizations regardless of their size can benefit from these technologies as they allow HR managers and employees to focus more on activities that will bring better value to the company, such as hiring the best people and boosting employee morale. [2]

To effectively use the competencies and skills of the employees has been a goal for any HR Manager and company. Using the help of IT by measuring the attributes and performance of HR data, can result in transforming raw data into insightful and quantifiable results. HR analytics is an evidence-based strategy that can include elements of business intelligence, tools, and methods from measuring specific metrics or even using predictive models. HR analytics can be used to make various workforce-planning decisions by using a more strategic approach. The purpose could be to pinpoint some of the troubled metrics and support the decision-making or to just give a better overview of the data. [3]

When HR analytics evolves and begins to collaborate with other departments such as finance and operations, it can eventually become a part of cross-functional and end-to-

end analytics and view at the human capital elements across the entire value chain of the company. Analytics typically only generate new insights when many perspectives are considered and can tell a more matured story of the collected data. [4]

Employees are more likely to discuss the views of others and share ideas for collaboration when they believe HR systems are strategically anchored around cooperation in their units. As a result, this can encourage more information sharing and lead to better collaboration between various departments. [5]

The components of HR Management systems can vary depending on the need of the organization and will be discussed in a future chapters where Helmes Group requirements are taken into consideration.

2.2 Build or buy software

Many organizations often reach a point where their internally used systems are no longer capable of supporting their business or are lacking the required functionalities to deliver value to their customers. This can be rooted in various reasons, but one common term here is change. To embrace the change and remain competitive at the same time, companies face the question to either buy or build new software to support their business needs. In recent years, the availability of ready-made business software has transformed the implementation of applications from software development and design to integrations. [6] This enables to combine various ready-made solutions together and additionally integrate them with the custom-made software. Hence, there are various options either to buy a solution and customize the solution to fit the processes, buy the solution and customize the processes around that solution or develop an in-house solution. [7]

Based on the findings, there are several common factors that organizations should consider in the decision-making process [8].

1. **The strategic and competitive advantage** factor suggests that the strategic applications supporting the core business require more flexibility and building them can be considered. Less strategic applications supporting the core business can be purchased [8].

22

2. **The cost** factor indicates that not only the development or implementation costs should be considered when making the decision. Maintenance, support, and aftercare must be accounted for to have a better understanding of total costs [8].

3. **Scale and complexity** factor considers that complex systems that require special technology could benefit the organization with the domain knowledge but could require more resources to maintain compared to an in-house solution [8].

4. **Requirements fit** factor considers the uniqueness of the requirements. The more unique the requirements, the less ready-made solutions would be available on the market. On the other hand, mature and standard processes such as payroll should be supported by a ready-made solution [8].

5. **Time** factor states that in-house solutions are viewed to require much more time and effort to implement compared to ready-made solutions. Yet systems with longer life-cycle expectancy to deliver value should be considered building instead [8].

6. **In-house information systems expertise** factor suggests that the presence of in-house IT competencies could result in a more cost-efficient and suitable solution to be developed in-house. Additionally, it could have an advantage of selecting the best suitable ready-made solution based on the existing knowledge base [8].

7. **Risk** factors can be related to exceeding the budget, maintenance, and completion time for building an in-house solution. The ready-made solution introduces vendor-related risks such as implementation time, support, and vendor viability [8].

8. **Support structure** factor relates to how the ready-made solution would be compatible with the already existing systems in case of implementation and how much data cleansing, migrations, and integrations it would require [8].

9. **Operational** factors are related to the organizational culture and any history of acquiring software in the past. Additionally, the support of management to either of the options can play a role on the outcome of such decisions [8].

10. **Intellectual property** factors and organizations that require maintaining it. Building an in-house solution can be used to guard the intellectual property [8].

These factors will be considered in the results of this thesis when conducting the SWOT analysis for both possible alternatives and proposing the authors suggestions.

2.3 Gathering requirements

Requirements are a group of statements that communicate certain needs and the constraints related to those needs [9]. Thoroughly designed and precisely documented software requirements are crucial to any project. Requirements can mainly be divided into two types: functional and non-functional. [10] Functional requirements describe how the envisioned system should behave. These behaviors can be expressed by services, tasks, or functionalities on and how they should perform in the system. Non-functional requirements describe the qualities and properties of the system. These requirements can be related to performance, maintenance, usability, security etc. Basically, how well any of the non-functional aspects of a system behaves. [11]

The process of colleting requirements enables to determine, manage and document the needs of stakeholders and what must be done to finalize their objectives. Gathering requirements should result in the definition of a project or product scope and can be performed at various stages of the project progress [12]. Some of the more traditional ways to gather requirements are:

- Interviewing people individually about the current situation and the issues and pain points they are currently facing with the system [13].

- Interviewing people in groups to identify any synergies and contrast in the requirements [13].

- Observing the people at various times to understand the data flows and what data is needed for them to do their work and potentially what is missing [13].

- Studying of existing documents to find some information regarding rules, policies, previously reported problems, and activities done previously [13].

In order to fully understand the business processes, it is essential to consider how the business interacts with the business environment. This would require understanding the market where the organization operates and how various external factors could affect it. Additionally, on how the organization meets the needs of its customers and what are the key factors of successfully bringing value to them. The changing processes must change together with the changing business environment. Another supporting analytical techniques for requirement discovery is the data flow analysis where the data flows between systems as well as business rules are considered to better understand the organization and its processes. [14]

In the next sub-chapters, the author will describe the methods and techniques on how business requirements were captured, and processes described.

2.3.1 Brainstorming sessions

Brainstorming is generally conducted together with the stakeholders and used to generate as many ideas as possible. These sessions focus on finding solutions and describing the problem in a clear way. [15] The brainstorming sessions can consider various parts of the system from different perspectives. The aim is to come up with visionary ideas and think outside of the box. Some useful tools supporting brainstorming sessions are whiteboards, post-its, and collaboration tools for mind mapping. [16]

To gather business and functional requirements, the author organized several brainstorming sessions together with the stakeholders to better understand the current processes and the internal systems that are being used to support these processes.

2.3.2 Interviews

Interviewing is an important method of gathering information to prepare requirements and conduct process mapping. If actors related to these processes can share their experiences and opinions on how the process currently works, it can give great input for further analysis. [14] Interviews support gathering the background information regarding the needs of the business and the problems stakeholders are facing [16]. The interviewees should include the owners of the process as well as internal and external stakeholders related to that process. Interviews can vary from having one-on-one sessions or asking questions via calls or e-mails. [14] Interviews are also great as they can be followed up later to gather more clarifications on the subject [16].

25

To map out the AS-IS and TO-BE processes, the author conducted several on demand interviews together with some of the key stakeholders in the HR department.

2.3.3 Goals, Capability and Value Stream view

ArchiMate modelling language is a comprehensive notation that provides a wide range of elements and relationships to model and visualize architecture across various business domains [17]. ArchiMate standard is based on the concepts of the IEEE 1471 standard and supported by various tools and consultation companies [18].

The goals view diagram can help describe why a certain demand is required and changes are needed. It enables to model the key drivers and root causes behind new demands, goals, outcomes, and requirements for future development. The view mainly answers the whom, why and what questions and can be applied to illustrate the strategy of an organization or to define business cases of a single target. [17]

A capability model helps to identify the strategic core capabilities that create the fundamentals of an organization and enable value creation and competitive advantage. Additionally, the Capability Model can capture the basic capabilities that realize the daily operations of the organization. A capability describes what the organization does and enables to divide it to lower-level capabilities that can then be evaluated. [17]

A value stream diagram defines on how value is created to the customers. Value Stream modelling helps to define how business capabilities are related to the value stream. This helps to define the roles for each capability of the organization and potentially what capabilities supporting the value stream are either useful or unproductive. [17]

The value stream, capability and goals diagrams are used when describing the organization and to give a better overview of the Helmes Group strategy and goals. Mapping out the capabilities showcase what parts could be improved as a result of this thesis.

2.3.4 BPM and BPMN

Business Process Management (BPM) approaches business processes as assets and presumes that organizational objectives can be reached by defining, engineering, controlling, and improving business processes. Mature BPM capabilities are managed in

a closed-loop cycle where business processes are continuously improved by planning, designing, implementing, executing, measuring, and controlling. [14]

Figure 2. Plan-Do-Check-Act Cycle [14].

Business Process Modelling is creating a representation of an existing or a proposed business process. Modelling can visually display the organizations core, supporting and management processes by using various techniques. The initial step to defining or updating an existing process is to ensure that there is mutual understanding of the current process and how it realizes its current goals. The mutual understanding is achieved by process analysis. [14]

Processes can be defined as a series of activities that are performed in an organization. Process models illustrate the behavior of a process and have a clear start and ending. Processes consist of tasks that flow between the start and end point of the process. [19] Business processes can be divided to:

- **Management processes** that are related to setting strategic goals for the organization [19].

- **Core processes** that are related to the mission of the organization and generate income [19].

- **Support processes** that are related to operational and supporting processes such as HR Management [19].

Business Modelling Notation (BPMN) is a standard that was developed by the Business Process Management Initiative. The main goal was to develop a commonly

understandable notation to all business users. BPMN can be used by analysts to map the processes, developers that can use the flows as an input for software development and stakeholders that will manage and monitor these processes. [20] Business Process Modelling Notation is much more complex compared to the data flow diagrams and includes various symbols with several variations. The basic concepts of BPMN are events, activities, gateways, and flows. [13] BPMN uses elements like flow objects, connecting objects, swim lanes and artifacts in the notation [20].

In this thesis BPMN is used to map out the AS-IS and TO-BE HR processes.

2.3.5 RACI Matrix

Organizations can manage assigning tasks and responsibilities by using the Responsibility Assignment Matrix (RAM), or also called as the RACI Matrix. This matrix supports planning as well as organizing and collaboration between the stakeholders involved. By assigning responsibilities to each of the participants it also enables to provide them an action plan to follow and a more global view of the processes and the manage expectations. [21] There are various interpretations of the RACI matrix, but the most common divides the responsibilities as follows [22]:

- **R**esponsible – For the person who is responsible for getting the work done. Usually assigned to one person [22].

- **A**ccountable – For the person who will be held accountable for the completion of the work. There is only one stakeholder for this assignment [22].

- **C**onsulted – For the group of stakeholders being asked to contribute to the work by providing more information [22].

- **I**nformed – For the group of stakeholders that need to be kept in the loop. There is no contribution required on their part [22].

For the first step towards finalizing the RACI Matrix, it is essential that all involved stakeholders have been included in the matrix. After that, based on the analysis, these responsibilities can be distributed and the level of the expected responsibility for each stakeholder defined. [23] Once the completed RACI is shared with the stakeholders, it can also add value by detecting any tasks or stakeholders that were not considered initially

and enabling to adjust activities at an earlier stage. Additionally, the RACI Matrix can be used as a checklist or reference when allocating resources such as time and cost estimations and to make sure that everything is accounted for. [22] RACI Matrix can also help to save time as the stakeholders can have the right conversation with the right person [24].

The RACI Matrix will be used in this thesis to present the AS-IS and TO-BE responsibilities for the selected processes.

2.3.6 Object-Oriented approach

The object-oriented approach focuses on capturing the structure and behavior of an application by dividing it into smaller modules and combining it with data and processes [25]. Object-oriented approach analysis design in data modelling is conducted by using entity relationship and class diagrams. These data model notations help to explain the characteristics and data structure. A data model defines permanent business rules that describe an organization. Business rules help to describe the characteristics of classes and the relationships between these classes. Data modelling enables to show some of the major categories of data that are also called as classes under the UML notation. Relationships are responsible for holding the data model together and define how each class is associated. These relationships play a crucial part on determining the rules in that organization and support the requirements determination. [13]

The author will use the object-oriented approach to describe classes and their relationships to define business rules for the planned system.

2.3.7 User Stories

User stories are artifacts that are often used in Agile to describe requirements in a more simplified manner. One advantage is that when user stories are in small sets or individually, they are easy to understand for the reader. User stories follow a format and express the functionality of the TO-BE system. [26] A user story expresses the smallest unit of work in Agile to describe an end goal. The purpose of a user story is to define how this piece of work would deliver value to the customer. [27] Typically, user stories follow a simple template where the user type is declared, and after that the goals and reasoning behind the requirement described [28].

The author will use user stories to describe the functional requirements for the planned system.

2.3.8 MoSCoW method

MoSCoW prioritization technique or the MoSCoW method is a well-known and widely used technique to manage requirements and their priority [29]. The term comes from each of the capitalized letters representing a prioritization category. These requirements hare categorized as follows [30]:

- **Must** have – Critical requirements that must be included. All these requirements must be included in a release. The other option would be to getting a mutual agreement between the stakeholders to downgrade the must have requirements [30].

- **Should** have – Requirements that are not so crucial. They share the similar importance to must have requirements but are not as time sensitive [30].

- **Could** have – Requirements that are important but not crucial to the release. Usually these are low-cost and low-effort requirements [30].

- **Will not** have – Requirements that are the least critical and might not even be related to the end goal or the strategy of the product. These requirements should not be considered in future release [30].

This method provides a simple solution to conduct prioritization to requirements and is best suited for internal projects. As this method lacks grading, it is not the best suited for customer-facing projects as it can result in confusion when several stakeholders are giving their priorities. [30]

The author will use the MoSCoW method to give priority to the functional requirements and product functionalities.

2.4 Software estimations

To this day organizations remain to face the challenges of accurately estimating software project efforts. Hence, the topic continues to be actively researched by academics and practitioners. There is a wide range of techniques that have been developed to estimate

the efforts based on the known and the unknown. These techniques can be categorized into parametric models, where statistical or numerical data analysis is conducted to predict the effort and nonparametric models that are based on using artificial intelligence techniques. [31]

Additionally, the knowledge and previous experiences of experts can be subjectively used for giving estimates and relying on their intuition. Some experts may have their own personalized structure and use checklists to make estimates that are more knowledgeable while others base their opinions solely on previous experiences. The latter can result in negative consequences when experts miss or are unaware of some of the critical functional and non-functional requirements. In an ideal world, such estimates should be avoided and given based on detailed analysis. However, due to the lack of time and resources or circumstance, estimates based on intuition are the only general guide to decide the next step. [32]

The main difficulty related to estimating the features of an agile project is that agile is so uncertain. It is possible that there will not be sufficient data to estimate much ahead of time. Customer requirements can be affected by changes in technology, budgets, and other factors, resulting in changing the requirements and at the same time making estimations in Agile software development difficult. The Cone of Uncertainty represents such ambiguity and considers various obstacles in the way of making accurate estimations. [33]
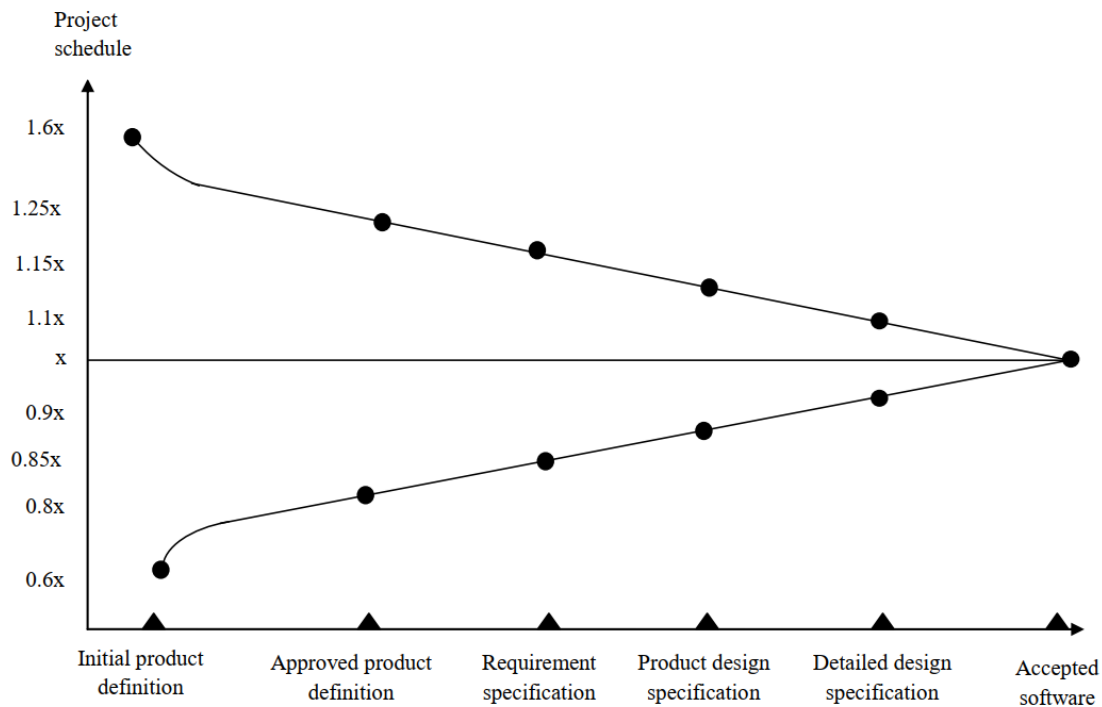
Figure 3. Cone of Uncertainty [33].

The Cone of Uncertainty illustrates the accuracy of software estimations and sizing by stages. The uncertainty is particularly high in the beginning as some information is yet to be discovered or there is a lack of a particular experience. Unless the requirements and estimations are not re-evaluated during the progress of the project, the cone of uncertainty will not achieve convergence. [34] The cone of uncertainty implies that, as the project progresses, the uncertainty reduces simultaneously [35].

As seen from the figure, at an early stage of the project, the estimates can vary tremendously during the initial product definition to both sides, over-and underestimation. During the product definition phase, the uncertainty could be multiplied by 1.6 for underestimations and by 0.6 for overestimations in terms of the project schedule. At the end of the project the efforts and costs are better known if sufficient the data was collected during the process [36]. One of the main advantages of achieving the convergence between actual and estimated efforts are related to improving the planning and management of project resources and goals. Also allowing the product quality to be monitored in more detail and to enable better collaboration and information exchange between stakeholders. [34]

32

The Software Cost Estimations (SCE) give information to support the decision making for stakeholders. Estimates that are either too high or too low will have a biased effect and result in the approval or a rejection of a project based on incomplete information. Projects with sufficient data do exist but can still fail due to problems related to leadership and the perception of technical issues in software development. [37] Having detailed design specifics and clear requirements can reduce the gap between over and underestimations of costs and effort [34].

These theories will be considered when conducting the estimations for the first alternative of building the HR Management system in-house.

2.4.1 Cost Estimations and PERT

An ability to accurately estimate the time and cost of the project has been a struggle for managers and software engineers. The usage of repeatable and defined software development processes has shown to be one of the most efficacious methods to gain insightful data that can be applied to statistical estimations [38]. The Program Evaluation and Review Technique also known as PERT is used by Project Managers to predict the estimated time for tasks to be completed when there are several unknown aspects [39]. This technique is used to estimate the project duration using the weighted average between the most optimistic, most likely, and most pessimistic estimations given [40]. If risks and uncertainty are involved, the accuracy of an estimate may be improved by applying the PERT estimation technique. Three-point estimates enable to outline an approximate range of the duration of a task. [12]

- **Most Likely (tM)** – An estimate that would consider resources likely to be assigned to the task considering their productivity and relations to other participants. It is the most realistic estimation that includes potential disruptions and previous experiences [12].

- **Optimistic** (**tO**) – An estimate that considers the best possible outcome and scenario at that given time [12].

- **Pessimistic (tP)** – An estimate that considers the worst possible outcome and scenario at that given time [12].

Based on these three values the PERT **(tE)** estimate can be calculated by a formula [41]:

$$tE = (tO + (tM \times 4) + tP) / 6$$

The author will use the PERT technique in the estimations section of this thesis to apply a more accurate estimate for Alternative 1 and combine it together with the Cone of Uncertainty to propose an estimate range for the cost of the development.

