

Master's Thesis:

“Investigation of communities of practice in a harmonized supply chain ERP landscape”



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*MMTM05 Degree Project in Production and Materials  
Engineering*

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## 1) Abstract:

This Master thesis is investigating how communities of practice can enhance knowledge sharing in a context of improving a harmonized Enterprise Resource Planning (ERP) system used in supply chain. A student from the faculty of production and materials engineering at Lund university (LTH) collaborated with the Global Trinity organization from Alfa Laval (Lund, Sweden) to answer the research question. The global Trinity Organization is the department in charge of delivering IT solution across the Swedish manufacturing company's supply chain to improve the organization's value stream.

An investigation of two business units (BU) from Alfa Laval was conducted in order to compare their level of maturity regarding communities of practice, but also their supply chain ERPs. The BUs that were used are the gasketed plate heat exchanger (GPHE) and the decanter (DEC) BU. It has been concluded that each BU confirmed that CoP does contribute to knowledge sharing and improving their ERP more efficiently. However, there are also some differences as the GPHE BU is much more mature in terms of CoP and harmonized ERP. Based on the finding made during interviews with various stakeholders from the Global Trinity organization, GPHE and DEC BU, several recommendations were provided in the discussion section in order to better improve CoPs which will lead to a better harmonized ERP landscape.

Furthermore, this project is a qualitative research which means that future work should be conducted as a limited amount of literature reviews regarding organizational concepts were used to build some theory related to communities of practice, and change management.

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## 2) Introduction

*This section will introduce the two main topics of this thesis which are: communities of practice and ERP systems used in supply chain. It will also include the problem statement of the project, an introduction of Alfa Laval used as a case study, the research methodology, and limitation of the project.*

### 2.1) Communities of practice:

According to the consulting company McKinsey & Company, the importance of knowledge sharing should not be underestimated. In fact, individuals within a manufacturing organization are strategic assets as they have the potential to develop innovative ideas that will improve a company's business's activities. According to the same source, a company that has the capability of having good use of its business network in order to share knowledge across the organization is a great competitive advantage. Spreading strategic knowledge across all manufacturing sites will spread the improvement of processes on a fast and global level (De Meyer, A., & Vereecke, A., 2009).

More companies have started to rely heavily on communities of practice (CoP). CoPs are a group of people sharing the same goals or passion. In this "community", the primary output is the knowledge shared that will help all stakeholders to accomplish their professional goals (Wenger, E. C., & Snyder, W. M., 2000). However, even if CoP does seem like a great solution, there are many challenges faced by organizations when implementing communities of practice. As a matter of fact, a manufacturing company relying on global supply chain is often operating in a decentralized structure. Therefore, finding common improvements when each business unit operates in a non-standardized manufacturing system makes it challenging to share common knowledge. Adding to that, stakeholders are spread out throughout the whole world with different time zones making it even more difficult for stakeholders to meet at the same time and place.

As CoP is used across many industries for many purposes, the scope of this project will focus on investigating CoPs in relation with improving supply chain Enterprise Resource Planning (ERP) systems across global supply chain operations. ERPs are IT tools used by organizations to manage their business operations (Oracle. n.d.). For instance, one of the ERP capabilities allows a better tracking of product flow going in and out of the warehouse. The end-user can monitor the inventory level at any given time and therefore, minimize the risk of stockout and overstocking (Ali, M., May 2023).

## 2.2) ERP scattered landscape within supply chain:

In order to maintain competitiveness in the rapid changing and unpredictable global supply chain environment, manufacturing companies need to constantly invest in technologies that enhance customer value during supply chain operations. However, investing in new tools do not automatically lead to value-added activities since investments also come with risks that can impact multiple stakeholders within the organization. According to the web source "Volosio" (Gabris C., 2022), one of the common risks in supply chain ERP implementation are associated with poor change management. Organizations often believe that investing in newer, better, and faster technology will improve their business processes. However, technology should not only be chosen based on its offerings, but also on whether it meets the user's needs (Gabris C., 2022).

Nonetheless, constantly changing the way an organization operates is crucial in order to keep up with new technologies. As employees are accustomed to the previous ERP system, implementing a new IT solution requires effective change management. One particular IT solution that organizations consistently improve is their ERP systems. ERPs are strategic tools that enhance data transparency and collaboration across different manufacturing sites (Jenkins A., 2023).