2.5 The Final Framework

These previously described methodologies and techniques are used in the in the various steps and stages of the thesis to get to the result and answer the research questions. The figure below illustrates these stages and steps. It also defines the final framework of analysis methods for describing the AS-IS situation, alternative 1 and alternative 2.
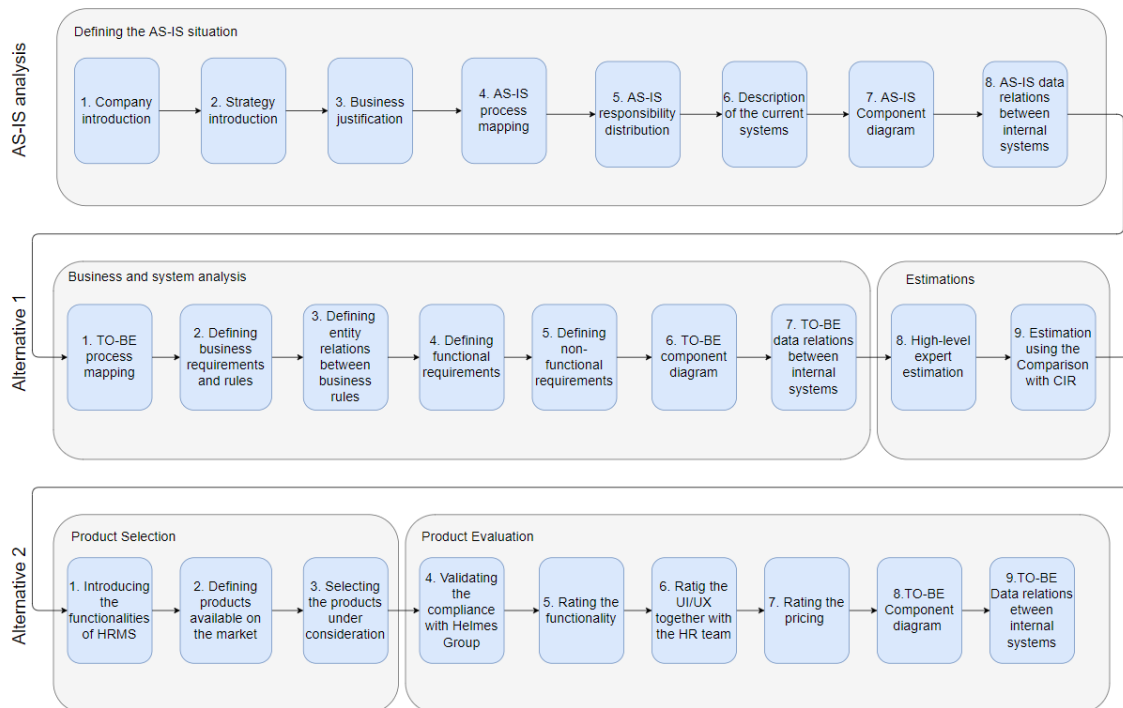
Figure 4. The final framework, (Source: Author)

3 Company Overview

This chapter is dedicated to introducing Helmes Group. This chapter also includes the value stream and capability mapping of the organization to better the capabilities that will be analyzed in this thesis and how they relate to the company strategy.

3.1 Company Introduction

Helmes AS was founded in 1991 and initially focused on IT consulting and selling hardware. Now, the company mainly specializes in custom software development and consulting.

Helmes Group consults organizations to help them with digital transformation strategy, service design and software development lifecycle. The in-house developed projects can range from web and mobile applications to large and complex enterprise solutions. Helmes Group employs all technologies and platforms without restrictions to match the requirements of the clients and competences of the experts. Some examples of the technology partners of Helmes Group are Microsoft SAP, Progress, Aurea and Oracle. Examples of the development technologies are Java, .NET, PHP and Python. In addition, cloud platforms such as Amazon AWS, Google Cloud and Microsoft Azure. To summarize, the company offers services from consulting to building, running and maintenance to its customers. [42]

In 2022, Helmes is operating in 23 different markets and has over 1000+ software experts. The annual revenue for the company in 2021 was 47 million EUR. The company has experiences in various major industries such as telecom, banking, insurance, logistics, government, healthcare, manufacturing, and energy. Throughout the years, Helmes has provided service to more than 500 companies, organizations, and government agencies. This success has been built on long lasting partnerships and the software experts who work in Helmes. [42]

The Level 1 Process Architecture [43] will give an overview of the management, core and support processes within the company. The process architecture is important to display as the support and management processes are correlated with the success of the core processes.
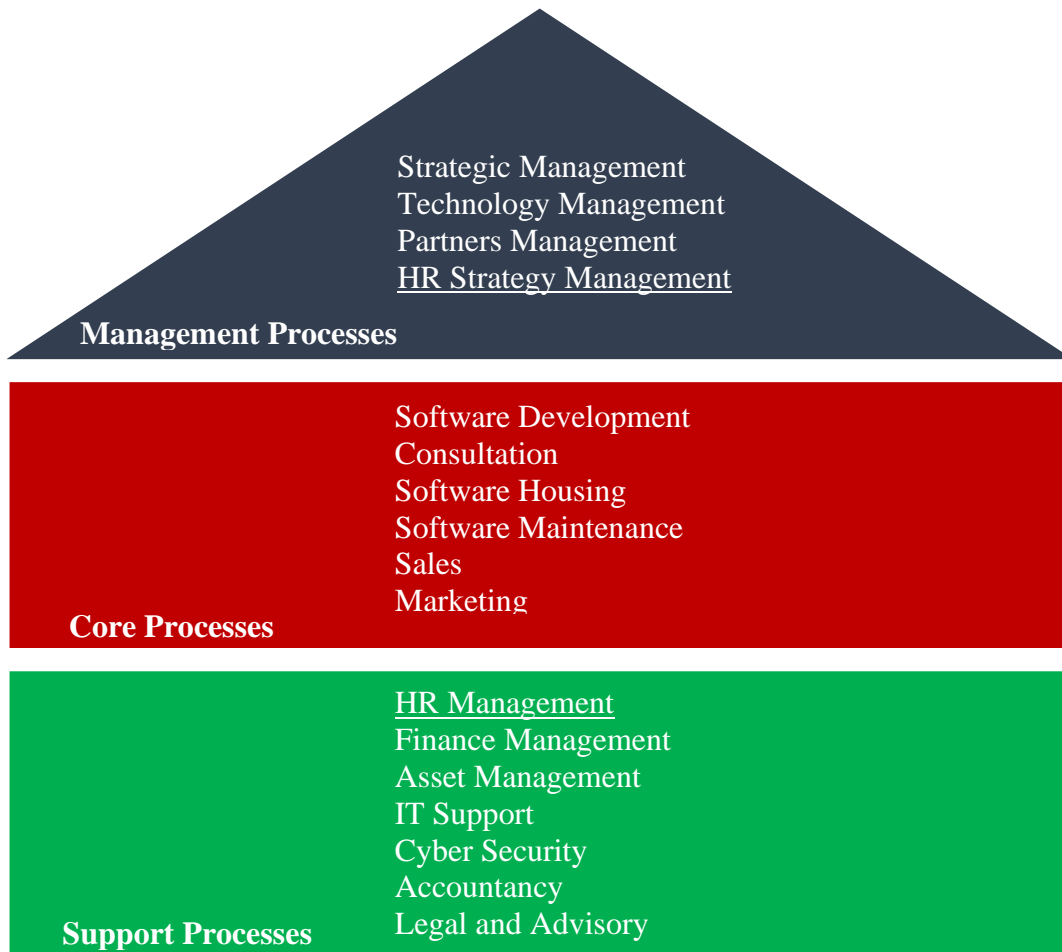
Figure 5. Level 1 Process Architecture [43].

At the time of writing this thesis, the Helmes Group has approximately 1050 employees.

3.1.1 Organization structure

The organization has four main functions, each having their own responsibilities:

- **Top management** – Responsible for the strategic decisions and the company mission and vision. They are defining the general business objectives, strategy and KPIs.

- **Business support** – Responsible for functional business objectives, strategy, planning and risk management. They are the functional business support for service delivery.

36

- **Business development** – Responsible for new sales and business development in the business area. They are creating new teams for their business area and managing the team leads within their area.

- **Service delivery** – Responsible for service delivery to the client. Building and growing new teams, managing team members and subcontractors.

The following figure shows the organization structure and how the functions are related.
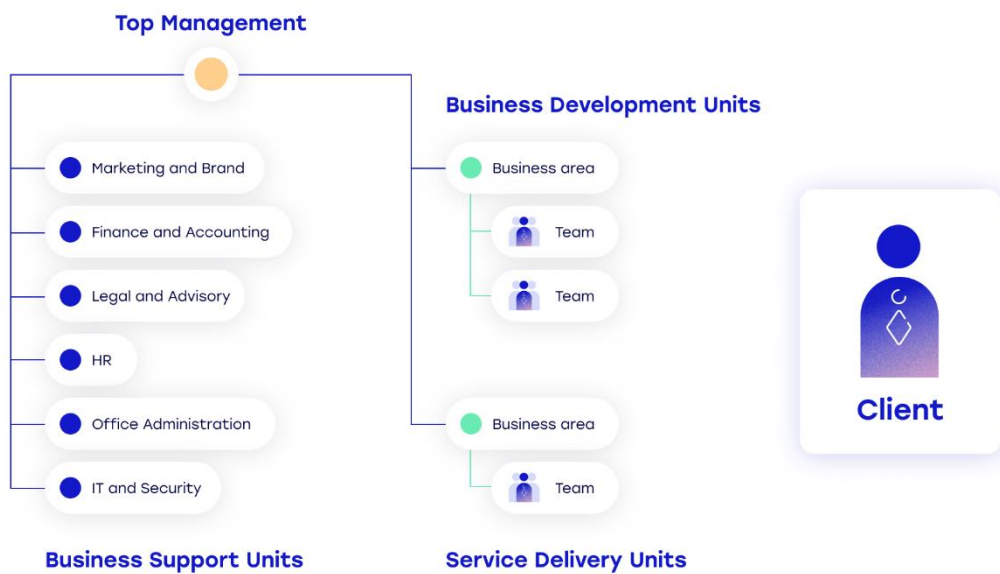
Figure 6. Organization structure [44].

3.1.2 Helmes Group Strategy

This chapter gives an overview of the company's vision, mission, core values and main KPIs. The company's vision is to be a digital innovation partner to its customers. The company's mission is to be the best partner for growth. [42]

Company's Vision

Helmes is a digital innovation partner. We build business operating systems for organizations that change the world [42].

Company's Mission

Helmes strives to be the best growth environment for its people. We build a supportive ecosystem for employees to develop both professionally and personally [42].

The company's core values are:

- **Courage** – To be honest, entrepreneurial, and innovative [42].

- **Caring** – The drive to take care of other people and their goals [42].

- **Efficiency –** The ability to deliver efficiently within the boundaries of business needs [42].

Helmes Group measures KPIs and Strategic objectives for every business unit separately in three aspects [44]:

1. **Employee satisfaction and wellbeing –** individual level, team level and company level [44].

2. **Customer satisfaction and NPS –** team-client level and company level [44].

3. **Financial efficiency –** team level and business area level [44].

Based on these strategic objectives the figure below illustrates the general goal view of the company and how the implementation of a global HR Management system can positively affect the results of the measured KPIs. The outcomes and requirements in green are the aspects that could be improved and positively affected by the introduction of a new global HR Management system.
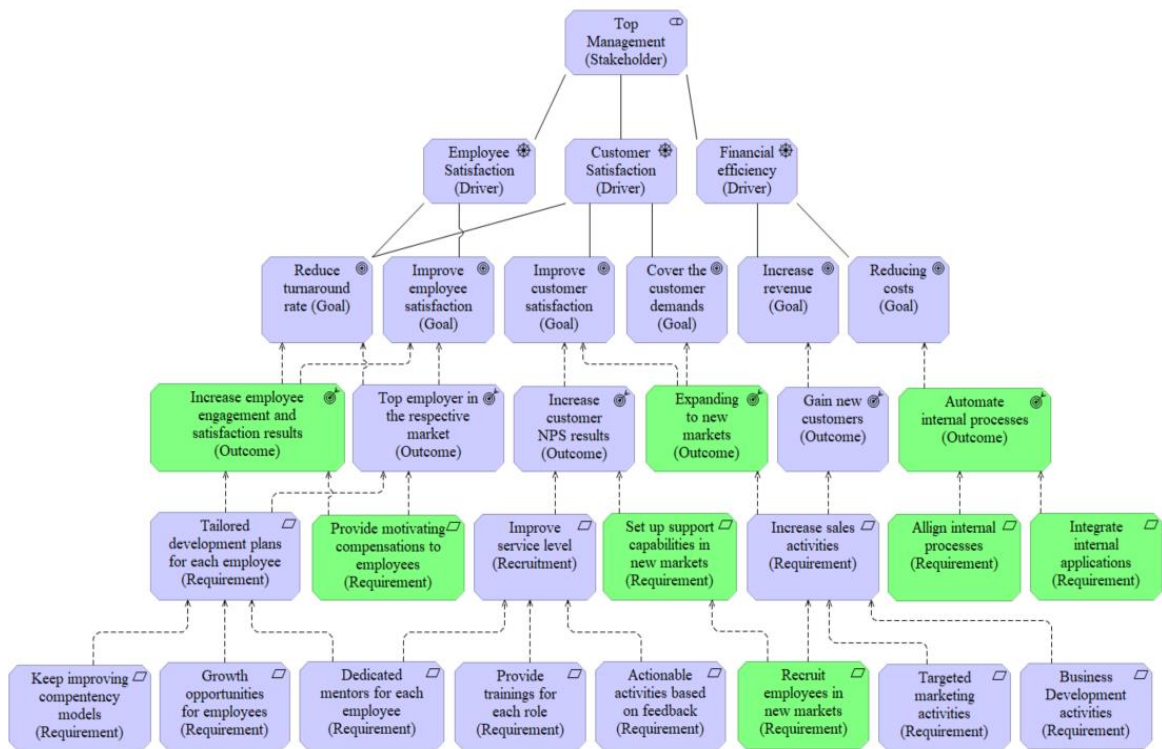
Figure 7. Goal View, (Source: Author)

3.1.3 Value Stream and Capabilities

Helmes Group creates value to its customers mainly by software development and consultation services. The company has operated in the past 30 years with the focus of providing consulting and software development services to its customers. Due to the company's long experience, the main core capabilities have evolved and the processes enabling these capabilities to have been fine-tuned to meet the expectations of customers and shareholders. The companies value stream is shown in the following figure:
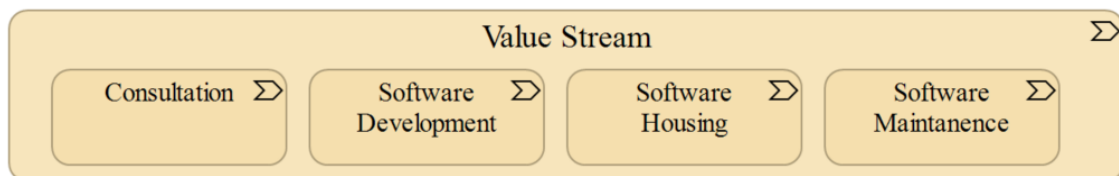
Figure 8. Value Stream, (Source: Author)

Depending on the business unit, the customer and the stage of the project, a various combination of such value streams could be created for them. The next figure will give an overview of the core capabilities related to the company value stream.
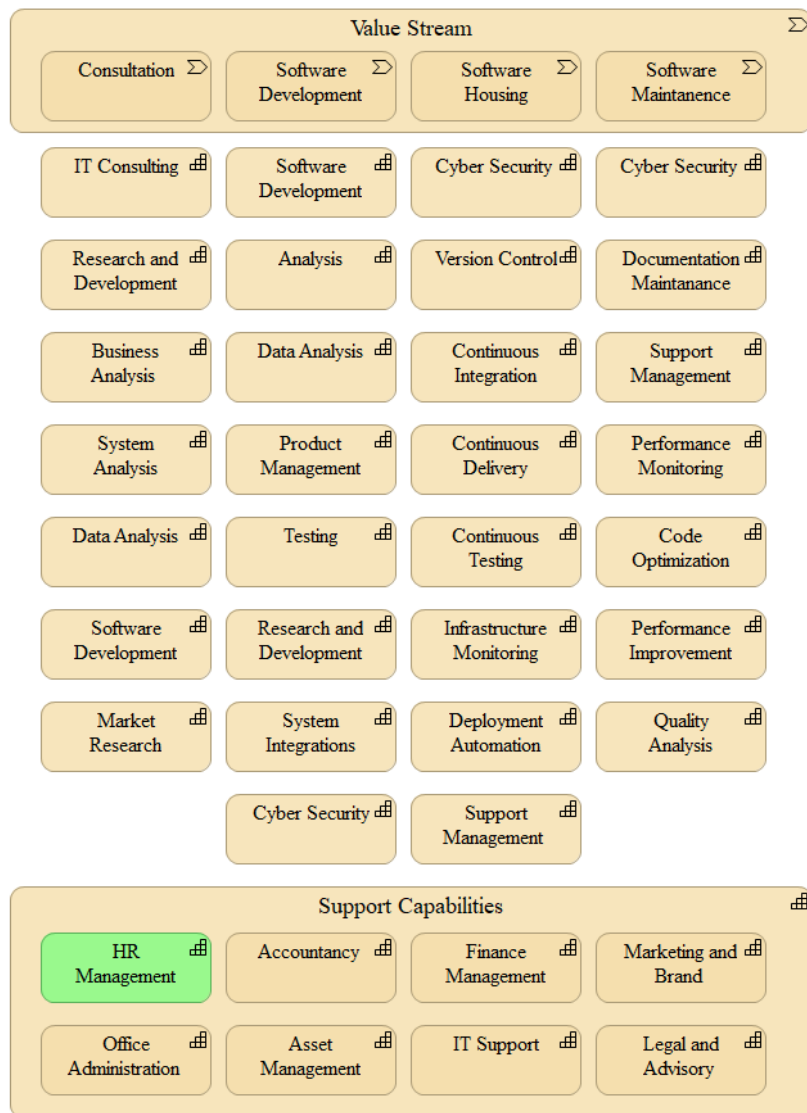
Figure 9. Company capabilities, (Source: Author)

The company's core capabilities are realized by the employees of the company. This thesis will focus on analyzing HR Management capabilities within Helmes Group and investigate on how the proposed changes in the HR processes could also have a positive impact on the core capabilities. HR Management and especially their success supports the company in a competitive market situation by bringing in new experts that participate in the main value stream. In the next figure 10, the author has broken down the various support capabilities within the HR department. The highlighted green capabilities will be improved by the implementation of a global HR Management System.
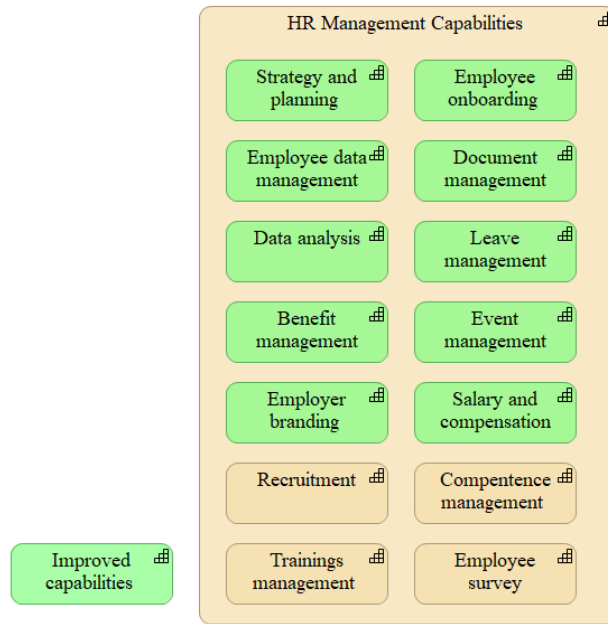
Figure 10. HR Support capabilities, (Source: Author)

4 The Business Justification

In this chapter the business justification from the market, company and stakeholder perspective will be described.

4.1 Market perspective

According to the OSKA research, the Estonian market had approximately 31 000 employees in the IT and telecommunication sector in Q3 2021. It is predicted that by 2027 this demand will increase 1.5 times to maintain the required level of workforce for the companies operating in Estonia. At the same time, annually the schools, vocational colleges and higher education institutions produce around 1050 graduates for the segment. [45] Thus, it is evident that throughout the years the competition for highly skilled IT specialists will grow.

Companies that employ such talents are in a competitive situation and need to provide their employees' industry standard work environments. In addition to a high salary, the employees expect a lot more from their employer and want to have challenging and attractive career opportunities while working together with the smartest people. Companies invest a lot into various types of employee benefits and provide attractive time-off policies to ensure employee engagement and satisfaction.

While the great workplace and company benefits are being aggressively promoted and marketed in various platforms, the reputation of the company can also be affected by factors that are not under its control. Employees who help to develop highly complicated solutions and products also expect that their employer has set a high standard for their own internal processes and use high tech solutions to support these processes.

The turnover for the IT and telecommunications workforce in 2020 on average was 18% in Estonia based on the Fontes compensation survey [46]. Hence, a lot of existing Estonian ICT workforce can and will compare their employers and their experiences there. Employee benefits, compensation models, stock options and even things like employee onboarding have a direct impact on the employer branding.

Strong employer branding and company reputation results in more applicants to open positions, reduces time to hire, improves retention rate and attracts top talents [47].

Meaning that investing in the improvement of internal processes can result in better employer branding and better employee experience.

4.2 Company perspective

Helmes AS has until recently maintained a relatively steady growth throughout the years in terms of employee headcount. So far, there has been one HR Specialist responsible for dealing with processes such as employee onboarding, and contract management. In recent years due to the high demand from the customers, the company has experienced more growth compared to the previous years and due to this, it has generated a lot of work for the HR Specialist. Just within the first months of 2022 Helmes AS has reached the previous annual growth number of onboarding new people to the company. Considering the 25 available positions and the growing demand for software engineers, the workload for the HR Specialist will continue to increase. Considering these aspects, the workload will no longer be maintainable only by one person. The company is currently at a decision point whether to employ additional people to the HR department that can support the HR processes or see if there are possible ways to automate the processes. The figure below gives an overview of the growth trends of Helmes AS.
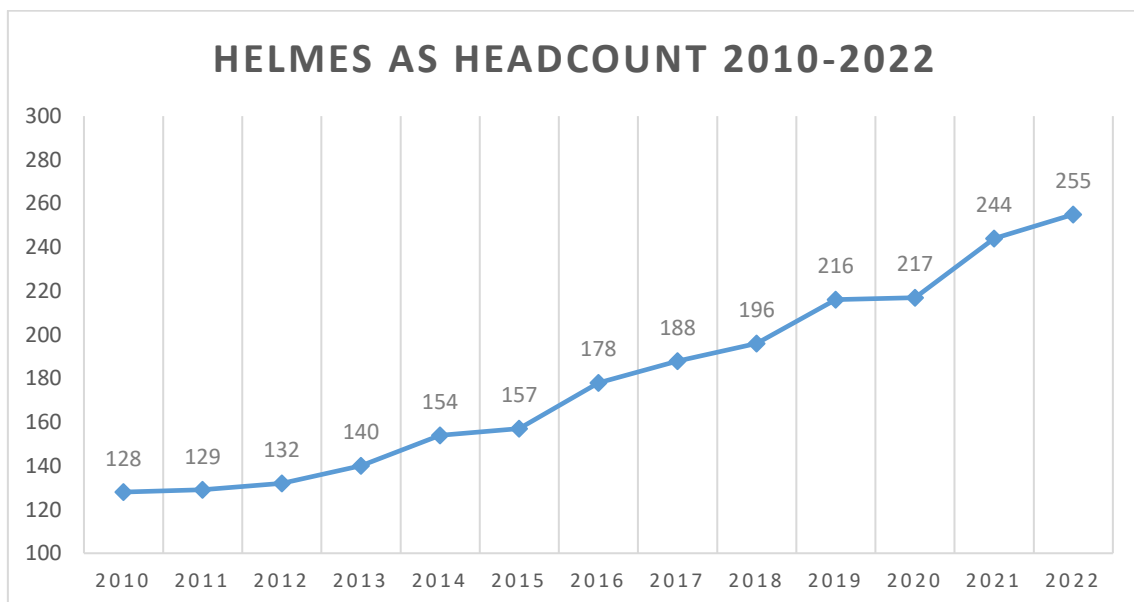
Figure 11. Helmes AS Headcount 2010-2022, (Source: Author)

In a competitive market, finding IT specialists is a difficult task and most of the time, effort and resources in the HR department are mainly dedicated to recruitment related

activities. In recent years, the HR department has added several new members to the team to focus on recruitment and support the growing demands. This has proven that not only is it hard to recruit IT talent, but it is also a challenge to hire technical recruiters and HR specialists that are knowledgeable in the domain and have the right qualifications to take on these responsibilities. The time of the HR department is valuable and directly related to the success of the company to meet the demand from customers. Eliminating monotonous tasks and automating parts of the process allows to use their time more efficiently and keep their engagement and motivation high.

From the group perspective, the company has also experienced growth in its existing locations as well as due to the M&A initiatives. Several new locations have been added to the group while new locations in Poland and Georgia are planned to be included in the upcoming months. This is due to the global events of 2022 and employees relocating to new offices.

Each location operates independently and has their own processes that are compliant with the laws and regulations in each country. Helmes offices are using their own HR Management systems that are available in that country only, except for SolbegInc that recently implemented a global SaaS solution to manage their HR Processes. Currently the HR data is being collected in various systems and requires manual reporting of the employee headcount and turnover on a group level. The following table will give an overview of the systems currently used to support the HR processes.

Table 1. Applications used to support the HR processes

	HelmesEst	HelmesBel	HelmesLat	Solbeg Inc
ATS	Workable	Workable	Workable	BambooHR
CORE HR	Persona	Excel	PAVS	BambooHR
Payroll	Persona	*Outsourced*	PAVS	*Outsourced*
Leave Management	Persona	Excel	PAVS	BambooHR
Benefits Management	MSForms	MSForms	MSForms	BambooHR
Onboarding	Excel, Teams	Excel, Teams	Excel, Teams	BambooHR
Analytics and Reporting	Confluence	Confluence	Confluence	BambooHR

In recent years, there have been discussions to initiate process alignment throughout the support functions of the company. This would enable scalability that supports the strategic plans to expand to new locations and provide better visibility to the top management.

4.3 Stakeholder perspective

Stakeholders are individuals or organizations that have an interest in the system and the characteristics of the system to meet their expectations. When it comes to requirements and participants of the processes, stakeholders can be related to various departments and vary across the projects. [9] The following subchapters will describe the stakeholders who mainly participate in the HR processes. The stakeholder description also includes the key issues each stakeholder is currently facing due to the lack of a better solution. These issues were collected during interviews and brainstorming sessions.

4.3.1 Employees

Employees start engaging with the HR Processes once the onboarding starts and they sign a contract with the company on the agreed terms. The employee role applies to all other roles that will be described next as the team leads, business area leads, and HR team members are also employees of the company. Each employee has a contract that determines the conditions and responsibilities of their role. During the employment, certain changes will occur and need to be reflected in the contract as well as in the internal systems. These changes can be related to changes in the job role, salary, benefits, and employee personal data. Employees are entitled to take vacation during their employment based on the legal regulations of the country. Vacations need to be requested and approved by the direct manager.

The key issues from the employee perspective:

- Currently there is no centralized timeline and overview of employment history – start date, role changes, and compensation changes.

- There is no combined overview of all the company benefits.

- Employee related documents are not centrally stored.

- The employee personal data remains static and usually originates from the first onboarding.

4.3.2 Team Leads

Team Leads report to the Business Area Lead and are responsible for the KPI objectives within the team. Team Leads are responsible for building a team to perform service delivery. Additionally, the Team Leads are responsible for coaching, supporting, their team members in their personal and professional activities. Onboarding activities are completed together with the local HR team where various responsibilities are shared. The Team Lead signs and approves any changes in the employment contract and approves employee vacations.

The key issues from the Team Lead's perspective:

- There is no overview of pending tasks, approvals, and signature requests related to HR processes.

- Currently there is no centralized timeline overview of employment history of team members – start date, role changes, compensation changes etc.

- Employee data is stored in several internal systems files and e-mails, making it difficult to find.

- Manual HR analytics and reporting.

4.3.3 Business Area Leads

The Business Area Leads report to the top management and are responsible for meeting the KPI objectives in their own business area. They are responsible for recruiting team leads and onboarding them together with the local HR team. Additionally, they are responsible that their team leads are knowledgeable in all aspects to ensure successful client service delivery. They support the team lead in important decisions regarding the team members, clients, and finances. Business Area Leads have a more strategic view of the HR processes and they monitor things like employee headcount and turnover.

The key issues from the Business Area Lead's perspective:

- Currently there is no centralized timeline overview of employment history of team members – start date, role changes, compensation changes etc.

- Employee data is stored in several internal systems files and e-mails, making it difficult to find.

- Manual HR analytics and reporting.

4.3.4 HR Managers

HR Managers for each location are responsible designing, monitoring, and improving the HR processes. HR Managers are also responsible for signing the initial employment contracts with new employees. Additionally, they are conducting exit interviews with all employees who leave the company. HR Managers are doing the monthly employee headcount and turnover reporting to the top management. They are also responsible for creating and distributing employee engagement and satisfaction surveys. HR managers have a strategic view of their HR activities in their location, and they are responsible for that the capabilities for HR management in Figure 10. HR Support capabilities, (Source: Author) to meet the business needs.

The key issues from the HR Manager's perspective:

- There is no overview of pending tasks, approvals, and signature requests related to HR processes.

- There is no timeline centralized overview of employment history for all the employees – start date, role changes, and compensation changes.

- Employee data is stored in several internal systems files and e-mails, making it difficult to find.

- Manual HR analytics and reporting.

4.3.5 HR Specialists

HR Specialists have a more operational role. They are responsible for the activities related to employee onboarding together with the Team Lead. HR specialists prepare all new contracts and update the existing ones so that the agreements between the employee and their direct manager are legally documented. They are also responsible for handling all

employee-related documentation by saving contracts, certificates and permits in the employee folder. HR Specialists support the employees regarding any questions they have regarding their employment terms and conditions or benefits. Additionally, they submit relevant data to the internal systems and files when required.

The key issues from the HR Specialist's perspective:

- There is no overview of pending tasks, approvals, and signature requests related to HR processes.

- Manual tasks related to employee onboarding, offboarding and contract changes consume most of their time.

- Employee data is stored in several internal systems files and e-mails, making it difficult to find.

- Handling data between various files and systems creates a risk of human error.

- There is no timeline overview of employment history of employees – start date, role changes, and compensation changes.

- Employees rely on asking about certain processes or progress of tasks directly from the HR Specialist. This contributes to the loss of time and focus for them.

- Various contract types signed with employees are difficult to monitor and track.

- Manual HR analytics and reporting.

4.4 Summary

Based on these observations from the market, company, and stakeholder perspective that were collected during interviews and brainstorming sessions, the author has identified the following key issues:

1. Due to the growth of the company, more process alignment is required to remain scalable and to better support the future strategic objectives.

2. The use of HR Management systems that are designed only for the local market results in not having a clear and instantaneous visibility of the key HR metrics.

3. Due to the substantial growth during the past year in Helmes AS, having only one HR Specialist will not suffice to maintain a similar level of support.

4. There are several steps within the HR processes that are manual and repetitive, and thus prone to human errors. Automation of some of the steps can free up time for more meaningful activities such as recruitment.

5. Some of the HR Processes' steps often require input from other stakeholders. These process flows can only be completed after a confirmation from the stakeholder. This generates a lot of tasks with a pending status that need to be monitored.

6. Some of the internal tools have integration capabilities that are currently not used and have a potential to automate the existing processes.

7. The events during the employee's lifecycle in the company are scattered in various systems, files, and e-mails. Having a better visibility of the employment history can lead to better visibility and decision quality.

8. The company benefits are not presented to the employees in a centralized and concise way, leaving them unused by the employees. Encouraging the usage of company benefits could lead to better employer branding.

Based on these findings the author created a goals view model to better illustrate the future vision of goals, outcomes, and requirements and described assessments from the group, company, and employee perspective. The model gives a structured and defined goals for the next steps on the analysis conducted in this thesis.
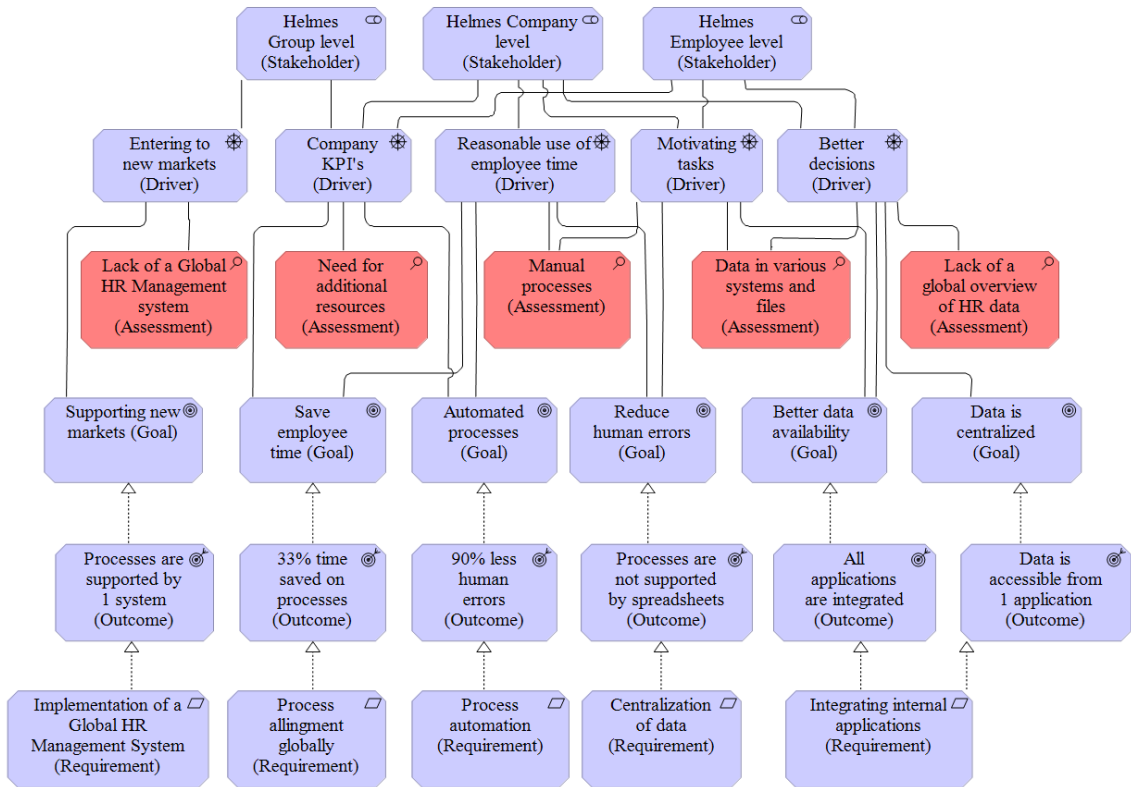
Figure 12. HR Goals View, (Source: Author)

5 Description of HR Processes AS-IS

This chapter will give the reader an overview of the current AS-IS processes that were highlighted as the most time-consuming by the stakeholders and the responsibilities within those processes. Additionally, a description of the currently used internal applications and files is created to describe their role and relations within those processes. In this thesis the author decided to first map these processes for Helmes AS.

5.1 AS-IS Processes

As a result of the conducted brainstorming sessions and interviews the most time-consuming and manual processes are – employee onboarding, employee offboarding and headcount analytics. These three processes will be in scope for more detailed analysis based on the example of Helmes AS.

5.1.1 New employee registration and onboarding

The new employee registration and onboarding in Helmes AS starts once a candidate has accepted a job offer. The input for this process model was gathered during an interview process with the HR Specialist. During the process, the HR Specialist will first start with creating an employment contract and collecting the needed details about the agreements from the Team Lead in an e-mail format to ensure that all agreements made during the interview are included. After the employment contract is signed, the HR Specialist creates an employee folder on SharePoint that will later include all documents related to the employee, save the employment contract, and is only accessible to the HR Specialist. After the contract is signed, the Team Lead simultaneously will request accesses to the new employee via JIRA and orders the necessary equipment for the employee.

The HR Specialist updates a dedicated Teams Channel for Onboarding new employees with a start date and from there the office administrator and the IT Specialist will start their own process flows that are not drawn in the figure, as it will be out of scope of the HR department. Once that is completed, the HR specialist will send the new employee a welcome e-mail and describe what will happen on the first day. Once the first day arrives, the employee will have several onboarding meetings together with the HR Specialist, office administrator and IT support before the actual introduction with the Team Lead

51

and project. During those initial meetings on the first day, the employee will give a digital signature to the GDPR and work description contract that the HR specialist will save in the employee folder.

As the next step, the HR Specialist will update the "Agreements", "Contracts" and "Onboarding" spreadsheets that each have a special purpose and will be described in the next chapters in more detail. After that, the new employee is registered in Persona that is used as an HR management and Payroll system in Helmes AS. Persona has integrations with TÖR where all new employees need to be registered but since this integration has not been reliable in the past, the HR specialist needs to check if the information went through, if not, then all the same employee registration also needs to be completed in TÖR. Once the new employee is registered, both in Persona as well as in TÖR the HR Specialist will update "Internal rates" table and submit parts of the employee information into internal systems CIR and GROW. The mapped-out AS-IS employee registration and onboarding process can be found in Appendix 2.

The HR specialist gave rough estimation on the duration of the employee registration process and considering all these tasks, meetings and waiting times for confirmations it can take approximately 5.75 hours to complete the process.

5.1.2 Employee offboarding

Employee offboarding in Helmes AS starts once the Team Lead has been notified by the employee on their final decision to leave the company. The Team Lead notifies the HR Manager who plans an exit interview with the employee. The HR Specialist notifies the Teams Channel dedicated to employee offboarding and from there the office administrator and the IT Specialist will start their own process flows that are not drawn in the figure as it will be out of scope of the HR department.

The employee writes a resignation letter that is signed by the employee and HR Manager. The HR Specialist prepares a contract to end the work relationship. Both documents are saved in the employee folder that will be archived after the last workday of the employee. Once that is completed, the HR Specialist notifies accountancy to prepare for the final salary and to close the work relation in Persona. The Team Lead requests employee accounts to be closed on the last day via internal system SAM and the HR Specialist updates the "Offboarding" file. On the last day of the employment the HR Specialist

closes the employee account in Persona, verifies whether the integration with TÖR was successful and updates the "Kokkulepped" file. The mapped-out AS-IS offboarding process can be found in Appendix 2.

The HR specialist gave rough estimation on the duration of the employee offboarding process and considering all these tasks, meetings and waiting times for confirmations it can take approximately 2.25 hours to complete the process.

5.1.3 Global headcount reporting

The Global HR headcount reporting is being done in the Confluence page where each HR Manager for each location on the last workday of each month updates the static headcount table. If these numbers have not been updated by each HR Manager per location in the beginning of the month, the Global HR Manager will request for the update from HR Managers who have not updated their figures. This table consists of only the headcount per each location monthly. If any graphs or reports need to be created, the table gets copied into a separate Excel file to work with that data. If additional information for example roles, team codes or business units are required to add to the report, and it needs to be requested separately from the HR Managers from each location. The mapped-out AS-IS headcount reporting process can be found in Appendix 2.

Although the various reports that are created can vary depending what data is needed, one of the standard reporting activities for head count reporting remains as a reoccurring monthly task. This process involves at least 5 people and the hours contributed can vary based on the market.

5.2 AS-IS RACI Matrix

To compare the AS-IS and TO-BE on-boarding and offboarding processes a RACI matrix is created to showcase how the responsibilities are assigned between different stakeholders. The table below will show various steps in the previously described processes and who is responsible for what.

Table 2. RACI AS-IS

RACI AS-IS				
Employee On-boarding	**HR Specialist**	**New employee**	**Team Lead**	**HR Manager**
Job offer proposal	I	I	R	I
Employment contract creation	R	I	C	I
Employee folder creation	R	N/A	N/A	N/A
Request for internal accounts via SAM	I	I	R	I
Order employee assets	I	C	R	I
Send welcome e-mails	R	I	C	I
Send meeting invitations	R	I	C	C
Registration in Persona	R	I	I	I
Update the Excel files	R	N/A	N/A	N/A
Add employee internal rate in CIR	R	N/A	I	N/A
Assign Grow roles	R	I	C	I
Employee Offboarding	**HR Specialist**	**New employee**	**Team Lead**	**HR Manager**
Send meeting invitations	I	I	R	R
Prepare contracts	R	I	C	I
Archive employee folder	R	N/A	N/A	N/A
Update the Excel files	R	N/A	N/A	N/A
Delete Persona account	R	N/A	N/A	N/A
Headcount Analytics	**HR Specialist**	**New employee**	**Team Lead**	**HR Manager**
Update confluence page	N/A	N/A	N/A	R

5.3 Information systems supporting the processes

The following table contains the description of the current systems that are being used in Helmes AS to support the HR Processes.

Table 3. Applications supporting the processes

Name	Description	Purpose	Users
Persona	System is used by employees to request time off and where their direct managers can approve the requested time off. Persona is also used to conduct payroll and it has integrations with the Governmental Employment registration.	Leave Management, Payroll	Managers, HR Specialist, Accountancy, Employees
Valamis	Platform that is combining learning materials and upcoming trainings for employees. Each employee can design their own learning path and register for trainings and sign up for online courses.	Learning Management	All employees
GROW	Professional development support system with the main purpose of supporting the professional growth of Helmes employees. The platform allows to create development plans, manage development discussions, register for upcoming trainings. Additionally, it monitors the company library and what books are available to be borrowed. The application has been developed and maintained by Helmes.	Performance and Growth Management	All employees
SAM	Simple Access Manager is used to structure and store all company accounts and monitor their relations. The system also showcases the organizational structure and enables to see the structure of different teams. Additionally, it allows managers to report various changes related to their employees. For example, if they are related to a new project or belong in an account group where certain firewall permissions are created. The application has been developed and maintained by Helmes.	User, role and access management, Organizational Structure	All employees
Culture Amp	Used to measure employee engagement and conducting various surveys across the company. The platform allows to customize survey forms and manage the survey distributions.	Employee Engagement	All employees

Name	Description	Purpose	Users
CIR	Contract Information and Invoice Request platform that is also called CIR is a system mainly aimed at Team Leaders and Business Area Leads, where the users can keep track of their contracts and documents, create invoice requests, manage crossbills, and request new project codes. The application has been developed and maintained by Helmes.	Contract Management, Invoice Management	Team Leads, Business Area Leads
Active Directory	Is a directory service with the purpose to authenticate, authorize users and computers in the Helmes Group network.	Account Management	-
Microsoft Dynamics NAV	Used to view the company's financial results and connect employees with projects and customers.	Accountancy	Accountants
Workable	Is used for talent sourcing and documenting communication with all candidates who were either sourced or have applied to the available positions. Additionally, it is used to track different recruitment stages and the results of job interviews.	Recruitment Management	Team Leads, Recruiters
Teams	Dedicated Teams Channels are used for sharing information regarding employee onboarding and offboarding between various departments.	Information sharing, Task Management	HR Specialists, HR Managers, Accountancy, IT Support, Office Administration
Confluence	Holds all the documentation regarding the Helmes Group and processes. It is also a source to important links for accessing internal systems and employee benefits. Additionally, it is currently used to store HR Analytics for employee headcount for each location.	Documentation, HR Analytics	HR Specialists, HR Managers, Team Leads, Employees
SharePoint	Is used as a file management system to hold all employee related documents.	File Management	HR Specialist

As described in the previous chapters additionally to the systems in the table above, some data is managed and stored in Excel files. Each have their own purpose and they support

the processes in various ways. The following table will give an overview of their purpose and how they are used within the company.