## 2.3) Problem Statement:

The goal of this project is to investigate how CoPs can positively impact the harmonization process of ERPs used across a global supply chain through knowledge sharing in order to improve an organization's supply chain processes.

To answer the research question, Alfa Laval was chosen as a case study. This report will review relevant source literatures related to CoPs supply chain ERPs. Additionally, the concepts of change management and Business Process Reengineering (BPR) will also be reviewed. Change management and BPR are relevant regarding the thesis topic. It would be intriguing to know for what purpose CoPs are used during change management and BPR in order to minimize employee's resistance to new changes. In the context of this project, the changes are associated with the integration of a new harmonized supply chain ERP across different factories.

After gathering relevant source literatures, two case studies will be conducted through interviews with three stakeholders from Alfa Laval. These interviews aimed to discuss the level of CoPs and the harmonization of supply chain processes within the BU's ERP. In the discussion section, a comparison will be made between qualitative data and theory concepts. Moreover, some recommendations about Alfa Laval's CoPs and harmonization process of its supply chain ERP will



also be provided in the discussion. Finally, a conclusion will summarize the knowledge gained throughout the project and determine if further research regarding the thesis topic would be necessary.

#### 2.4) Case study - Alfa Laval:

All information related to Alfa Laval are taken from their internal website such as SharePoint, but also their official public web source (Alfa Laval,nd). Alfa Laval is a world-leading manufacturing company that delivers technologies such as heat transfer, separation, and fluid handling solutions. Founded in 1883 by Gustaf de Laval and Oscar Lamm, the company initially focused on manufacturing fluid separators. Over time, Alfa Laval has experienced significant growth and expanded its offerings to various industries on a global scale. As of now, with 42 manufacturing sites across 14 countries, Alfa Laval has established a global presence. While initially producing centrifugal separators for food processing companies, the Swedish company now serves customers in the food, water, energy, and marine sectors. The organization's primary objective is to provide its customers with the best technological products that optimize their business processes while increasing their environmental, social, and economic sustainability. Alfa Laval's corporate culture is based on three key principles: efficiency, flexibility, and employee involvement in decision-making processes. To remain competitive and deliver cutting-edge technologies to its partners, Alfa Laval employs three main strategies: enhancing customer interactions, strengthening technology, and expanding service offerings. (Alfa Laval,nd).

#### 2.5) Research methodology:

This project is a qualitative research study based on non-numerical empirical data collected during various interviews (Aspers, P., & Corte, U., 2019). To successfully achieve the project's goal, different milestones were accomplished in a predetermined and chronological order:

- **Literature Review:**

Initially, research literature on CoP, supply chain ERP, change management, and BPR was conducted to gain knowledge related to the research question. However other relevant information regarding *Section 4* “Alfa Laval’s organizational culture” and *Section 5* “Harmonization of mERP systems” were taken from the Alfa Laval’s SharePoint only accessible by Alfa Laval employees. Some other information was also taken from Alfa Laval employees throughout the course of this project during different sort of meetings. The purpose

of the literature review was to collect information used to formulate relevant questions during the interview stage of this project.

- **Two case studies conducted through interviews:**

Two case studies were carried out, consisting of interviews with three different employees from the company. The interviews aimed to discuss the level of CoPs and the harmonization of mERPs from two BU's. Throughout the project, the interview structure underwent many iteration steps. The first interview session was more of an open discussion, and questions were asked when relevant to the conversation. However, the structure evolved over time, and stakeholders were provided with a predetermined topic discussion and a list of questions beforehand. Additionally, previous source literatures were reviewed iteratively to establish connections between the research topic, source literature, and stakeholders' answers.

- **Case studies selection process:**

Two case studies have been identified to meet the project's goal. The main case study of this project is about investigating the level of maturity in CoP and harmonized ERP within the Gasket Plate Heat Exchanger business unit (GPHE BU). Alfa Laval has chosen to roll out a new ERP solution in several GPHE factories, making it a relevant case study. Two stakeholders from the GPHE BU were interviewed to gather relevant information. Another case study was performed by interviewing a stakeholder from the Decanters BU (DEC BU). Conducting two case studies in two BUs will allow the reader to have two different perspectives and compare any similarities or differences when it comes to CoP and harmonization of ERP. These interviews were also performed to compare findings from source literatures related to help the reader visualize how real-life scenarios can have commonalities with theoretical concepts. Finally, it is important to remember that all information gathered from those interviews should be considered as testimonies and not actual facts as it is based on the stakeholder's personal opinions and professional experience.