Table 4. Files supporting the HR processes

Name	Description	Purpose	Users
Kokkulepped	The table is used to store employee data. Examples of the data stored: Employee personal data, employee unique number, contract number, gender, date of birth, employment duration, start date, date of employment, gross salary	Since some people are working with a Sub-contracting agreement, their information cannot be included to Persona that only allows to submit the data for employees working under the employment contract. To keep the HR data in the same place both employment contract as well service providers contract this file is kept and maintained.	HR Specialist
Lepingute register	The table is used to monitor the contract numbers and to ensure that each contract number is unique. Examples of data stored: contract number, employee position, contract type and contract status	Maintenance and tracking of the contract numbers.	HR Specialist, Accountancy, Legal Counsel
Onboarding	The table is used to track all new employees who join the company. Examples of the data stored: employee name, start date, team code, position, date and time of onboarding meetings and general comments.	This is a collaborative-shared file to track all new employees, their start dates and when they will participate in the Newcomers Day.	HR Specialist, HR Manager, Office Administrator, IT Support
Offboarding	The table is used to track all employees who will leave the company. Examples of the data stored: Employee name, team code, position, business unit, last date, reason for ending the contract, exit interview date and time.	This is a collaborative shared file to track employees who will leave the company, their last day and when they will participate in the exit interview.	HR Specialist, IT Support, Office Administrator

5.4 AS-IS Component diagram

The component diagrams in this thesis are created on a high-level view and will only include the applications supporting the HR processes that the implementation of a new HR Management system would affect. Helmes Group uses many additional applications to support the internal processes but in this analysis will remain out of scope.

Azure Active Directory is responsible for the user authentication. The applications exchange the data using an API gateway that uses the REST standard and HTTPS protocol. The main goal is to exchange the employee data such as name, team code, project codes and employee role and trigger notifications. The blue components represent the authentication and infrastructure. The green components are applications that have been developed in-house by the employees of the company. The red components are applications that have been outsourced.
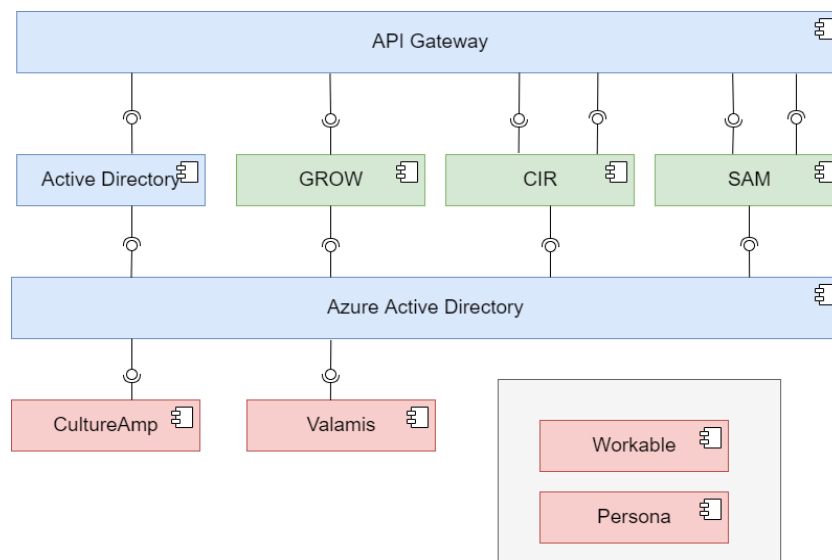
Figure 13. Component diagram AS-IS, (Source: Author)

5.5 Data relations between internal systems AS-IS

In this chapter, the author will introduce the data relations between the current systems and files used to realize HR processes in scope and whether the data gets transferred manually or it is integrated and automatically distributed.
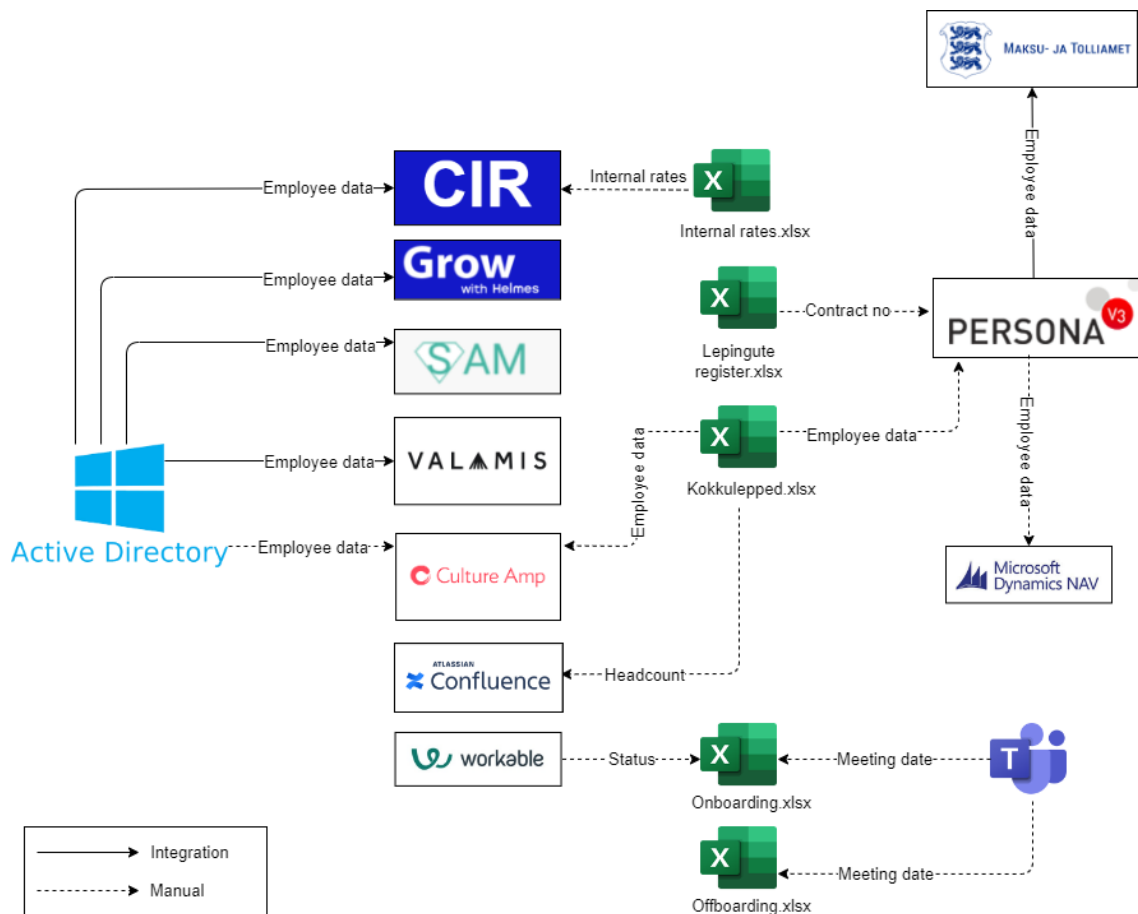
Figure 14. AS-IS relations between internal applications, (Source: Author)

A solid line represents automatic data exchanges between the two systems. As seen on the figure, Active Directory is mostly responsible for the automatic data exchange with the internal systems within Helmes Group. Active Directory uses in-house built APIs to exchange various Employee data between the internal systems. The "Employee data" indicated on the figure can be various sets of employee related data such as name, team code, project code, start date etc.

The dashed line represents manual data transfer from one system or a file to another. In the case of this figure, the data is being submitted mainly by the HR Specialist to realize various HR Processes. For example, onboarding and offboarding employees, sharing employee-related data, creating new or updating existing contracts, changing employee work conditions and benefits and many more. The manual data transfer to files can introduce various risks to data integrity. Human errors or corrupted files can result in inaccurate data regarding the employee and be irrecoverable later.

6 Description of HR Processes TO-BE

This chapter is dedicated to describing the vision of TO-BE HR processes taking into consideration the business requirements. The TO-BE processes will give input to the different scenarios that will be analyzed in more depth in the next chapters.

6.1 Brainstorming sessions

In the following chapter, the author will describe the business requirements that were gathered from the brainstorming sessions with HR managers and stakeholders. The author sent the questions to each of the participants prior to the meeting. Each participant was able to share their experiences and discuss openly how they see the use of a new HR system could benefit their work. The following questions were sent in advance to the participants:

1. What processes are the main time and energy consumers for you today?

2. What processes do you do currently that you see should be automated or done in a more efficient way?

3. What data do you update manually in more than one system/place (including Excel spreadsheets)?

4. What employee data is currently missing today that would be important for your everyday tasks?

5. What type of data would add some insight and value to you when we talk about analytics?

6. How much of your time would a new system save potentially in your view?

6.2 Business Requirements

Based on the results of the brainstorming session the author together with the participants outlined 23 business requirements that are described in the next table. These business requirements are one of the inputs for drawing out the new TO-BE HR processes.

Table 5. Business Requirements

ID	Business requirement
BReq-1	The new system must include the HR data from all organizations across the group level.
BReq-2	The new system must enable storing HR data throughout the employee's lifecycle in the organization.
BReq-3	The new system must minimize the time it takes to complete HR processes for the stakeholders.
BReq-4	The new system must eliminate manual tasks such as data submission multiple times and cross-checking from various data sources.
BReq-5	The new system must use the integration capabilities that the current internal applications already have in place.
BReq-6	The new system must eliminate the need to use Excel spreadsheets for storing data and collaboration.
BReq-7	The new system must showcase the organization hierarchy on a group level.
BReq-8	The new system must be customizable taking into consideration the specifics of each organization.
BReq-9	The new system must enable adding and changing employee personal data and trigger change in other internal applications.
BReq-10	The new system must enable moving employees between teams and organizations.
BReq-11	The new system must support the HR processes by having tasks related to each process that can be assigned to a stakeholder.
BReq-12	The new system must have e-mail notifications to support the HR processes.
BReq-13	The new system must have approval management so direct managers can approve employee requests.
BReq-14	The new system must enable changing employee contract information (roles, salary, bonuses).
BReq-15	The new system must support the onboarding and offboarding processes by distributing tasks to responsible stakeholders.

ID	Business requirement
BReq-16	The new system must keep record of each change made in the employee personal data and contract information.
BReq-17	The new system must enable benefit management and assign benefits to employees.
BReq-18	The new system must enable employees to enroll for benefits and have an overview of their benefit history.
BReq-19	The new system must enable leave management for all companies across the group level.
BReq-20	The new system must enable the configuration of leave management on the country and organization level.
BReq-21	The new system must enable to conduct analytics and reporting with the stored HR data.
BReq-22	The new system must enable exporting the data to an Excel format.
BReq-23	The new system must enable storing employee related documents and make them available for assigned stakeholders.

Based on the described business requirements the figure below will give an overview of the value stream and describe the new or improved capabilities supporting the existing processes. The outcome of the value stream summarizes the outcomes that were described in the goals view in figure 12.
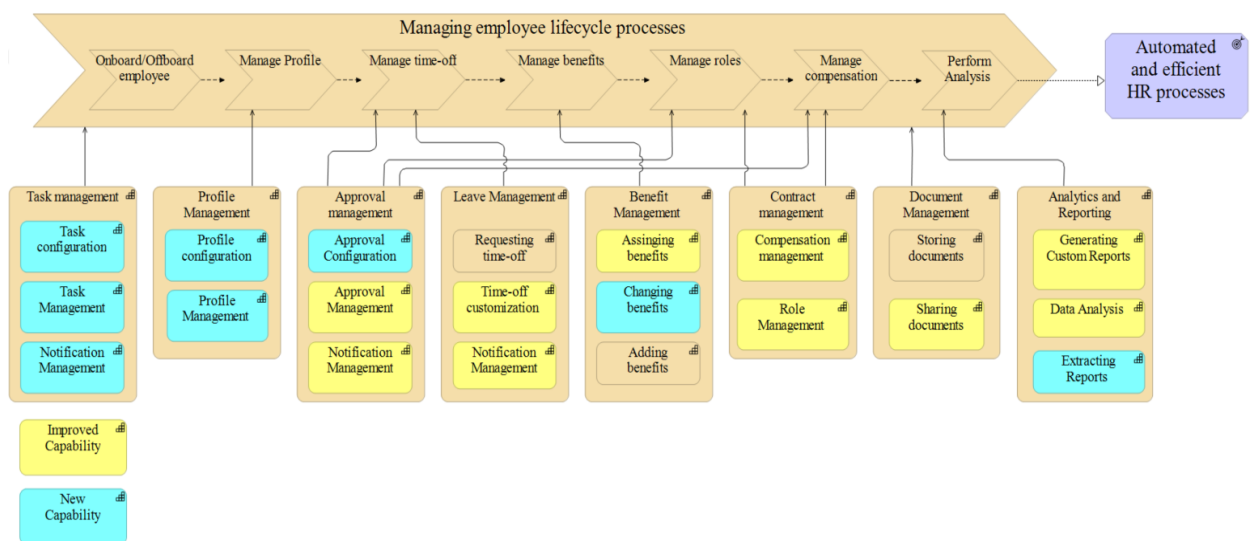
Figure 15. Value Stream – Managing employee lifecycle, (Source: Author)

6.3 TO-BE Processes

The TO-BE processes are mapped based on the business requirements outlined in the previous chapter and introduce the new global HR Management system to the process. Additionally, the process mapping considers the currently used internal systems that support the HR processes and their integration capabilities. These drawn-out processes are just the initial vision and can partially change during further analysis and actual implementation.

6.3.1 New employee registration and onboarding TO-BE

The employee registration and onboarding process starts with the candidate accepting the proposal and the HR Specialist creating a new employee account in the system and selecting an onboarding package. This would automatically trigger a new task for the Team Lead who will need to fill in the details needed to create a contract to the employee. Once that is confirmed in the system, it will trigger another task to the HR Specialist to create a contract based on the information saved previously. When the contract is created and uploaded, it would send a task to both the HR Manager and candidate to sign and upload the contract to the system. After both parties have done so in the system the Specialist verify this and assign the employee with a time-off policy and benefits. That activity would trigger data to be sent to other internally used systems such as Active Directory, Persona, CIR, GROW and SAM. Additional Onboarding tasks would be generated based on the settings. The process ends once the final documents are signed by the employee and stored in the employee folder. The mapped-out TO-BE employee registration and onboarding process can be found in Appendix 3.

When we compare both TO-BE and AS-IS onboarding processes the main advantages the new HR Management System would bring are:

- Enabling the distribution of responsibilities between stakeholders by using tasks.

- Elimination of Excel spreadsheets that need to be updated.

- Employee data submission once to only one system.

Based on these changes, the author sees that the simplifying and automating the process by implementing a new HR system would save stakeholder time, provide more clarity to the process, and limit the risk of human errors happening.

6.3.1 Employee offboarding TO-BE

The employee offboarding starts once the Team Lead has been notified by the employee of their final decision to leave the company. The Team Lead notifies the HR Manager who plans an exit interview with the employee. Once the employee has written a resignation letter, the HR Specialist will save the document to the employee folder and prepares an appendix to the existing contract based on the agreed conditions. The document is uploaded to the employee folder. Then the HR Specialist will assign the employee with an offboarding package and sets the final day of work. That will trigger the HR System to generate a list of tasks to the stakeholders to complete the process. The task list for each offboarding package would depend on the configuration, but one example would be giving signatures for the contract by the employee and HR Manager. When the contract is signed and the last day of the employee has been set, the system would send the information to the other internal systems to close the accounts and archive the employee's folder. The process will be finalized after the exit interview is conducted with the HR Manager. The exit interview can take place before or after the last day of employment. The mapped-out TO-BE employee offboarding process can be found in Appendix 3.

Similarly, to the Onboarding process the author sees same advantages in the TO-BE process. The distribution of tasks and integrations with other systems will decrease the amount of time each stakeholder spends on the process and minimizes the risk of human errors.

6.3.2 Global headcount reporting

The HR Analytics and reporting in the TO-BE process will not require any manual tasks from any of the stakeholders. The data to conduct analytics and reporting will be sourced from the database of the system. Based on the data collected various dashboards can be created to showcase HR data in a meaningful way. Additionally, since the data is centralized the viewer can export it in an Excel format and customize it based on the need. The author decided not to map out a TO-BE process since it is simply opening the view

and applying the required filters on the dashboards depending on that the viewer wants to see. The main advantage of this new process is to eliminate manual reporting and having access to all the HR data on a group level.

6.4 TO-BE RACI Matrix

In this chapter the author created a TO-BE RACI Matrix to see the changes in workflows and responsibilities in the processes. This RACI Matrix will also include the new HR Management system as an actor.

Table 6. RACI TO-BE

RACI TO-BE					
Employee On-boarding	**HR Specialist**	**New employee**	**Team Lead**	**HR Manager**	**New HR System**
Job offer proposal	I	I	R	I	N/A
Employment contract creation	R	I	C	I	N/A
Employee folder creation	N/A	N/A	N/A	N/A	R
Request for internal accounts via SAM	N/A	N/A	R	N/A	R
Order employee assets	I	C	R	I	N/A
Send welcome e-mails	I	I	I	I	R
Send meeting invitations	R	I	C	C	R
Registration in Persona	N/A	N/A	N/A	N/A	R
Update the Excel files	N/A	N/A	N/A	N/A	N/A
Add employee internal rate in CIR	N/A	N/A	N/A	N/A	R
Assign Grow roles	N/A	N/A	N/A	N/A	R

Employee Offboarding	HR Specialist	New employee	Team Lead	HR Manager	HR System
Send meeting invitations	R	I	C	C	R
Prepare contracts	R	I	C	I	N/A
Archive employee folder	N/A	N/A	N/A	N/A	R
Update the Excel files	N/A	N/A	N/A	N/A	N/A
Delete Persona account	N/A	N/A	N/A	N/A	R
Headcount Analytics	HR Specialist	New employee	Team Lead	HR Manager	HR System
Update confluence page	N/A	N/A	N/A	N/A	N/A

6.5 Summary

For the onboarding process, the main changes in the responsibilities are the automatic account creation and automatic data updates since each of the current systems in use have integration availabilities. Once a new employee is registered in the system, it will automatically trigger the data changes in other integrated systems. Additionally, the system would automatically generate a folder for a new employee profile, and it would no longer be done manually. The use of Excel files will not be needed as the system functionalities enable to store and transfer the data automatically. For each new onboarding, the system will generate a list of tasks that need to be completed to complete the process. This will allow to keep track of the activities such as sending various meeting invitations to the employee. The system will have the ability to send out notification e-mails, meaning that the standard welcome e-mail can be sent automatically to the new employee.

For the offboarding process the situation is similar. Once the employee's last day is determined, the built-in integrations would support closing the account and archive the employee folder. So, when an offboarding is initiated, it would create a set of tasks that

need to be completed to end the process. No manual activities will be required for the headcount analytics, as the system would have analytics and reporting functionalities.

Based on the estimations of the stakeholders of the HR team, at least 33% of their time could be saved by implementing a global HR management system. These evaluations were given during the brainstorming sessions and testing the products under consideration assuming that the TO-BE vision of these processes can be realized.

7 Development of a new HR Management System

This chapter focuses on analyzing the developing the HR System in-house using the internal resources. First, business rules are defined together with a high-level class diagram. Secondly, functional requirements are described as user stories and prioritized using the MoSCoW method. After that the non-functional requirements and the TO-BE vision of the component diagram will be mapped out. Lastly, the effort and cost range for the system will be estimated based on the Cone of Uncertainty theory and PERT estimation technique.
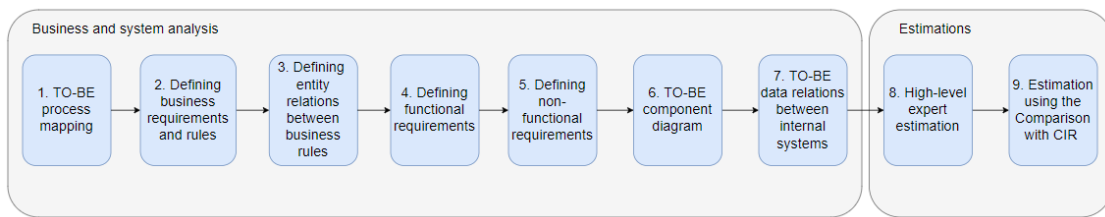
Figure 16. Roadmap for Alternative 1, (Source, Author)

7.1 Business rules

In this chapter, the author has created a list of business rules that would be applied to the system. Business rules are imposing a list of constraints and criteria that drive business decisions [14]. The business rules will be the input for the time estimations as well as the user stories and give a high-level how each entity would be related.

Table 7. Business rules

ID	Business rules
BR1	Each organization is related to one-to-many countries. One country is related to one-to-many organizations.
BR2	Each business unit is related to one organization. One organization is related to zero to many business units.
BR3	Each team is related to one business unit. One business unit is related to zero to many teams.
BR4	Each employee is related to zero to one team. One team is related to one-to-many employees.

ID	Business rules
BR5	Each employee is related to one user role. One user role is related to zero to many employees.
BR6	Each user role is related to zero to many user rights. One user right is related to zero to many user roles.
BR7	Each organization is related to zero to many onboarding packages. One onboarding package is related to zero to many organizations.
BR8	Each employee is related to one-to-many onboarding packages. One onboarding package is related to zero to many employees.
BR9	Each organization is related to zero to many benefit packages. One benefit package is related to zero to many organizations.
BR10	Each employee is related to zero to many benefit packages. One benefit package is related to zero to many employees.
BR11	Each organization is related to zero to many time-off policies. One time-off policy is related to zero to many organizations.
BR12	Each country is related to zero to many time-off policies. One time-off policy is related to zero to many countries.
BR13	Each employee is related to one-to-many time-off policies. One time-off policy is related to zero to many employees.
BR14	Each employee is related to one job profile. One job profile is related to zero to many employees.
BR15	Each employee is related to one-to-many contracts. One contract is related to one employee.
BR16	Each organization is related to zero to many contracts. One contract is related to one organization.
BR17	Each task is related to zero to many onboarding packages. One onboarding package is related to one-to-many tasks.
BR18	Each task is related to zero to many assigned tasks. One assigned task is related to one task.
BR19	Each employee is related zero to many assigned tasks. One assigned task is related to one-to-many employees.
BR20	Each notification is related to one assigned task. One assigned task is related to zero to many notifications.
BR21	Each employee is related to zero to many requests. One request is related to one employee.

ID	Business rules
BR22	Each request is related to one approval. One approval is related to one change request.
BR23	Each employee is related to zero to many approvals. One approval is related to one employee.
BR24	Each notification is related to one approval. One approval is related to one notification.

The relationships between the business rules are shown in the next figure.
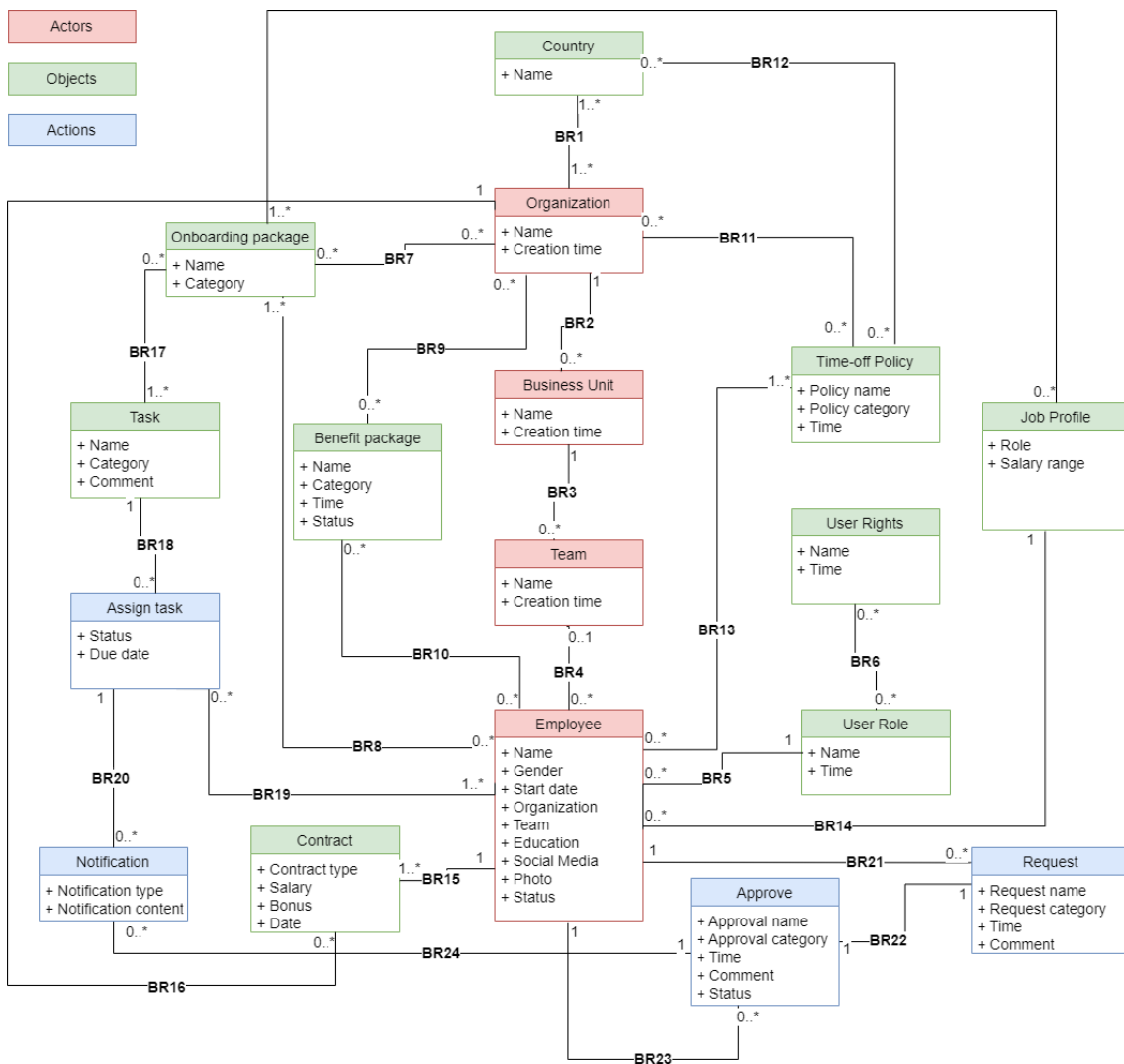
Figure 17. Business rules and entity relations, (Source: Author)

It is important to note that the object "onboarding package" will later down the analysis represent both processes – onboarding and offboarding. As the main purpose as well as relations to entities are the same, the author decided to use one naming for both processes.

The described business rules and their relations in the diagram will clarify the expectations for the planned system and give input to the time estimations.

7.2 Functional requirements

The functional requirements for the planned software were collected based on the business analysis conducted in the previous chapters. These functional requirements are based on:

- The brainstorming sessions together with the HR team where business requirements were gathered.

- Interviews and discussions with the HR Specialist, HR Managers and Team Leads.

- Business rules and the relations between the entities.

- The mapped out TO-BE HR processes.

- The analysis of available products on the market and their functionalities.

The functional requirements are categorized by epics and described as user stories. Each epic will represent a component for the planned system and will later be the input in giving high-level time estimations. The functional requirements are prioritized using the MoSCoW technique. The priorities were set during the brainstorming session as well as discussions with the Global HR Manager and the IT Project Manager for internal systems.

7.2.1 Epic 1. Organization Management

The functionality includes enabling the creation of organizational structures and building hierarchies. Since there are various hierarchy models used in Helmes Group, there is a need to configure them based on the needs of each location. The functionalities under this category would allow building an organization chart and an employee directory based on the employee profile.

Table 8. Epic 1

Epic 1	Organization Management	
ID	**User Story**	**Priority**
FN-1	As an administrator, I want to create the organizational structure so that I can setup the hierarchy models.	M
FN-2	As an administrator, I want to configure the organizational structure so that it is compliant with the requirements of each entity.	M
FN-3	As an administrator, I want to configure how users see the organization chart so that I can limit this by access level.	M
FN-4	As an administrator, I want to configure what employee information is displayed in the organization chart about the employee.	S
FN-5	As an employee, I want to view the company directory so that I can find the contact information of my colleagues.	M
FN-6	As an employee, I want to view the organization chart so that I can see who reports to who.	M
FN-7	As an employee, I want to view a list of important links so I can access the right information.	M

7.2.2 Epic 2. Employee Profile Management

The functionality includes creating an employee profile and customized fields based on the requirements of that unit. Employee profile includes general information about the employee. Their place in the organization hierarchy, their basic information such as name, gender, date of birth, address and contact information. There are fields that can be changed by the employee and the Team Lead. However, their placement in a certain team and unit can only be adjusted by the HR Specialist. The functionalities under this category would allow to create and adjust the employee profile during their time of employment. The main benefit is to keep the employee data in a centralized view and adjust it if needed.

Table 9. Epic 2

Epic 2	Employee Profile Management	
ID	User Story	Priority
FN-8	As an administrator, I want to create employee profile fields so that they would be adjustable in the future based on the company needs.	M

Epic 2	Employee Profile Management	
FN-9	As an administrator, I want to configure the employee profile fields so that they would be adjustable in the future based on the company needs.	M
FN-10	As a HR Specialist, I want to see the employee profiles so that I can view or adjust the employee data when needed.	M
FN-11	As a HR Specialist, I want to assign a new employee to a team so that they would showcase in the company hierarchy model.	M
FN-12	As a HR Specialist, I want to move the employee to another team so the hierarchy would showcase accurate information.	M
FN-13	As a Team Lead, I want to see employee profiles who report to me so that I can view or adjust the employee data when needed.	M
FN-14	As a Team Lead, I want to store notes from discussions with the employee so that I can refer to them later.	S
FN-15	As an employee, I want to see my profile, so that I can see and update my personal data.	M
FN-16	As an employee, I want to request changes about my profile information that is not adjustable so that my profile would reflect accurate information.	S

7.2.3 Epic 3. Task Management

The functionality enables to create various task flows and associate them with HR processes. Tasks can be related to employee onboarding or offboarding and include activities such as requesting documents to be signed, planning a lunch with the employee, or setting up meetings, the task contents are configurable. The list of tasks will depend on the configuration of the package and the requirements each role will have in the organization. Tasks would be displayed as a list in the user's inbox and once the activity is completed, tasks can be checked off. This results in the tasks being moved in the completed folder. For each task, a comment can be added to it, to provide additional context. The functionalities under this category would allow the users to receive tasks under their responsibility and check them off once they are completed. The main benefit is to keep track of the process and ensure that all participants of the process can see tasks under their responsibility.

Table 10. Epic 3

Epic 3	Task Management	
ID	User Story	Priority
FN-17	As an administrator, I want to create the task workflows so that they can be assigned to a task list.	M
FN-18	As an administrator, I want to configure the task workflows so that they can be assigned to a task list.	M
FN-19	As an administrator, I want to create a task list so that they can be assigned to employees.	M
FN-20	As an administrator, I want to configure a task list so that they can be assigned to employees.	M
FN-21	As a HR Specialist, I want to have a task list of action items in my inbox so I can keep track of all my tasks.	M
FN-22	As a HR Specialist, I want to have an overview of completed tasks so I can refer to them when needed.	M
FN-23	As a Team Lead, I want to have a task list of action items in my inbox so I can keep track of all my tasks.	M
FN-24	As a Team Lead, I want to have an overview of completed tasks so I can refer back to them when needed.	M
FN-25	As an employee, I want to have a task list of action items in my inbox so I can keep track of all my tasks.	M
FN-26	As an employee, I want to have an overview of completed tasks so I can refer to them when needed.	M

7.2.4 Epic 4. Notification Management

The functionality enables to notify users by e-mail once a new event is triggered instantaneously. This can be configured for each task and approval request by the administrator. The e-mail notification will include a link to the user inbox in the system for a quicker access. The functionalities under this category would allow the users to receive e-mail notifications to notify them about new pending tasks and approval requests. The main benefit is to keep users better informed about tasks and approvals assigned to them.

Table 11. Epic 4

Epic 4	Notification Management	
ID	**User Story**	**Priority**
FN-27	As an administrator, I want to create notifications for tasks so that employees can be notified about a new task.	M
FN-28	As an administrator, I want to configure notifications for tasks so that employees can be notified about a new task.	M
FN-29	As an administrator, I want to create notifications for approvals so that employees can be notified on pending approvals.	M
FN-30	As an administrator, I want to configure notifications for approvals so that employees can be notified on pending approvals.	M
FN-31	As a HR Specialist, I want to get notifications about new tasks, so I know they are added to my task lists.	M
FN-32	As a HR Specialist, I want to get notifications about approvals, so I know what is pending for my approval.	M
FN-33	As a Team Lead, I want to get notifications about new tasks, so I know they are added to my task lists.	M
FN-34	As a Team Lead, I want to get notifications about approvals, so I know what is pending for my approval.	M
FN-35	As an employee, I want to get notifications about new tasks, so I know they are added to my task lists.	M

7.2.5 Epic 5. Approval Management

The functionality enables to create various approval flows and associate them with HR processes. Approvals can be related to changes in the employee placement in the organization hierarchy, changes in the employee profile, employee compensation, employee bonus, time-off requests, employment status and job information. The approvals can be configured by the role and organization. Approvals can be requested by the users as well as automatically generated depending on the process. Approvals will be displayed in a list in the user's inbox and will require the user to select between approval or denying the request. This results in the approvals being moved to the completed folder. For each approval, a comment can be added to it, to provide additional context. The functionalities under this category would allow the users to approve activities within the

HR processes. The main benefit is to keep track of the process and ensure that all participants of the process can see approve requests under their responsibility.

Table 12. Epic 5

Epic 5	Approval Management	
ID	User Story	Priority
FN-36	As an administrator, I want to create the approval workflow so that the requests can be approved.	M
FN-37	As an administrator, I want to configure the approval workflow that so the requests can be approved.	M
FN-38	As an administrator, I want to create approvals so they can be assigned to the users.	M
FN-39	As an administrator, I want to configure approvals so they can be assigned to the users.	M
FN-40	As a HR Specialist, I want to have a list of pending approvals so that I can approve or decline them.	M
FN-41	As a HR Specialist, I want to have an overview of my approvals so I can refer to them when needed.	M
FN-42	As a Team Lead, I want to have a list of pending approvals so that I can approve or decline them.	M
FN-43	As a Team Lead, I want to have an overview of my approvals so I can refer back to them when needed.	M

7.2.6 Epic 6. Job Management

The functionality includes creating an employee job profile and customize fields based on the requirements of that unit. Most importantly, this module includes information about the employee employment status, the job information, the employee compensation, and the employee bonuses. Contract changes are one of the main triggers to change the job profile. Changes in the employee profile can be done by the direct manager or the HR Specialist. The employee can also request changes in the employee job profile. These requests will go to the approval list of the direct manager where they can either approve or deny them. The main benefit is to keep the employee data in a centralized place, adjust it when it is needed and maintain the history of all changes made throughout the employee's lifecycle in the company.

Table 13. Epic 6

Epic 6	Job Management	
ID	**User Story**	**Priority**
FN-44	As an administrator, I want to create the job management workflows so that they can be assigned to an organization.	M
FN-45	As an administrator, I want to configure the job management workflows so that they can be adjusted based on the company needs.	M
FN-46	As an administrator, I want to create the job management profiles so that they can be assigned to the employee's job profile.	M
FN-47	As an administrator, I want to configure the job management profiles so that they can be adjusted based on the company needs.	M
FN-48	As a HR Specialist, I want to change the employee job profile so that it would reflect the contract.	M
FN-49	As a HR Specialist, I want to see the time when the job profile was changed so I can make better decisions.	M
FN-50	As a Team Lead, I want to change the employee job profile so that it would reflect the contract.	M
FN-51	As a Team Lead, I want to see the time when the job profile was changed so I can make better decisions.	M
FN-52	As an employee, I want to have an overview of the job profile changes so that I can have a better overview of my employment history.	M
FN-53	As an employee, I want to request changes to my job profile so that my manager could approve or decline them.	M

7.2.7 Epic 7. Onboarding and Offboarding Management

The functionality includes creating onboarding and offboarding packages based on the requirements of that unit. Each package will include a list of tasks that can be assigned to various user roles based on the configuration of that package. These tasks will go to the inbox of the user where they can complete the tasks or approve or deny the requests. The tasks are distributed into categories such as HR, IT support and Manager related tasks. The main benefit of the functionality is managing the employee onboarding and offboarding tasks in a centralized way and ensure that all parties involved in the process have an overview of what needs to be done to complete the process and be compliant with the companies' procedures.

77

Table 14. Epic 7

Epic 7	Onboarding/Offboarding Management	
ID	User Story	Priority
FN-54	As an administrator, I want to create onboarding packages for an organization so that they can be assigned to new employees based on their role.	M
FN-55	As an administrator, I want to configure onboarding packages for an organization so that they can be adjusted based on the company needs.	M
FN-56	As a HR Specialist, I want to get an onboarding task list so I can complete the process.	M
FN-57	As a HR Specialist, I want to get an offboarding task list so I can complete the process.	M
FN-58	As a Team Lead, I want to get an onboarding task list so I can complete the process.	M
FN-60	As a Team Lead, I want to get an offboarding task list so I can keep track of all my tasks.	M
FN-62	As an employee, I want to get an onboarding task list so I can keep track of all my tasks.	M
FN-63	As an employee, I want to get an offboarding task list so I can keep track of all my tasks.	M

7.2.8 Epic 8. Benefit Management

The functionality includes creating and configuring benefit packages so that the employees can enroll to them. For each unit a certain set of benefits can be made available based on the user role. The HR Specialist can assign benefit packages to the employee so that the package would become available for enrolment. Benefits belong under a benefit category that can be created or configured based on the company requirements. Each user would be able to see their active benefits as well as the list of benefits they were enrolled in the past. The main goal of the functionality is to give employees the ability to enroll for company benefits and to have an overview of their active and inactive benefits they were enrolled to in the past.

Table 15. Epic 8

Epic 8	Benefit Management	
ID	User Story	Priority
FN-64	As an administrator, I want to create benefit packages so that employees can enroll to them.	M
FN-65	As an administrator, I want to configure benefit packages so that they are up to date.	M
FN-66	As an administrator, I want to assign benefit packages to an organization so that they are available for enrolment.	M
FN-67	As a HR Specialist, I want to assign employees to benefit packages so that they can enroll to them.	M
FN-68	As a Team Lead, I want to see the benefit packages my team members enrolled to so that I have an overview of benefits used in my team.	M
FN-69	As a Team Lead, I want to get an e-mail notification so that I know when someone in my team enrolled to a benefit package.	S
FN-70	As an employee, I want to see the benefits available to me so I can enroll to them.	M
FN-71	As an employee, I want to get an e-mail notification so that I know when a new benefit package becomes available for me.	S
FN-72	As an employee, I want to see the history of benefits I have enrolled in the past so I can have a better overview of my employment history.	M

7.2.9 Epic 9. Leave Management

The functionality includes creating and configuring time-off policies that can be used within the organization. Each organization would have their own policy based on the laws and regulations of that location as well as their own customizable policies like adding an additional vacation day for one year of employment in the company. Each employee would be able to request for time off, see how many vacation days they would have left and to see their time-off history. The main goal of this functionality is to manage the vacations of employees, enable better planning for managers and configure these time-off policies based on future requirements.

Table 16. Epic 9

Epic 9	Leave Management	
ID	**User Story**	**Priority**
FN-73	As an administrator, I want to create time-off policies for an organization so that it is compliant with the laws and regulations.	M
FN-74	As an administrator, I want to configure the time-off policies, so they are compliant with the laws and regulations.	M
FN-75	As a Team Lead, I want to approve time-off requests for my team so that it will be reflected on the time-off schedule.	M
FN-76	As a Team Lead, I want to get notified via e-mail when someone from my team requested time off so I can approve it.	M
FN-77	As a Team Lead, I want to see time-off schedules for my team so that I can plan the resources for the project.	M
FN-78	As an employee, I want to see the employee time-off schedule so I know when I would be able to reach my colleagues.	M
FN-79	As an employee, I want to see my remaining vacation days so that I can request time off.	M
FN-80	As an employee, I want to see my time-off requests so that I can have a better overview of my employment history.	M

7.2.10 Epic 10. Analytics and reporting

The functionality enables to conduct analytics and reporting based on the collected data within the system. The users would be able to view various datasets configured into dashboards and filter them based on selected variables. This functionality is mainly dedicated for HR Managers, HR Specialists and Team Leads who can use the data for making better decisions and have an overview of how the HR data has changed throughout the years. As an example, the author also created a low-fidelity prototype in the appendix 4 for this epic to show how the dashboards would look like for the end-user using the PowerBI tool. The main goal of this functionality would be to allow employee data to be displayed in a centralized way and to support the current HR processes.

Table 17. Epic 11

Epic 11	Analytics and reports	
ID	**User Story**	**Priority**
FN-81	As a HR Manager, I want to see a graph of the Headcount dynamics, so I have a better overview of the company.	M
FN-82	As a HR Manager, I want to see a graph of the Contract types, so I have a better overview of the company.	M
FN-83	As a HR Manager, I want to see a graph of the Headcount by roles, so I have a better overview of the company.	M
FN-84	As a HR Manager, I want to see a graph of the Employee turnover by country, so I have a better overview of the company.	M
FN-85	As a HR Manager, I want to see a graph of Newcomers and leavers, so I have a better overview of the company.	M
FN-86	As a HR Manager, I want to export the HR analytics data in an Excel format, so I can do reporting.	M

7.2.11 Epic 11. Documentation Management

The functionality enables to store employee documents and enable the accessibility to these documents. Each employee would be able to get access to the documents the company has about them and export them when needed. Employee folders can also include sub-folders and the access levels can be configured by the administrator based on the need. The main goal of this functionality is to store all employee-related documents in a centralized way and configure who has access to them within the company.

Table 18. Epic 12

Epic 12	Documents Management	
ID	**User Story**	**Priority**
FN-87	As an administrator, I want to create employee document folders so that the documents can be imported and exported.	M
FN-88	As an administrator, I want to configure the access levels to the employee document folders so that only authorized users would have access to them.	M
FN-89	As a HR Specialist, I want to store employee documents so I can access them when needed.	M

Epic 12	Documents Management	
FN-90	As a Team Lead, I want to store employee documents so I can access them when needed.	M
FN-91	As an employee, I want to store my documents so I can access them when needed.	M

7.3 Non-functional requirements

The table below gives the reader an overview of the preliminary non-functional requirements for the system using the FURPS categorizing method. FURPS is a method used to define important quality attributes such as functionality, usability, reliability, performance, and supportability [48]. The more detailed non-functional and especially security requirements will be out of the scope of this thesis and must be defined in more detail in the next stages of this initiative. It is important to emphasize that the company uses the ISO/IEC27001 information security management system (ISMS) framework, and all systems developed by the company must comply to these standards. This includes both internally used systems as well as the SaaS solutions supporting the internal processes.