- **How case studies interviews were transcribed in the report:**

The data provided by the stakeholders were filtered as not all information received during the interviews were relevant to the thesis topic. Data received from interviewing stakeholder were then summarized into several sub sections in *Section 6*. This section was also reviewed through iteration by the stakeholders being interviewed to avoid any misinterpretation from the Author of this report. Moreover, it was decided towards the end of the project that only interview from

two employees were relevant to the case studies. Nonetheless, some of data received from the third employee being interviewed were used to describe the benefits of harmonized mERP's business processes in *Section 5.2*. A list of the questions asked during interviews can be found in *Section 11*.

- **Role of the company's supervisor during this this project:**

Given the broad nature of ERP and supply chain processes, it is important to stay focused on the main objective of the project, which is investigating how CoP can enhance business activities in a harmonized ERP environment. Therefore, throughout the project, constant communication and bi-weekly meetings were held with the company's supervisor. The supervisor provided guidance on specific aspects of CoP and ERP that the research should emphasize on. The supervisor also played a significant role by providing contact information for stakeholders to be interviewed. Finally, the supervisor also contributed greatly by providing feedback based on the data gathered during interviews and sharing relevant observations from his professional experience at Alfa Laval.

#### 2.6) Limitations of the project:

Due to project time constraints, there are limitations regarding the scope of the thesis topic. As Alfa Laval's IT landscape includes various types of ERPs, this research will solely focus on mERP (manufacturing ERP) which is the ERP used to support supply chain processes across the organization. Consequently, the project will concentrate on the CoP level and harmonized mERP of one main business unit called GPHE. This specific business unit was selected because it is one of the few BUs that has already implemented the new mERP solution. Exploring their previous projects will provide valuable insights into the lessons they have learned and areas where they have improved to better utilize the use of CoPs in order to optimize business processes through a standardized mERP system. However, another business unit (BU) was also investigated to compare the maturity level of CoP and harmonized ERP. The DEC BU was chosen as they have not yet implemented the new ERP solutions in their factory. The objective is to understand the underlying cause of why the DEC BU is behind the GPHE BU when it comes to implement the new mERP solution.

### 3) Literature review:

*This section will cover the methodology of how source literatures were collected. The literature review section will also cover the different theory concepts such as: Communities of practice, the use of ERP in supply chain, change management, business process reengineering, and the conscious competence learning model.*

#### 3.1) Purpose of the literature review:

A literature review was conducted to gain insight into the topic area through theoretical concepts. The thesis aims to investigate how Communities of Practice (CoP) can enhance the Enterprise Resource Planning (ERP) capabilities of supply chain operations through harmonization. Various concepts were explored in this regard. Multiple search engines were utilized to find appropriate source literatures. CoP has been extensively studied by experts since the late 90s, resulting in abundant research on the topic. Therefore, websites such as LUBSearch and Google Scholar were employed to find relevant research papers. The same method was applied to investigate *Sections 3.3, 3.4, 3.5 and 3.6*. However, for a deeper understanding of the technical aspects of ERP utilization, additional web pages from companies offering ERP solutions, such as Oracle, were consulted.

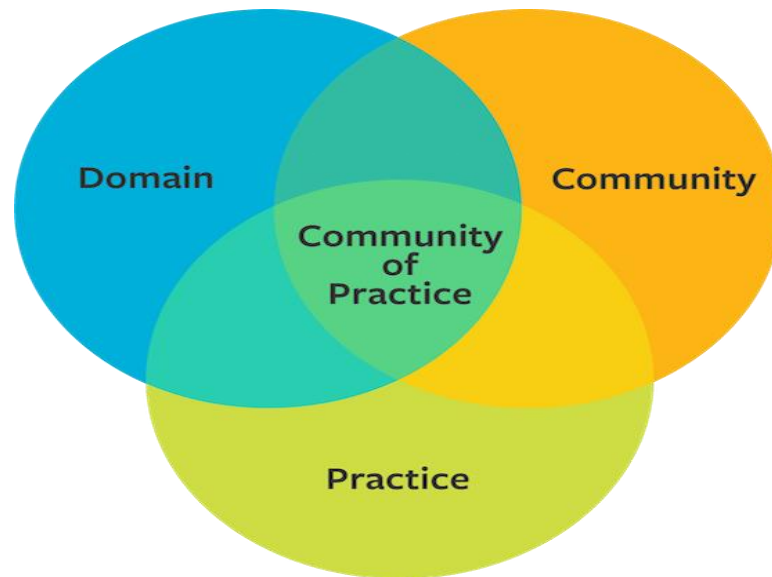
Regarding the ordering structure of the literature review section, *Section 3.2* will provide background theory on CoP to comprehend the main challenges, recommendations, requirements, characteristics, and framework for a successful CoP implementation. Since CoPs are tools used to share knowledge and provide support in order to achieve specific goals defined by the community, additional reviews will explore the types of knowledge transferred within organizations. Not all knowledge is equally relevant to share; for instance, tacit knowledge holds greater importance. Next, *Section 3.3* will provide background information related to ERPs in a supply chain environment. Given that Alfa Laval's challenge is to harmonize over 80% of their mERPs (manufacturing ERP) across their supply chain, it is crucial to understand the importance of ERPs and their potential benefits. Lastly, implementing changes within a company entails the involvement of change management, business process reengineering, and different learning stages. Consequently, *Section 3.4, 3.5 and 3.6* will cover these two organizational concepts.