Table 19. Non-functional requirements

ID	Requirement	FURPS category
NFR-1	The system must have English language localization.	Usability
NFR-2	The system must be intuitive and usable without an instruction manual.	Usability
NFR-3	The system must be convenient to use and not require unnecessary clicks and navigation to find information.	Usability
NFR-4	The error messages should be precise and guide the user to find the needed information.	Usability
NFR-5	The system must verify with a pop-up window and require confirmation if the user wants to delete data or leave a page without saving the data.	Usability
NFR-6	The system must ensure role-based access.	Usability

ID	Requirement	FURPS category
NFR-7	The system must store logs of user activities and error messages.	Usability
NFR-8	The system should be accessible 24/7.	Reliability
NFR-9	The system should have at least 99.8% available, monthly maximum downtime is 1 hour 26 minutes and 24 seconds.	Reliability
NFR-10	The system can only be accessed via Helmes Active Directory SSO.	Reliability
NFR-11	The system should log the user out after being inactive for 200 minutes.	Reliability
NFR-12	User must be able to login and log out of the application.	Reliability
NFR-13	The username password must comply with the requirements of AD.	Reliability
NFR-14	The system must comply with the GDPR regulations and Privacy by Design principles.	Reliability
NFR-15	The system must delete personal data after the expiry of a contract unless it's necessary to retain the data by law.	Reliability
NFR-16	The system must comply with the ISO/IEC27001 or equivalent standards.	Security
NFR-17	The system must follow the HTTPS protocol.	Security
NFR-18	The system must be capable to send the logs to the internally used SIEM software.	Security
NFR-19	The load-time of data should not be below 5 seconds.	Performance
NFR-20	The system must enable at least 200 concurrent users to use the application.	Performance
NFR-21	System must scale with the company, being able to handle growth up to 1000 employees per year.	Performance
NFR-22	System must be configurable in terms of the scalability of performance and memory usage.	Performance
NFR-23	The system must run on the latest versions of Chrome, Safari, Edge, and Mozilla Firefox.	Supportability
NFR-24	The system is usable with a laptop, tablet, and mobile.	Supportability
NFR-25	The system must enable integrations with other external applications.	Supportability

ID	Requirement	FURPS category
NFR-26	All connecting interfaces must be documented in the Confluence page.	Supportability

7.4 TO-BE Component diagram

The component diagram represents the TO-BE vision for the in-house built system. The blue components in the diagram represent the authentication and infrastructure. The green components are applications that have been developed in-house by the employees of the company. The red components are applications that have been outsourced. Azure Active Directory is responsible for the user authentication. The planned system would communicate with other applications via API Gateway similarly as it does now.

One additional and important integration here is related to Persona. This integration requires development on both sides to exchange the data via API Gateway. Additional applications added to the diagram would be PowerBI that would cover the functionality of HR analytics and SharePoint that would support the document management.
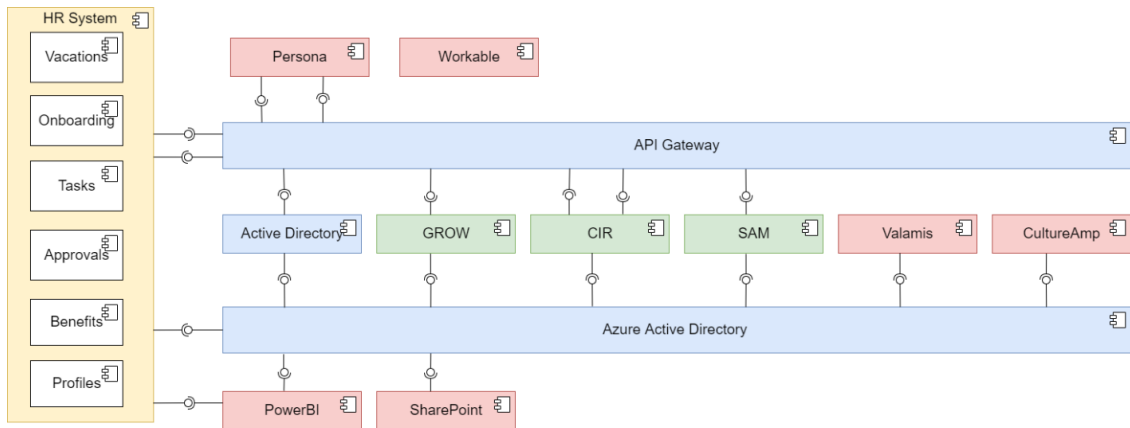
Figure 18. TO-BE Component diagram for Alternative 1, (Source: Author)

7.1 Data relations TO-BE

The following diagram illustrates the TO-BE vison between the relations of the already existing systems and the new HR system. Similarly, to the AS-IS diagram example in figure 16 the solid line represents automatic data exchange between the two systems. The main difference in this scenario is that the Excel spreadsheets would not be required

anymore as the data would be stored in the system and functionalities would be covered by the system. The internally built APIs would fetch information every hour from the HR Management system and update the employee data within the internal systems in case a change has been made.
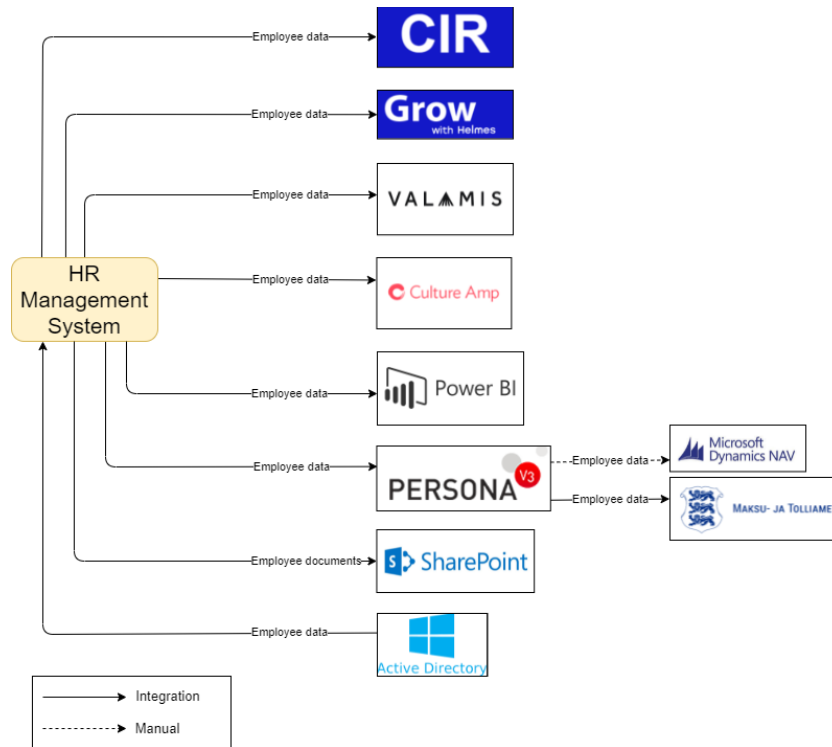
Figure 19. TO-BE relations between internal applications for Alternative 1, (Source: Author)

7.2 Estimations for development

This chapter will give an overview of the rough time estimates to build the HR System that were given by a senior analyst from Helmes AS. These estimates were done on a very high level and are based on the business rules and requirements. Additionally, the author showed the analyst one of the SaaS test environments to give him a better idea of the functionalities.

As a disclaimer for the reader, the estimations for Epics, Cone of Uncertainty must be considered since there is no complete user interface design nor fully-dressed use cases to get a more accurate estimation for the time efforts needed. For the project setup, role and permission management and integrations the estimations are more accurate since they are based on previous experiences in developing internal systems and using the same stack.

These estimations already include analysis, project management, testing and documentation.

The author also used the PERT technique to get to a more accurate number between the most optimistic and pessimistic estimations resulting the time effort to be somewhere around 3343 hours. When we apply the Cone of Uncertainty theory and multiply and assume we are at the approved product definition phase [33], the time estimation would vary between 2674 - 4178 hours. To get to that figure, the estimate is multiplied by 0.8 to get the lower and by 1.25 to get the higher end of the spectrum. The time estimations table is in the appendix 6.

The author's main intention was to get a general understanding of how much effort and cost it could bring if the company decided to develop the HR system in-house. Assuming that the average internal rate for software engineers in the company is 50 EUR the cost for building this system could vary between **133 000 – 208 900 EUR.** In addition to the development and integration costs, maintenance costs must be considered as a separate cost factor to this alternative. Since it is an internal system, the SLA conditions would not have to be as strict as they are with client-facing applications. To maintain the system after the first release to production, the author will also consider 0.25 FTE of a software engineers time as the contribution of additional maintenance cost.

7.2.1 Example of CIR

Another way to give high-level time estimations for the system would be to compare it with other similar internal systems and how much time effort was required to implement them. In 2018, the company made an investment to build an application dedicated to managing contracts and invoices – CIR. The main functionalities include contract management, invoice creation and requests, project directory and crossbills with employee internal rates.

Based on the initial evaluation and comparison of these two systems the IT Project Manager who was responsible for the CIR implementation and the Analyst estimated that building this HR System would require about twice the amount of effort. Developing CIR was an investment that cost around **110 000 EUR.** Meaning that based on this evaluation, the cost of building the HR System would be at least **220 000 EUR.**

8 Implementation of a SaaS solution

Software as a service or SaaS solutions offer cloud-based capabilities over the Internet. The main benefits for such solutions are managing the functionality without investing capital into hardware, software, and labor. SaaS solutions enable the access of services through a web browser. Generally, these solutions provide a lower cost alternative and faster implementation compared to custom software development. [48]

In this chapter, the author will introduce available SaaS products in the market as the HR Management software. Firstly, there will be an introduction of what functionalities and modules HR software usually includes and what functionalities will be required by the company. Secondly, there will be a small overview of what is being used in similar sized and global companies in the Estonian market. Next, a preselection will be made for products available in the market. Then each solution would be checked for compliance with the rules of Helmes Group. After that, a rating for each product will be conducted using the Merit Point system. The product functionality will be rated by the author, UI/UX will be rated by the HR Team who would use the product the most and pricing rating will be done based on the quotations. The following figure will show the steps of the selection process.
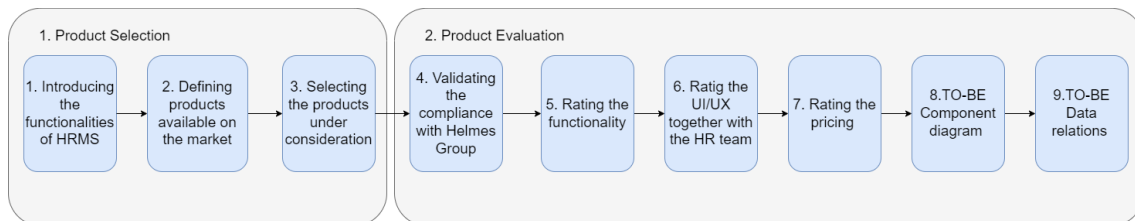
Figure 20. Roadmap for Alternative 2, (Source: Author)

8.1 Introduction to HRMS

HR technology platforms can be called as human resource management systems (HRMS) or human capital management (HCM) systems are a combination of connected modules that realize various sets of HR processes. Generally, HR software enables the automation of how companies conduct their business with employee management and employee data management within the HR processes. The software supports HR Managers and

Specialists to have more structure in their daily work and to automate the reoccurring administrative tasks. [2]

All employees require management of their information and various updates of that information as their career progresses within the company. HR software solutions can support activities such as storing and organizing data, onboarding and offboarding employees, recruiting new talent to the company, managing employee benefits, and conducting HR Analytics on a larger scale. The combination of such functionalities enables a continuous transfer of data between the modules and other internal systems. This can result in delivering HR processes in a more meaningful and efficient way. [2]

The software can have various names, where the most common ones are HRIS (Human Resource Information System), CORE HR Software, HCM (Human Capital Management) Software and HRMS (Human Resource Management System). [2]

Each of the products available on the market have their own functionalities and capabilities. Organizations are responsible for choosing the right product that would meet their business needs and would integrate well with other internal systems [2]. The following table will introduce what functionalities are mainly included in most available HR Software products on the market and whether such functionalities are required by Helmes Group.

Table 20. Product functionalities [2].

Feature	Description	Helmes Group view
CORE HR	The basis of any HRMS that is dedicated to maintaining a central employee database. This module stores various types of employee data and allows that some of the fields can be customized based on the needs of the company. The module also has a self-service functionality so that employees and managers can view and update information.	**Must have.** Currently lacking this feature. Various local systems and files are used to manage the processes.
Benefits administration	The module is responsible for managing the company benefits. It allows employees to enroll for benefits available to them, track their used benefits and view the benefit history. It has a self-service functionality for enrolment and selection. It is customizable per employee groups and locations.	**Must have.** Currently lacking this feature. Various internal systems and files are used to manage the processes.

Feature	Description	Helmes Group view
Onboarding	The module helps the company to streamline their onboarding processes. It allows creating various onboarding packages depending on the location or employee group. It automates activities such as e-mail distributions, meeting invitations, helps to track the ongoing tasks and collaborate with other employees in the company.	**Must have.** Currently lacking this feature. Various internal systems and files are used to manage the processes.
HR Analytics	The module is responsible for helping to convert HR data into analytical reports and dashboards. This could result in better collaboration between departments and give an insightful overview of the people who work for the company. The module could also support the decision-making process for managers and enable to find certain patterns within the data.	**Must have.** Currently lacking this feature. Currently only one static table is manually kept for employee headcount.
Workforce Management/ Leave Management	The module enables to manage work schedules, employee attendances, vacations, and schedule forecasts. Also allows employees to sign up for various shifts for open work schedules. It can also help to track the employee performance and do analytics based on employee attendance.	**Must have.** Due to the nature of the business, only leave management would be required from this module. Helmes AS covers this functionality with Persona.
Compensation Management	The module enables to manage compensation models, compare compensation levels per role, initiate bonuses, and changes in the compensation. The module would have integrations with payroll and leave management and would deliver seamless data flow.	**Must have.** Currently lacking this feature. Various internal systems and files are used to manage the processes.
HR Compliance	The module is responsible for ensuring the company is compliant with the laws and regulations in each location it operates. It includes the centralization of important company rules and documentation. Also allows storing employee related documents that due to regulations must be stored and available for those who request them.	**Should have.** Currently lacking this feature. Helmes AS would not need this feature due to the low bureaucracy in Estonia. It would be nice to have in other locations.
Recruitment	The module is responsible for managing, tracking, sourcing, and communicating with candidates for open positions. It helps to keep a network and store the communications, meeting notes and documents from candidates in the pipeline.	**Will not have.** Currently out of scope and covered by an existing ATS – Workable.
Payroll	The module is responsible for payroll and helps to ensure the accuracy of calculations	**Will not have.** Currently out of scope and covered

Feature	Description	Helmes Group view
	based on the employee profile that were set in the CORE HR module. That includes salary, workload, and salary payment intervals.	by an existing payroll system. For example, Persona in Helmes AS.

8.2 Products Available on the Market

To determine the most suitable HR software solution for the Helmes Group, the author decided to research what are the available products on the market. G2 is one of the largest peer-to-peer review sites for business software. The platform requires users to authenticate themselves via LinkedIn to ensure the authenticity of the review. Additionally, the platform tries to identify fake user reviews via algorithms and requires screenshots from the reviewer using the software before submitting their review. All reviews are manually screened and later validated to minimize publishing information that is biased or not useful. [49]

All scores from the reviews for business software are aggregated and added to The Grid that acts like the Gartner's magic quadrant review model but with slightly different parameters – Contenders, Leaders at the top and Niche and High Performers at the bottom. The x-axis represents the satisfaction and y-axis the market presence. The main goal of G2 is to support companies to make better technology decisions if they are considering implementing a new or changing an information system in their company. The following image shows The Grid for HRMS products reviewed by the users. [2]
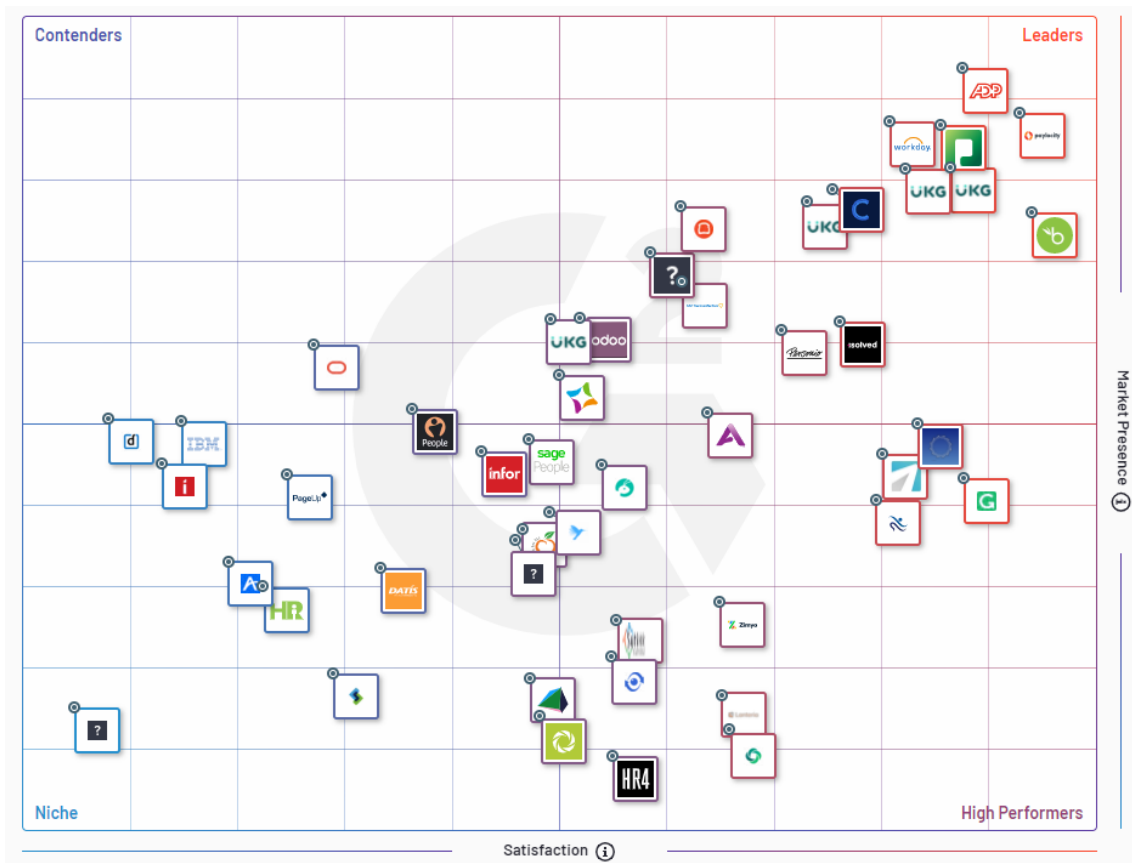
Figure 21. G2 Grid® for Human Resource Management Systems [50].

The author decided to contact eight highly rated solution providers and request for a demo and see if their products could be suitable for Helmes Group in terms of pricing and functionality. Large ERP corporations such as SAP, Oracle and Microsoft Dynamics were excluded from the consideration as their cost would most likely be much higher and they would have complex functionalities that would not be required for Helmes Group.

8.3 Products Used in the Estonian Market

As the author was contacting and researching the highly reviewed products on G2, it became evident that unfortunately many of them were only dedicated to the North American market and would not be available for European companies. Additionally, many were also only focused on the payroll functionality that is out of scope. To expand the research and products to be considered, the author reached out to her network of friends and acquaintances who work for similar sized technology companies in Estonia. These companies had a global presence like Helmes Group and were also recruiting employees with a similar profile – software engineers. The author asked what HR Management System their company was currently using to support the HR processes. The

companies who had their own custom developed software were excluded from this selection. The table below shows a list of technology companies and what software they use to support their HR processes.

Table 21. List of companies

Company	HRMS used	Countries	Employees
Company 1	BambooHR	8	+ 900
Company 2	BambooHR	2	+ 140
Company 3	BambooHR	2	+ 150
Company 4	BambooHR	4	+ 400
Company 5	BambooHR	4	+ 200
Company 6	BambooHR	2	+ 165
Company 7	WorkDay	3	+ 1000
Company 8	WorkDay	45	+ 4000
Company 9	hiBob	2	+ 300
Company 10	hiBob	2	+ 1000

These findings solely rely on the network of the author and no official interviews were planned with the employees of these companies. The main purpose was just to expand the list HR Systems that could be considered for Helmes Group. Their user experience and feedback were not considered nor discussed. Knowing that these systems are already used by companies in Estonia, gave additional confidence that they could also be implemented in Helmes Group.

8.4 Products Selection

The next step was to preselect some of the top-ranking companies in the list from G2 that would be suitable for the market and contact them via their website to book an introduction meeting and a demo. As a result, three products were preselected for further analysis.

The table below will give an overview of products under the initial review. Additionally, it includes their rating at G2 and the amount of reviews each product had. The ratings and review count does not mean that the product would cover all the requirements of the Helmes Group. It will just give confidence that there are many satisfied users around the world who recommend the product to others.