### 3.2) Communities of Practice:

#### 3.2.1) What is communities of practice?

In order to cope with global competition, more companies are finding ways to share and use knowledge within and across different departments of the organization. Knowledge sharing allows a fast exchange of innovative solution that would improve business activities. A good knowledge management system within an organization will allow knowledge hold by each individual to be gathered and spread out throughout the organization. (Azeem, M., Ahmed, M., Haider, S., & Sajjad, M., 2021).

According to the Canadian website “Community of Practice” (Community of Practice, n.d.), CoP is an organizational concept where a group of people possessing similar or different skillsets and share common interest. The members of this community then gather together to discuss and share knowledge in order to achieve common goals. CoP has been used over the years to communicatee and share knowledge to reach a certain goal without necessarily having a formal CoP framework with clear requirements and rules. However, it was in 1991, that that Etienne Wenger firstly introduced CoP as an actual theory concept. As seen in *Figure 1*, CoP is defined by three main characteristics: the domain, community and practice. First, the domain is defined by a shared goal from the different members of the community. By having a common interest, they will most likely have less resistance into taking the time to participate in CoPs. In other words, the domain state “WHY” there is a need for a CoP. Secondly, the community which is defined by the members part of CoP interacting with each other through problem-solving discussion, network building, and information sharing. This is more related to “HOW” they conduct their CoP. Finally, the practice refers to “WHAT” they are sharing. What is the focus of this community (Community of Practice, n.d.).



*Figure 1: CoP's three main characteristics (21st Century Skills Lab at Berkeley. n.d.)*

### 3.2.2) Differences between explicit and tacit knowledge:

As mentioned earlier, companies need to improve their capabilities and business processes through knowledge sharing in order to stay ahead of their competitors. Therefore, knowledge within the organization is a prime source of competitive dominance and can exist in different aspects.. Knowledge management involves identifying, capturing, storing, sharing, and using that knowledge. Hence, CoP is a common tool to facilitate knowledge management particularly when trying to manage tacit knowledge.

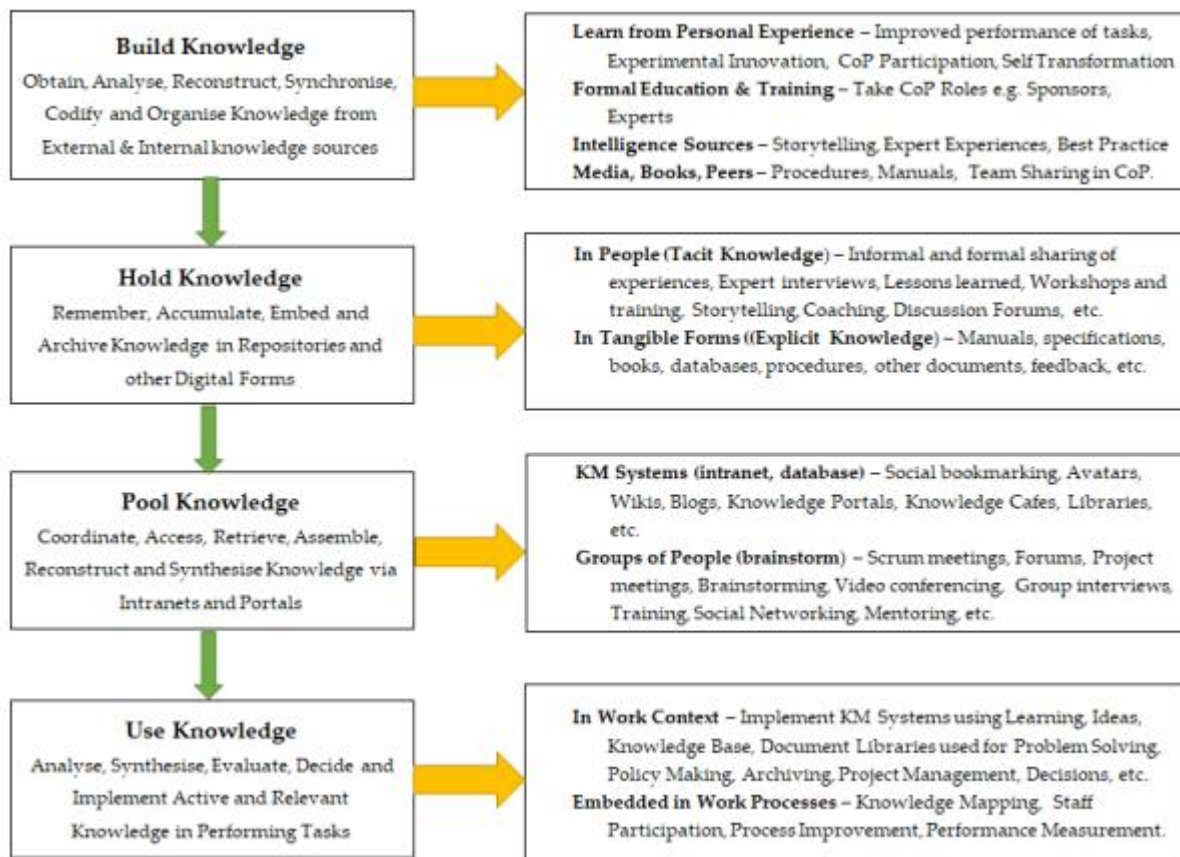
There are two forms of knowledge: explicit knowledge and tacit knowledge. Explicit knowledge is any information that can be easily found in written document such as books, company websites (Venkatraman, S., & Venkatraman, R. in 2018). Managing explicit knowledge is not a big of a challenge for companies. However, tacit knowledge is more challenging for organization. Tacit knowledge is a knowledge that comes directly from the human mind through personal and professional experience, and therefore, it is very complicated for other competitors to replicate. Tacit knowledge offers competitive advantage as it is quite unique in comparison with explicit knowledge (Venkatraman, S., & Venkatraman, R. in 2018). However, the challenge is that tacit knowledge is often transmitted verbally, or not even shared in some cases. Hence why, it is essential for organization to have a well-structured knowledge management framework such as CoP to be able to “catch” this tacit knowledge and spread it out throughout the organization (Venkatraman, S., & Venkatraman, R. in 2018).

### 3.2.3) Knowledge management framework - The Wiig Cycle:

Over the years, many researchers have been developing different knowledge management cycles to better create, distribute and use knowledge. One of the most popular cycles is called the Wiig cycle as it is a valuable framework that provides a well-structured methodology to organize knowledge sharing. In the case of the thesis topic, the goal is to share knowledge to improve ERP capabilities. Therefore, to best capture the knowledge needed using the Wiig cycle, there are three main requirements in CoP that an organization should have (Venkatraman, S., & Venkatraman, R. in 2018):

- **Product and customer**: This criterion can be related to the domain as it clarifies what sort of knowledge is shared within a particular CoP (Venkatraman, S., & Venkatraman, R. in 2018).
- **Resources**: without human resources, it is impossible to manage knowledge especially in this highly digitalized competitive world that is global supply chain. The resources can be associated with the "community" (Venkatraman, S., & Venkatraman, R. in 2018).
- **The ability to act**: The organization should have the tools to be able to support knowledge management . Tools can be in the form of platform, training programs. It is associated with the "practice" elements of CoP (Venkatraman, S., & Venkatraman, R. in 2018).