Table 22. Products under review

Company	G2 Rating	Reviews
ADP WorkForce Now	4.1	3108
Paylocity	4.5	1932
WorkDay	4	1143
Bamboo HR	4.4	1044
UKG Pro	4.2	1384
Personio	4.4	133
hiBob	4.3	177
Rippling	4.8	1133

Based on these results on the initial contact was made to verify if their availability in the markets where the company plans implement them. After opting out products unsuitable or not matching the entry criteria or for Helmes Group markets, three products were selected, and initial introduction meetings were planned. The author shared the main list of requirements of Helmes Group before the meeting to ensure the representatives could be better prepared on which functionalities they would need to share during the meeting. After each meeting, the author requested credentials to their test environment to test the products together with the HR team. Additionally, the pricing models for each product were requested considering that there would be 450 employees using the software to cover the current business needs of Helmes Group. As the quotes sent by the service providers were confidential the author decided to anonymize their names in the further analysis.

8.5 Comparison of the products

The comparison and results for each product will be done in four sections. The first section will be the general requirements for the product to be compliant with Helmes Group. The next three sections – Requirements rating, UI/UX and pricing will each have a weight to their rating and will support the final decision-making. The weights for each of the rating criteria were set by the Global HR Manager and the IT Project Manager of Helmes Group. The sections and the methodology are described as follows:

1. The entry criteria whether the product is compliant with the requirements of Helmes Group. If any of the requirements is not met – the product must be opted out.

2. The functionality ratings for each of the **Must Have/Should have** requirements described in the business analysis section. Each of the functionalities is evaluated, using the credentials provided for testing purposes. The results would be summarized, and the section will have a 20% weight for the final score.

3. The UI/UX rating where the global HR team tested the products and completed a survey by giving a rating. The average score for each of the products will have a 20% weight for the final score.

4. The product pricing that will include the implementation costs and a summarized 3-year annual cost if the Helmes Group would grow 10% annually. This will be based on the quotes each service provider gave and their pricing models that change according to the user count. This section will have the largest weight for the final score – 60%.

8.5.1 The entry requirements

The following table will compare and evaluate whether the three selected products are compliant with the rules and regulations of the Helmes Group. In case one of these criteria is not met, the product will be opted out.

Table 23. Evaluation criteria

	Company A	Company B	Company C
Azure AD Integration	X	X	X
An open API to extract and update data	X	X	X
Customer support	X	X	X
GDPR Compliance	X	X	X
Security - ISO/IEC27001	X	X	X

In addition to the entry requirements, there were other nice-to-have functionalities that the author has included in the table below. The available integrations between these external applications enables to exchange the data with the built-in logic and this would not need any development effort on the Helmes' side.

Table 24. Additional functionalities

	Company A	Company B	Company C
Available integrations with internal systems	Workable, CultureAmp, Valamis	Workable, Valamis	-
Mobile readiness	X	X	X

8.5.2 The functionality ratings

The functionality ratings table includes the results of testing the products. The scale used to calculate these results defines 0 – Missing functionality, 1 – Lacking most of the functionality, 3 – Missing some of the functionality and 5 – Full and expected functionality. The weight of this section is 20%, meaning that the product gaining the highest score will get 20 points. The rest of the products results will be correlated to the best score.

Table 25. Product evaluation

Functionality - Weight 20%	Epic	Company A	Company B	Company C
Employee onboarding	Epic 7	5	5	5
Moving the employee to another department	Epic 2	5	5	5
Benefits Management	Epic 8	5	5	3
Changing the employee role and title	Epic 2	5	5	5
Changing employee compensation	Epic 6	5	5	5
Changing the workload	Epic 6	5	5	5
Changing employment type	Epic 6	5	5	5
Updating personal information	Epic 2	5	5	5
Requesting vacations	Epic 9	5	5	5
Approving vacation	Epic 9	5	5	5
Manage documents	Epic 12	5	5	5
Employment history	Epic 6	5	5	5
Employee offboarding	Epic 7	5	5	3
Reports: Headcount dynamics	Epic 11	5	5	5
Reports: Contract types	Epic 11	5	0	5
Report: Headcount by roles	Epic 11	5	5	5
Report: Employee turnover by country	Epic 11	5	5	5
Report: Newcomers and leavers	Epic 11	5	5	5
Total		**90**	**85**	**86**
Final functionality score		**20.00**	**18.89**	**19.11**

To summarize, all three products had extensive capabilities and most or all the Helmes Group requirements can be covered by them. Based on the initial testing by the author and stakeholders, all of these solutions would be suitable for implementation.

8.5.3 UI/UX ratings

The author also included the global HR team in the product testing and requested to simulate their daily work by using each product. For all products, one week of testing was given and once all of them were tested by everyone, a simple survey was sent to them to collect and structure their feedback. This was later finalized by a collective meeting where the survey results were shared and where everyone was able to share their experiences and opinions about the solutions they had tested.

Since the HR processes and responsibilities can vary for every location, the author decided not to give any strict test cases to the team during the week of testing. The only suggestion made was to simulate various scenarios that already happen in their daily work such as employee onboarding and offboarding, changing employee data, leave management and document management. No instructions on how to use the product or where to find the sections were given to the team to measure how intuitive the solutions were.

The UI/UX table ratings are combined based on the survey conducted within the HR team answering the following question – How would you rate the UI/UX for the product on a scale of 1-5. The weight of this section is 20%, meaning that the product gaining the highest score will get 20 points. The rest of the products results will be correlated to the best score.

Table 26. UI/UX Scores

UI/UX - Weight 20%	Company A	Company B	Company C
Average rating 1-5	4.67	4.87	3.67
Final UI/UX score	**19.18**	**20.00**	**15.07**

The questionnaire example can be found in the Appendix 5.

8.5.4 Pricing ratings

The pricing ratings' table was based on the quotes given by each provider. The author assumed that the employee count would grow 10% annually following the current trends. The price changes were also considered in the calculation based on the quotes from the

service providers. It was decided to calculate the pricing for three years as within that timeframe the solution would remain feasible and would still be in active use.

Table 27. Pricing overview

Price - Weight 60%	Company A	Company B	Company C
2022			
Monthly price per user (EUR)	3.97	9.9	5.54
Annual cost for 447 users	21 294	53 103.6	29 716.56
2023			
Monthly price per user (EUR)	3.97	9.9	5.54
Annual cost for 492 users	23 438.88	58 449.6	32 708.16
2024			
Monthly price per user (EUR)	3.97	9.9	5.53
Annual cost for 542 users	25 820.88	64 389.6	35 967.12
Summary			
Total cost for 3 years	70 553.76	175 942.8	98 391.84
Implementation costs	4160.55	50 000	23 390
Additional costs			2160
Total cost for 3 years	74 714.31	225 942.8	123 941.84
Final Price Score	**60.00**	**19.84**	**36.17**

It is important to note that these calculations do not include the cost of integrating with other internally used systems. This will be covered in the results comparison and also require further analysis in case the company decides to go with alternative 2

8.6 Results

The final score for each solution is combined in the table below:

Table 28. Final scores

	Company A	Company B	Company C
Functionality - Weight 20%	20.00	18.89	19.11
UI/UX - Weight 20%	19.18	20.00	15.07
Pricing - Weight 60%	60.00	19.84	36.17
Final Score	99.18	58.73	70.35

Based on the evaluation – Company A gained the highest score in the functionality and pricing evaluations. The Company B platform had the best user interface and user experience based on the ratings given by the HR Team, but due to its very high price it lost a lot of points in the evaluation. The Company C solution in terms of pricing was more competitive, but due to the low score in the UI/UX evaluation it lost a lot of points.

8.6.1 Financial impact

Based on the quotes given by the three companies, the author also created an overview of the financial impact of using these solutions if the employee headcount would change over the years. The following figure will compare the annual cost for each solution depending on the employee count.
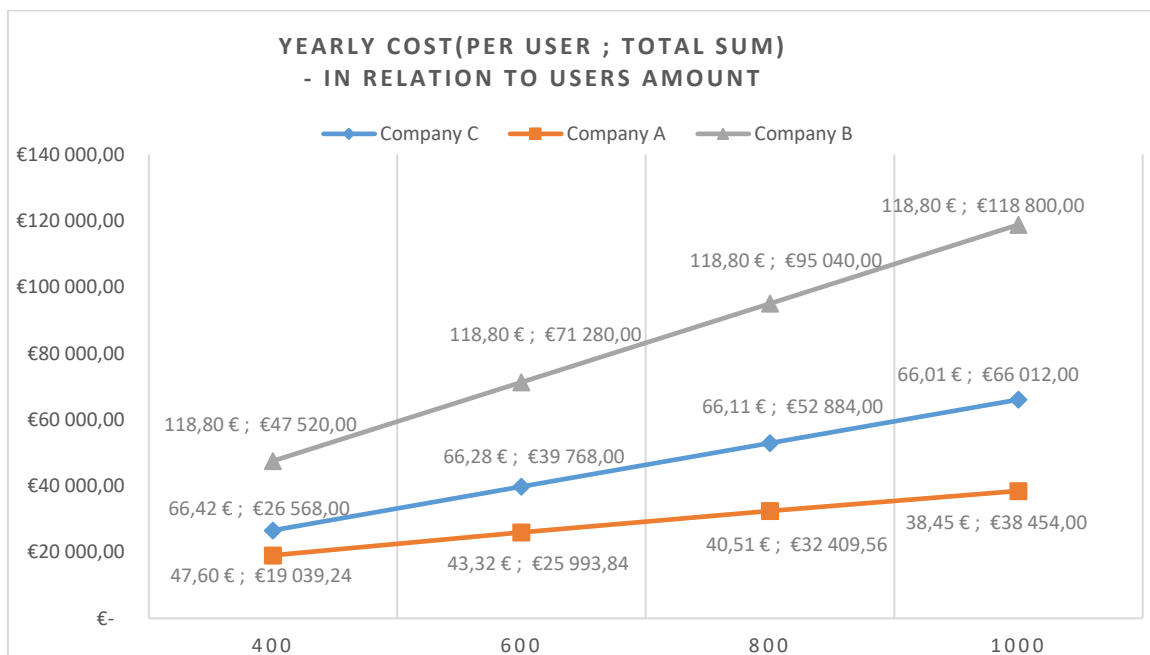
Figure 22. Annual costs in relation to users, (Source: Author)

Company A and Company B offer a license-based pricing and Company C is price changes in increments after 100 new users join. Based on the cost analysis once the user base increases to 1000 employees Company A solution will become more cost-effective due to the discount that the company proposed in their quote and an annual cost per user will change from 47,60 EUR to 38,45 EUR. For Company C the price change would be minimal and for Company B solution, no discount was initially proposed.

8.6.2 Component diagram TO-BE

This component diagram represents the TO-BE vision for implementing a SaaS solution. The blue components in the diagram represent the authentication and infrastructure. The green components are applications that have been developed in-house by the employees of the company. The red components are applications that have been outsourced. Azure Active Directory is responsible for the user authentication. The new system would communicate with other applications via API Gateway similarly as it does now.
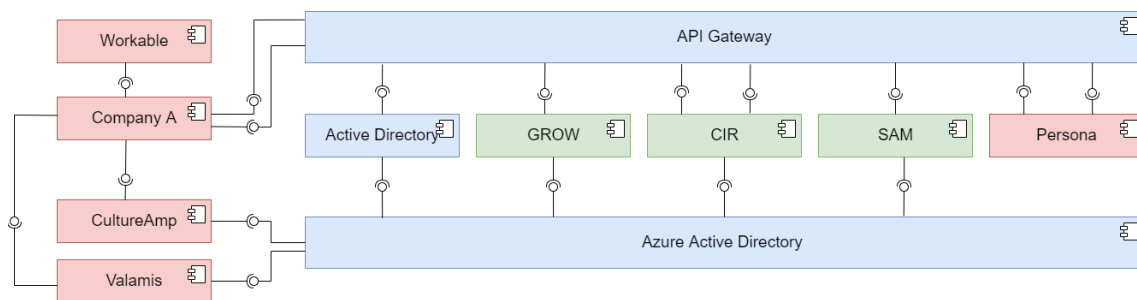
Figure 23. TO-BE component diagram for Alternative 2, (Source: Author)

8.6.3 Potential relations between internal systems TO-BE

As an example, the author created a figure to showcase the vision of how the internal systems would correlate with Company A if it were to be implemented. Ideally, the employee account creation could even be triggered from the ATS Workable since they have a built-in integration already available. Since Company A has an Open API, the rest of the systems would require additional development effort to build the integrations and realize the vison author had when mapping out the TO-BE processes. To implement the solution that correlates to the TO-BE vision, there are three types of integrations that need to be considered.

1) Integrations between the external applications – Workable, CutureAmp and Valamis. Since these are already popular products in the market, Company A has built-in integration capabilities, and these could require configuration by the service provider. If that is the case, the cost and effort are yet to be determined and can only be known, if the company decides to move forward with the product. There is also a possibility that the connection between the applications could be configured using an admin panel and no cost would be added.

2) Integrations between API Gateway and Persona – this requires development efforts from both sides. Once a decision has been made, Helmes AS would need to get a quote from Persona based on the defined requirements.

3) Integrations with internal applications – GROW and CIR. These APIs require in-house development and can be based on the estimations conducted in the previous chapter.
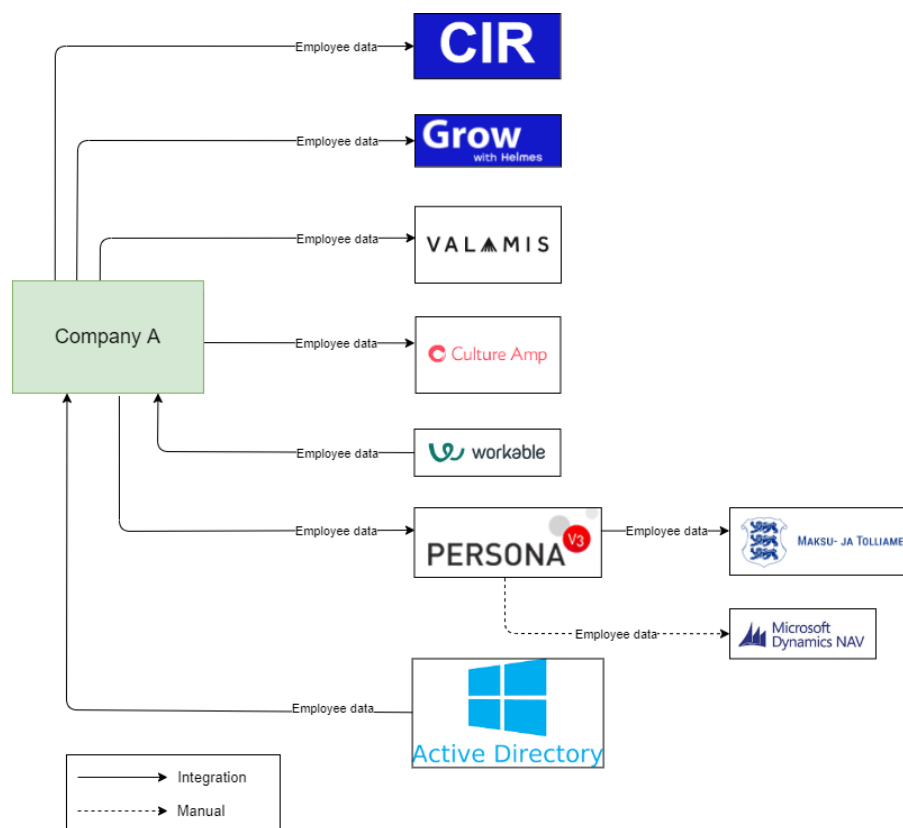
Figure 24. TO-BE relations between internal applications for Alternative 2, (Source: Author)

9 Results

In this chapter, the author will summarize the results of this thesis. For both alternatives costs comparisons are created together with a SWOT analysis. The last chapter is dedicated to the suggestions from the author.

9.1 Total Cost of Ownership

This chapter is dedicated to give an overview of the estimated costs for both alternatives if we assume using either of these systems for three years. The table below has a couple of important assumptions and disclaimers, as more information needs to be gathered to provide a more accurate cost estimation.

- The estimations for Alternative 1 are done on a high level and the actual development, integration and three-year maintenance costs could vary between **205 000 – 280 900 EUR.**

- The cost for the development and integration with Persona needs to be quoted for to include this cost in the comparison table. The effort for both alternatives would be the same.

- The integrations between external applications for Alternative 2 require more analysis and might add additional cost.

- The maintenance costs for Alternative 1 assume that **0.25 FTE** of software engineers time will be dedicated to support and maintenance of the application.

Table 29. Cost comparison

Cost type	Alternative 1 - Build	Alternative 2 - Buy
Implementation costs	0	4160 EUR
Development costs	136 816 EUR	0
Integrating internal applications	19 666 EUR	5333 EUR
Integrating external applications	10 666 EUR	0
API development in Persona	-	-

Cost type	Alternative 1 - Build	Alternative 2 - Buy
Maintenance costs for 3 years	72 000 EUR	0
License cost for 3 years	0	70 553 EUR
Total estimated cost for 3 years	**239 149 EUR**	**80 046 EUR**

9.2 Alternative 1 – Development of a new HR Management System

This chapter dedicated to the SWOT analysis for Alternative 1.

Table 30. Alternative 1 SWOT

Strengths	Weaknesses
• Company has in-house competencies and experience in developing internal systems. • Allows to customize the software exactly to the internal processes and create additional value with unique functionalities. • Allows to build seamless integrations with the internal systems. • Allows to add additional functionality later down the line to support other stakeholders such as accounting. • The company would have the intellectual property of the code. • The company can select their own tech stack for development. • The company would have a better control over system updates, security measures. • Feedback and feature requests directly from the employees can be considered and added in future releases. • No data cleansing and migrations required for the existing databases.	• Based on the estimated time efforts, the implementation of the system could take over a year with two dedicated software engineers. • The cost of this alternative is three times higher, based on the high-level estimates. • The maintenance costs are difficult to estimate at this stage. • End-user support is required after the first release. • The software tech stack will require upgrades throughout its lifecycle. • There are already 25 open software engineer positions in the company to fulfil the demand from the core business. Currently there is a lack available resources to dedicate to developing such a large internal system. • Potential profit would be lost as the engineers would not work on customer projects. • In case someone from the project leaves the company, knowledge transfer is required.

Strengths	Weaknesses
	• Since product development is not in the core business of the Helmes Group, the system would only be for internal use and would not be sold to other companies.
Opportunities	**Threats**
• In case the company changes its business model into product development, the solution could be sold as SaaS in the future. • Depending on its lifecycle the system might be able to pay itself off in the long run due to the scalability and unique functionality.	• The project goes over budget and passes the deadline. • The project would be delayed since recruitment takes longer than expected. • Some of the functionalities will not be used by the stakeholders. • As this is an internal system the documentation created for it is not sufficient for future developments of knowledge transfer.

9.3 Alternative 2 – Implementation of a SaaS solution

This chapter dedicated to the SWOT analysis for Alternative 2.

Table 31. Alternative 2 SWOT

Strengths	Weaknesses
• The functionalities required by the company are quite standard and most of the SaaS solutions on the market cover these requirements. • The application would be implemented to the support functionalities of the company and would be a less strategic application not requiring complex advancements in the future. • The cost is much lower compared to the build alternative.	• Complete dependency on the vendor. In case any new functionality is required it would either result in additional cost or waiting time until implementation. • The costs for long term can grow significantly and additional licenses are required when the company grows. • The decisions regarding the software are being done by the vendor. • To realize the TO-BE vision additional developments are still

Strengths	Weaknesses
• The software can be implemented within a few months. • No maintenance costs. • The provider is responsible for updating the tech stack and maintenance. • Built-in integrations with other external tools • The SaaS solution has a large user base globally and it is already used within the Estonian market by similar companies • The SaaS solutions have mobile applications making it easier to use for the employees.	required to use the Open API that the SaaS solution has. • The company will rely on support of the vendor in case of incidents.
Opportunities	**Threats**
• The provider is responsible for creating new functionality to the product and the requirements would come from a large community of users and domain experts. This could lead to additional process improvement.	• Company must adjust their internal processes around the software. • Vendors can be exposed to their own micro and macro-economic issues and no longer be viable or maintain the service. • The solution would generate additional workload to the stakeholders as the analysis done prior left out important aspects that were not considered.