After the requirements being defined, it is now time to identify the four different steps of the Wiig cycle shown in *Figure 2* (Venkatraman, S., & Venkatraman, R. in 2018):



*Figure 2: CoP implementation using the Wiig Cycle (Venkatraman, S., & Venkatraman, R. 2018 )*

- **Build knowledge:**

The first step is to identify and organize knowledge from different stakeholders. Knowledge can either be built through personal experience which would be more related to tacit knowledge. However, explicit knowledge can also be built during training or documentation. Moreover the “domain” element is heavily present when knowledge is built during formal training as it targets a specific competence. The building knowledge phase also helps identifying ‘the type of knowledge needed through filtering information from individuals or tangible sources. As knowledge management is time consuming and challenging for organizations, members of the community need to identify the knowledge needs, conduct knowledge audit, analyze organization goals and objectives to see where a particular knowledge can be beneficial (Venkatraman, S., & Venkatraman, R. in 2018).



- **Hold knowledge:**

Once the desired knowledge is built, the next step will be retaining and storing knowledge in a "repertoire". Tacit knowledge would be stored within individuals, whereas explicit knowledge would be mainly stored in a more tangible form such as digital documents shared in the organization's cloud-based system. The challenge is to keep both types of knowledge within the company's memory. This step is also playing an important role regarding knowledge life cycle management. If new knowledge replaces old ones or when some knowledge is outdated, then it should clearly be identified and updated into the repertoire (Venkatraman, S., & Venkatraman, R. in 2018).

- **Pool knowledge:**

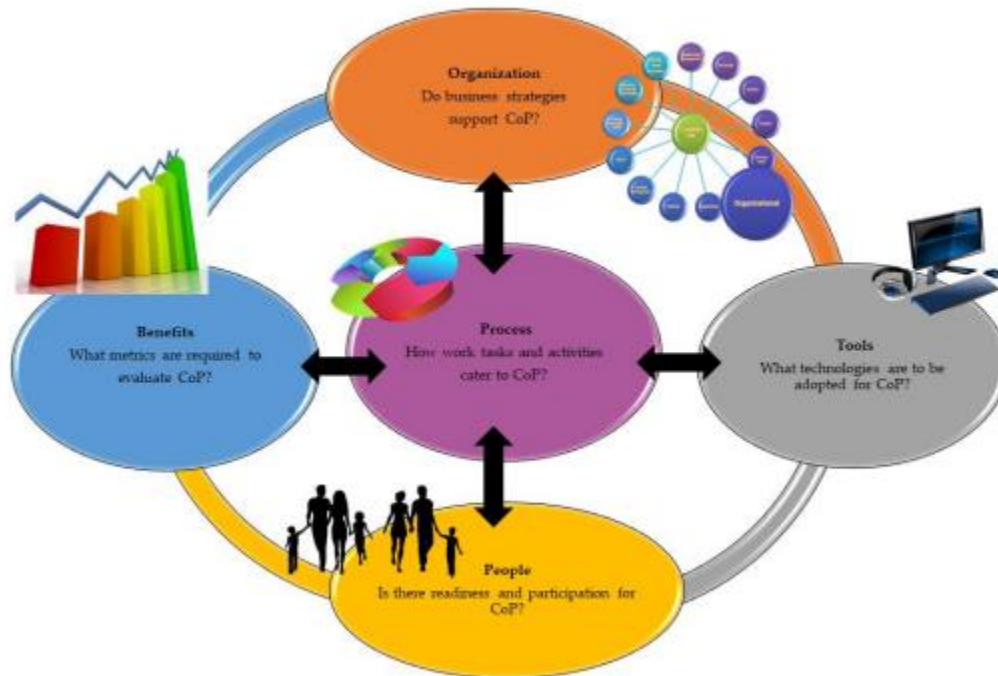
Once knowledge is hold within a system, it then needs to be efficiently retrieved from stakeholders. Knowledge can be distributed through social contact and scrum meetings. In other words, this is when CoP comes into place as knowledge is pooled through brainstorming and group meetings to solve complex problems. CoP minimizes the issue of not sharing tacit knowledge within organization as it pushes people to come into contacts with other stakeholders and share personal information. However, when it comes to explicit knowledge, it can be easily retrieved from written documents accessible by all stakeholders (Venkatraman, S., & Venkatraman, R. in 2018).

- **Use knowledge:**

This step consists of using knowledge towards solving problems, decision making and execution of change management. CoP is also heavily involved in this step as the community evaluates what knowledge is useful or not to a particular topic but also, minimize the learning curve of new employees (Venkatraman, S., & Venkatraman, R. in 2018).

#### 3.2.4) CoP implementation framework using the BTOPP model:

For an efficient implementation of CoP, it is important that the company understands how the flow of knowledge is shared within and between CoPs, and how it can contribute to the company's objective. As a matter of fact, good knowledge management will help stakeholders to access valuable information more easily by accessing the right knowledge in a time efficient manner (Starmind., 2022). The BTOPP model is considered as a guideline to successfully use CoP in an organization by answering 5 critical elements as seen in *Figure 3*. (Venkatraman, S., & Venkatraman, R. in 2018)



*Figure 3: CoP implementation BTOPP guideline (Venkatraman, S., & Venkatraman, R. in 2018)*

- **Benefit:**

Benefits that member of the community get from participating in CoPs. One method to see the benefit would be identifying and measuring specific metrics. Some of the benefits found in are (Venkatraman, S., & Venkatraman, R. in 2018):

- Ease collaboration and networking within and across different teams within the organization
- Opportunity to participate in other projects and thus develop unknown skills and capabilities.
- Greater potential for generating new and innovative ideas by sharing insights.
- Stay informed and knowledgeable about emerging technologies and advancements.
- More effective decision-making processes.

- **Tools:**

Tools used to communicate through digital platform or physical interaction. In order to extract explicit and tacit knowledge, it is crucial to select the right communication technology that will offer the best leverage. Selecting a technology that will provide the maximum benefit for the CoP. For example, if the CoP involves sharing a lot of multimedia content such as videos, images, or audio recordings, it might be important to choose a platform that can handle these

types of files effectively. Similarly, if the CoP is focused on knowledge sharing between geographically dispersed members, it may be important to choose a tool that allows for real-time collaboration and communication. In other words, leverage in this context means selecting the technology that will best support the specific needs and goals of the CoP. (Venkatraman, S., & Venkatraman, R. in 2018)

- **Organization's culture:**

The organization culture put in place is crucial in order to successfully have a CoP and promote knowledge sharing. The company strategy has to come from top to bottom. In fact, top level managements play an important role in the organization aspect of the BTOPP model as they are the one providing the human and tool resources to organize those CoPs. In a global decentralized organization, it is challenging to reach out to key employees having relevant knowledge to share. It is up to the management level to identify key members and organize meeting across different teams. The management team is also responsible for implementing the correct culture by aligning business strategies across business units and find common knowledge to share and solution to come up with from CoP (Venkatraman, S., & Venkatraman, R. in 2018).

- **People:**

When implementing a CoP, it is important that the people are actively sharing knowledge and are being proactive, otherwise it is a waste of human resources. Employee staff is already busy with their own personal tasks. Therefore, it is important that they see the actual benefit for participating in CoPs. To show those benefits, optimal change management will be required to make people more comfortable about participating in CoPs. The concept of change management will be explained more in detailed in *Section 3.4*. (Venkatraman, S., & Venkatraman, R. in 2018)

- **Processes:**

Processes are different methods and procedures used to support the CoP efficiently and to make sure that members can engage in CoP more comfortably. Some of the processes are: Knowledge detection, knowledge organization, knowledge sharing, knowledge reuse, knowledge creation and knowledge acquisition. (Venkatraman, S., & Venkatraman, R. in 2018)

### 3.2.5) Challenges regarding CoP implementation:

To minimize challenges when organizing CoPs, a well-structured CoP framework should have three main components as expressed below (Venkatraman, S., & Venkatraman, R. in 2018):

- **Sponsorship**: Management team promoting and scheduling CoP practice
- **Recognition**: Build recognition beyond teams and tasks group.
- **Support**: Provide funds, technology infrastructure and guidance, time: Also give people the time to express and share their knowledge.

However, despite having a good CoP framework, companies still struggle with many challenges which such as (Venkatraman, S., & Venkatraman, R. in 2018):

- resistance to knowledge sharing
- work overload
- lack of management support
- technical issues using the IT tools
- lack of time
- non-clear benefits
- conflicting priorities between CoP and business functions

Those challenges can be grouped into two main categories (Venkatraman, S., & Venkatraman, R. in 2018):

- **organization culture**:

Regarding challenges towards organizational culture, more and more companies are changing their management programs. One possibility to minimize impact of organizational change is to monitor organizational change by sharing new transformation happening in the organization by making sure stakeholders are aware during meeting or through organizational update in the company website. A good organizational culture for CoP implementation is a company that values and promotes knowledge sharing (Venkatraman, S., & Venkatraman, R. in 2018).