9.4 Suggestions from the Author to the Helmes Group

Based on the analysis conducted so far, the author suggests that Helmes Group would choose to go with Alternative 2 and implement a SaaS solution to support the HR processes. From the three alternative solutions Company A had the best score from the selection criteria of functionality testing, UI/UX and pricing. It is currently complicated to see if the TO-BE vision would be realized in the same way and how much automation could be achieved. Yet, the test environments did show a lot of potential of covering all

the business and functional requirements. Based on chapter 2.2 the main factors SME companies consider in making the build or buy decision are described in the table below:

Table 32. Factors to consider [8]

Factor	Justification
The strategic and competitive advantage	This application would not directly support the core business and would only serve the support functions. The requirements for functionalities are related to the most common and mature HR processes that any organization has.
The cost	The cost for implementation, licenses and integrations are about three times lower compared to building the software in-house when we consider a three-year timeline of usage.
Scale and complexity	The application would be a straightforward workflow management tool that supports the HR processes and would not require complex technologies or algorithms to be built in to meet the business requirements.
Requirements fit	All the SaaS solutions the author tested covered the main business requirements of the Helmes Group. These are matured processes that are common in most businesses.
Time	Due to the growth, trends and ongoing progress of opening two additional locations within the group the implementation of such a system is rather time critical. The SaaS solutions could potentially be implemented within a few months while building the solution could take years.
In-house information systems expertise	The company has in-house expertise meaning it could support the build option with these competences. On the other hand, these competences can also support integrating the SaaS solution with the existing internal applications and use the Open API capabilities of the product.
Risks	The risks related to the vendor viability and implementing a solution large solution are mild as they have a big userbase represented in various countries.
Support structure	The company has experience in building internal systems and integrating them via various in-house developed APIs. In recent years, the company has added several new SaaS solutions to the internal systems portfolio. Hence, there are competences and previous experience to support the implementation.
Operational	The company has experienced both, buying and building the software to support the internal processes. Considering the market situation, lack of resources and the time criticality the company should consider Alternative 2.
Intellectual Property	Company has no interest in owning the IP of the HR Management system nor has any intentions of selling it.

Summary

The primary goal of this thesis was to analyze how implementing a global HR Management system throughout the organization could add value to the company by improving its internal processes. The author set out to find answers to the following questions: 1) How would the implementation of a global HR Management system improve the current HR processes? 2) What alternative would be more feasible for the company – building the software in-house or implementing a ready-made a SaaS solution?

To answer to these research questions and present the results to the company the author completed the following activities and gave:

- An overview of the academic literature that would support the steps of this thesis.

- An overview of the company's strategic objectives and capabilities.

- An overview of the stakeholder perspective to justify the changes within the processes.

- An overview of AS-IS and the vision TO-BE processes and stakeholder responsibilities.

- An overview of the currently used internal applications and their functions in supporting the processes.

- An overview of the business, functional and non-functional requirements.

- An overview of the AS-IS component diagram together with the data relations between internal systems.

- An overview of the TO-BE component diagram and relations between both systems for both alternatives.

- An overview of the financial implications for both alternatives.

- An overview of both alternatives using the SWOT analysis technique.

Based on the completed activities the conclusion for the thesis is that:

1. The implementation of a global HR Management system would benefit the organization in many aspects by improving and aligning its internal processes.

    a. From the group perspective it would give the company an advantage when entering to new markets by having a globally usable application in place to support HR related activities.

    b. From the organization perspective it would support the growth trends by eliminating manual tasks and providing better visibility of key HR metrics. Based on the preliminary estimations of the HR team, implementing the system would result in saving at least 33% of their time that could be used on more valuable activities such as recruitment.

    c. From the employee perspective it would improve the internal HR processes and give an overview of historical changes within the employee's lifecycle in the company and resulting in better informed decisions.

2. Implementing a ready-made SaaS solution would be more feasible mainly due to the financial implications and time efforts that are required for implementation. The more detailed justification for this decision is described in chapter 9.4.

The research questions for this thesis have been answered by the author and the primary goal has been achieved. In the next steps the company should finalize the decision and can use the results of thesis to support the decision-making process of either building the software or choosing the right product for Helmes Group.

References

[1] M. Holliday, "Oracle NetSuite," Oracle, 2020. [Online]. Available: https://www.netsuite.com/portal/resource/articles/human-resources/human-resources-management-system-hrms.shtml.

[2] "Best HR Software," [Online]. Available: https://www.g2.com/categories/hr.

[3] K. M. Weena Yancey Momin, "HR Analytics as a Strategic Workforce Planning," *International Journal of Applied Research,* 2015.

[4] D. U. Thomas Rasmussen, "Learning from practice: how HR analytics avoids being a management fad," *Organizational Dynamics,* vol. 44, p. 236—242, 2015.

[5] Y. C. C. C. Saba Colakoglu, "Collaboration-based HR systems and innovative work behaviors: The role of information exchange and HR system strength," *European Management Journal ,* 2021.

[6] A. N. I. Asit Shahzad, "Build Software or Buy: A Study on Developing Large Scale Software," *IEEE Access,* vol. 4, 2017.

[7] P. W. F. Z. Olga Gomez, "Build or Buy: A case study for ERP system selection in SMEs," *Human-Computer Interaction Theory, Design, Development and Practice,* p. 23–33, 2016.

[8] G. C. L. L. W. Farhad Daneshgar, "An investigation of 'build vs. buy' decision for software acquisition by small to medium enterprises," *SciVerse ScienceDirect,* 2013.

[9] I. 29148:2011, Systems and software engineering — Life cycle Processes Requirements Engineering.

[10] "What are Functional and Non-Functional Requirements and How to Document These," 09 April 2021. [Online]. Available: https://enkonix.com/blog/functional-requirements-vs-non-functional/.

[11] D. B. Ruth Malan, "Functional Requirements and Use Cases," [Online]. Available: https://www.bredemeyer.com/pdf_files/functreq.pdf.

[12] I. Project Management Institute, A guide to the project management body of knowledge (PMBOK guide) Sixth Edition, Project Management Institute, 2017.

[13] J. F. G. Joseph S. Valacich, Modern Systems Analysis and Design, 2017.

[14] N. B. P. V. E. P. D. M. M. S. D. L. G. F. T. L. R. S. Tony Benedict, BPM CBOK Version 3.0, 2013.

[15] "Requirement Gathering Techniques," [Online]. Available: https://www.tutorialspoint.com/business_analysis/business_analysis_requirement_gathering_techniques.htm.

[16] "11 Requirements Gathering Techniques for Agile Product Teams," [Online]. Available: https://www.jamasoftware.com/requirements-management-guide/requirements-gathering-and-management-processes/11-requirements-gathering-techniques-for-agile-product-teams.

[17] E. Hosiaisluoma, ArchiMate Cookbook, 2019.

[18] "ArchiMate," Wikipedia, [Online]. Available: https://en.wikipedia.org/wiki/ArchiMate.

[19] A. v. D. Arned Stemerding, "Business Process Modelling, Basic guidelines and tips," *Deloitte booklet.*

[20] S. A. White, "Introduction to BPMN," *Business Process Trends,* 2004.

[21] M. R. R.-C. Cristina Cabanillas, "Mixing RASCI Matrices and BPMN Together for Responsibility Management," *VII Jornadas en Ciencia e Ingeniería de Servicios,* 2011.

[22] K. A. Q. P. M. Khan, "Impact of RACI on Delivery & Outcome of Software Development Projects," 2014.

[23] I. I. o. B. Analysis, BABOK v3 - A Guide To The Business Analysis Body of Knowledge v3, 2015.

[24] J. M. D. SANTOS, "Understanding Responsibility Assignment Matrix (RACI Matrix)," PM Project Management, 2021. [Online]. Available: https://project-management.com/understanding-responsibility-assignment-matrix-raci-matrix/.

[25] "Object Oriented Approach," [Online]. Available: https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_object_oriented_approach.htm.

[26] J. M. S. H. Y. W. S. P. Konstantinos Tsilionis, "Conceptual Modeling Versus User Story Mapping: Which is the Best Approach to Agile Requirements Engineering?," p. 356–373, 2021.

[27] M. REHKOPF, "What are agile user stories?," Atlassioan Agile Coach, [Online]. Available: https://www.atlassian.com/agile/project-management/user-stories.

[28] "What is a user story?," [Online]. Available: https://www.mountaingoatsoftware.com/agile/user-stories.

[29] "MoSCoW Prioritization," [Online]. Available: https://www.productplan.com/glossary/moscow-prioritization/.

[30] "20 Product Prioritization Techniques: A Map and Guided Tour," [Online]. Available: https://www.career.pm/briefings/product-prioritization-techniques.

[31] F. A. A. A. Ali Idri, "Accuracy Comparison of Analogy-Based Software Development Effort Estimation Techniques," *NTERNATIONAL JOURNAL OF INTELLIGENT SYSTEMS,* vol. 31, p. 128–152, 2016.

[32] K. P. J. B. P. S. N. Muhammad Usman, "Developing and using checklists to improve software effort estimation: A multi-case study," *The Journal of Systems and Software,* vol. 146, p. 286–309, 2018.

[33] A. B. Evita Coelho, "Effort Estimation in Agile Software Development using Story Points," *International Journal of Applied Information Systems ,* vol. 3, no. 7, 2012.

[34] C. S. B. B. Pongtip Aroonvatanaporn, "Reducing Estimation Uncertainty with Continuous Assessment: Tracking the "Cone of Uncertainty"," *Proceedings of the IEEE/ACM international conference on automated software engineering,,* pp. 337-340, 2010.

[35] T. Little, Schedule Estimation and Uncertainty Surrounding the Cone of Uncertainty, IEEE Computer Society, 2006.

[36] A. Abran, Software Project Estimation The fundamentals for Providing High Quality Information to Decision Makers, IEEE computer society, 2015.

[37] V. L. J. R. J. H. Jurka Rahikkala, "Top management support in software cost estimation. A study of attitudes and practice in Finland," *International Journal of Managing,* vol. 8, no. 3, pp. 513-532, 2015.

[38] WikiBooks, "Introduction to Software Engineering," [Online]. Available: https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering#Software_ Engineering.

[39] M. Bell, "Project Management Academy," Project Management Academy, [Online]. Available: https://projectmanagementacademy.net/resources/blog/a-three-point-estimating-technique-pert/.

[40] "Project management Institute," [Online]. Available: https://www.pmi.org/pmbok-guide-standards/lexicon.

[41] D. Fourie, "What is PERT and how can we use it?," 8 March 2015. [Online]. Available: https://www.linkedin.com/pulse/what-pert-how-can-we-use-dave-fourie-pmp-prince2-/.

[42] H. i. documents, "Helmes Quality Management System QMS," 2021.

[43] M. D. L. R. M. A. Reijers, Fundamentals of Business Process Management, 2013.

[44] H. AS, "KPI's and Objectives," [Online].

[45] [Online]. Available: https://oska.kutsekoda.ee/wp-content/uploads/2022/01/OSKA_IKT_uuringu-lyhiaruanne_2021.pdf.

[46] F. P. OÜ, "ICT SECTOR COMPENSATION SURVEY ESTONIA 2021," 2021.

[47] "What is employer branding?," [Online]. Available: https://resources.workable.com/hr-terms/what-is-employer-branding.

[48] "Nonfunctional Requirements," Scaled Agile, 10 February 2021. [Online]. Available: https://www.scaledagileframework.com/nonfunctional-requirements/.

[49] R. Steingerg, ITIL Service Operation, 2011.

[50] "G2 Crowd," [Online]. Available: https://en.wikipedia.org/wiki/G2_Crowd.

[51] L. S. Sterling, The Art of Agent-Oriented Modeling, London: The MIT Press, 2009.

[52] H. AS, "Organization structure," 2021.

[53] "G2 Grid® for Human Resource Management Systems," [Online]. Available: https://www.g2.com/categories/human-resource-management-systems#grid.

Appendix 1 – Non-exclusive license for reproduction and publication of a graduation thesis[1]

I Esther Lätte

1. Grant Tallinn University of Technology free license (non-exclusive license) for my thesis, supervised by Meelis Lang
    1.1. to be reproduced for the purposes of preservation and electronic publication of the graduation thesis, incl. to be entered in the digital collection of the library of Tallinn University of Technology until expiry of the term of copyright;
    1.2. to be published via the web of Tallinn University of Technology, incl. to be entered in the digital collection of the library of Tallinn University of Technology until expiry of the term of copyright.
2. I am aware that the author also retains the rights specified in clause 1 of the non-exclusive license.
3. I confirm that granting the non-exclusive license does not infringe other persons' intellectual property rights, the rights arising from the Personal Data Protection Act or rights arising from other legislation.

19.05.2022

---

1 The non-exclusive licence is not valid during the validity of access restriction indicated in the student's application for restriction on access to the graduation thesis that has been signed by the school's dean, except in case of the university's right to reproduce the thesis for preservation purposes only. If a graduation thesis is based on the joint creative activity of two or more persons and the co-author(s) has/have not granted, by the set deadline, the student defending his/her graduation thesis consent to reproduce and publish the graduation thesis in compliance with clauses 1.1 and 1.2 of the non-exclusive licence, the non-exclusive license shall not be valid for the period.

Appendix 2 – Processes AS-IS

This appendix includes the following HR processes that were drawn out using the BPMN technique:

- Employee onboarding

- Employee offboarding

- Headcount reporting

Onboarding process

Team Lead | **Candidate** | **HR Specialist** | **HR Manager**

Accepted proposal → Request employee personal data

Share personal data

Send Email to confirm employment contract details

Share the employment contract details → Create/send employment contract

Sign and send employment contract (HR Manager)

Sign and send employment contract (Candidate)

Save contract to employee folder — Employment Contract.doc

Create an account in SAM

Order assets to employee

Share the details in Onboarding Chat

Send an introduction Email to the employee

Send the Welcome Email — Work Description.doc, GDPR Agreement.doc

Sign/send requested documents

Save signed documents to the employee folder — Kokkuleppeed.xlsx

Update files — Lepingute register.xlsx, Internal rates.xlsx

Fill in the employee data in Persona — Onboarding.xl sx

Update CIR/GROW

Employee On-boarded

114

Offboarding process

Employee	HR Specialist	HR Manager	Team Lead

Team Lead
- Announcement (start)
- Notifies the HR manager

HR Manager
- Plans an exit interview
- Creates a ticket in SAM
- Signs and sends contract
- Conduct exit interview
- Employee offboarded (end)

Employee
- Writes a resignation letter
- Sends resignation letter
- Signs and sends the contract

HR Specialist
- Saves letter to the employee folder (Resignation Letter.doc)
- Notify the Offboarding Teams chat
- Prepares and sends contract
- Saves contract to the employee folder (Contract appendix.doc)
- Notify Accountancy
- Update the Offboarding table (Offboarding.lsx)
- Archive the employee folder
- Delete Personal access (Kokkulepped.xlsx)
- Update Kokkulepped table

115

Headcount reporting process

HR Manager	Global HR Manager

Wants to create a report → ● (start)

↓

Opens Confluence Page

↓

◇ **Have all locations reported their headcount figures?**

- **no** → **Requests the figures to be updated** → **Update the Headcount table** → **Notifies about the updated figures**
- **yes** → **Copies the table to an Excel file**

Notifies about the updated figures → **Copies the table to an Excel file**

↓

◇ **Do I have access to all data needed for the report?**

- **no** → **Request additional data** → **Create a report with the requested data** → **Send the report**
- **yes** → **Finalizes report**

Send the report → **Finalizes report**
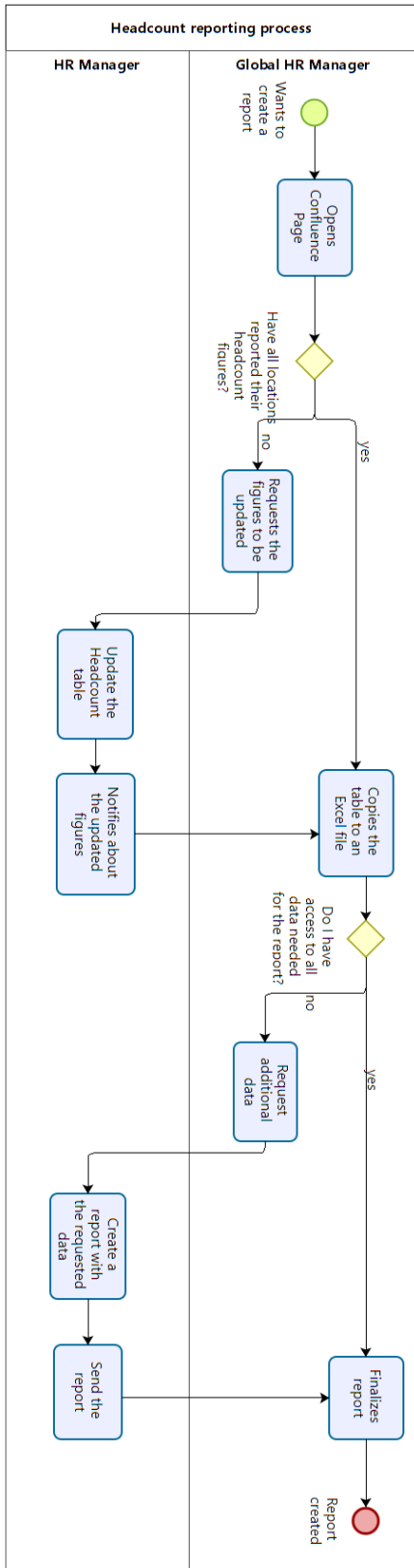
↓

● **Report created**

116

Appendix 3 – Processes TO-BE

This appendix includes the following HR processes that were drawn out using the BPMN technique:

- Employee onboarding

- Employee offboarding

Offboarding process

HR System	Employee	HR Specialist	HR Manager	Team Lead

HR System (lane contains):
- Employee offboarding (data store)
- Sends out offboarding tasks
- Employee data (data store)
- Send data to other systems
- Archive employee folder

Employee (lane contains):
- Writes a resignation letter
- Upload resignation letter
- Resignation Letter.doc
- Signs contract

HR Specialist (lane contains):
- Prepares contract
- Contract appendix.doc

HR Manager (lane contains):
- Signs contract
- Conduct exit interview
- Employee offboarded (end event)

Team Lead (lane contains):
- Employee announces the final decision (start event)
- Report employee leaving

Appendix 4 – Prototype view of the HR Dashboard

Appendix 5 – Questionnaire example

1. On a scale of 1-5 how would you rate the product in general? *

☆ ☆ ☆ ☆ ☆

2. What did you like best and what did you dislike? *

Enter your answer

3. Please rate the following functionalities for the product? *

	1 - Very bad	2	3	4	5 - Love	N/A
Onboarding a new employee	○	○	○	○	○	○
Changing employee data	○	○	○	○	○	○
Document management	○	○	○	○	○	○
Leave management	○	○	○	○	○	○
Offboarding	○	○	○	○	○	○

4. Please add any comments or remarks about the functionalities you would like to share..

Enter your answer

5. How did you like the UI/UX for the product? *

☆ ☆ ☆ ☆ ☆

6. What did you like best and what did you dislike about UI/UX?

Enter your answer

Appendix 6 – Estimation

Description	Most optimistic	Most likely	Most pessimistic	PERT
Project setup	**240**	**350**	**460**	**350**
Setting up the project and environments	*80*	*120*	*160*	120
Setting up CI (assuming we have prod, dev and test)	*80*	*120*	*160*	120
Setup SSO	*40*	*50*	*60*	50
Create UI kit	*40*	*60*	*80*	60
Role / Permission management	**240**	**300**	**480**	**320**
Create role				
Edit role				
Permission management				
User permission check				
Epic 1: Organization Management	**100**	**120**	**240**	**137**
Add new organization unit				
Edit organization				
Configure organization rules				
UI: View organizations				
View list of organization units				
Display organization hierarchy				
Epic 2: Employee Profile Management	**100**	**120**	**240**	**137**
Add new employee				
UI: Employee profile view				
Edit profile				
UI: View list of employees				
Search for employees				
Epic 3: Task Management	**290**	**360**	**720**	**408**
Add new task category				
Add option to configure task flow				
Add new task				
Approve task				
Assign a task				
Epic 4: Notification Management	**100**	**120**	**240**	**137**
Setup e-mail notifications				
Add new alert				
Add option to configure notification flow				
Epic 5: Approval Management	**200**	**240**	**480**	**273**
Setup approval flows				

Description	Most optimistic	Most likely	Most pessimistic	PERT
Adding new approvals				
Configure approvals for employee profile				
Configure approvals for job management				
Configure approvals for compensation management				
Configure approvals for leave management				
Epic 6: Job Profile Management	**200**	**240**	**480**	**273**
Setup job roles				
UI: Job view				
Add employment status				
Edit employment status				
Add job information				
Edit job information				
Add compensation				
Edit compensation				
Add bonus				
Edit bonus				
Epic 7: Onboarding/Offboarding Management	**200**	**240**	**480**	**273**
Setup onboarding packages				
Add new onboarding category				
Add onboarding tasks				
Edit onboarding tasks				
Epic 8: Benefit Management	**192**	**240**	**480**	**272**
Setup benefit plans				
UI: Benefit view				
Add benefit				
Edit benefit				
Benefit history list				
Epic 9: Leave Management	**288**	**360**	**720**	**408**
Setup time-off policy				
UI: Time-off view				
Add time-off policy				
Edit time-off policy				
Epic 10: Analytics and reports	**48**	**60**	**120**	**68**
PowerBI development				
Report: Headcount dynamics				
Report: Contract types				
Report: Headcount by roles				
Report: Employee turnover by country				
Report: Newcomers and leavers				

Description	Most optimistic	Most likely	Most pessimistic	PERT
Integrations	**480**	**550**	**960**	**607**
Integration: GROW	*40*	*50*	*80*	*53*
Integration: Persona	*80*	*50*	*160*	*73*
Integration: CIR	*40*	*50*	*80*	*53*
Integration: Valamis	*80*	*100*	*160*	*107*
Integration: CultureAmp	*80*	*100*	*160*	*107*
Integration: PowerBI	*80*	*100*	*160*	*107*
Integration: SharePoint	*80*	*100*	*160*	*107*
Total	**2438**	**3000**	**5620**	**3343**
Cost	**121 900**	**150 000**	**281 000**	**167 150**