- **Performance measures**:

It is big challenge as it can be difficult for companies to demonstrate the benefit of CoP. Mainly due to the fact that it is difficult to link how communication and knowledge sharing contribute to business goals. Finding a shared goal and performance metrics can be challenging especially for CoP's members part of different business units or departments. Therefore, it is crucial to make sure that CoP meetings are productive, and relevant knowledge is shared. A recommendation would be having some common KPI's to see if the CoP meeting are contributing to a certain need. Performance measures can also be used for feedbacks from

members of the community. Perhaps, they can provide recommendations of how meetings should be conducted, what knowledge to share or how to prepare before the member of the community gather together (Venkatraman, S., & Venkatraman, R. in 2018).

In total, there are three types of metrics. First, the system metric measures the usage of the CoP platform and indicate the level of knowledge sharing taking place. Secondly, the output metric measures outcomes from having CoPs in terms of problems being solved, and the time taken to solve them. Finally, the output/consequence metric focuses on the impact of the CoP on the organization's performance (Venkatraman, S., & Venkatraman, R. in 2018).

### 3.3) ERP's use in a supply chain environment:

#### 3.3.1) Importance of supply chain ERPs in risk management:

As mentioned in Section 3.2.1, CoPs are used to share knowledge about a specific domain in order to achieve a certain goal. As the purpose of this report is to investigate CoPs within the context of improving supply chain ERP capabilities, some research about the importance of a supply chain ERP has across a global manufacturing organization would be relevant.

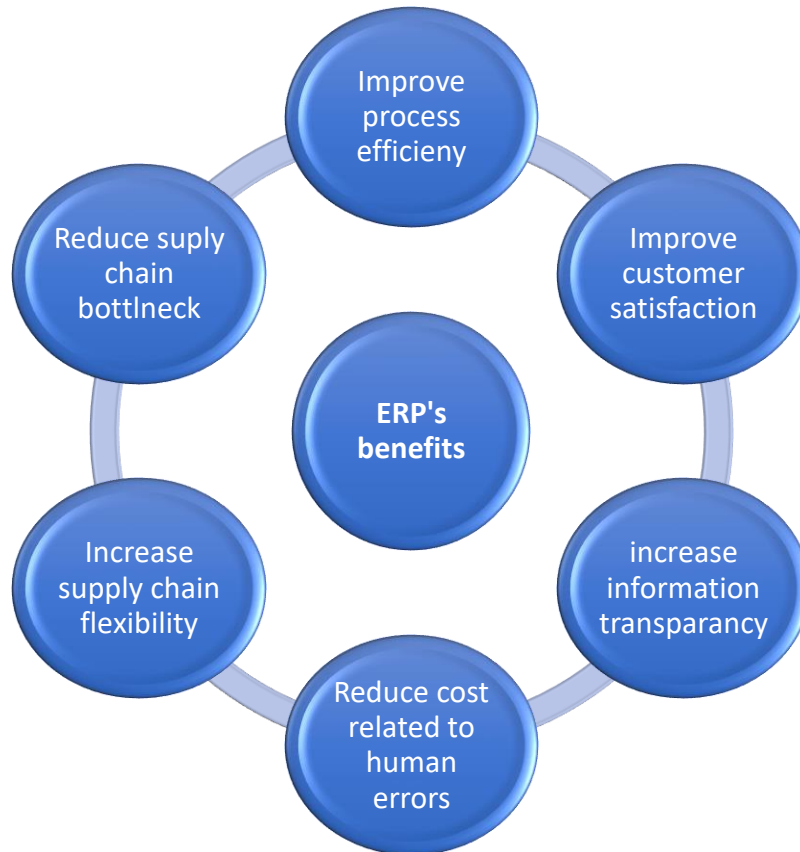
Manufacturing companies should not underestimate the importance of ERP systems. According to the web source "Netsuite" (Jenkins A., 2023), ERPs provide information on every process within the company's supply chain management as well as the interdependence between each supply chain entity. According to the web source "ERP Advisor Group" (ERP Advisors Group., 2021), supply chain ERPs are a vital competitive asset for manufacturing companies. Since all entities in the supply chain are interconnected, any waste or deficiencies in one component will most likely have an impact on the rest of the business operations. Hence, CoP and a harmonized ERP is a tactical organizational strategy that can monitor and alert other stakeholders about unfortunate disturbances happening in the supply chain and allow faster decision-making processes to mitigate those risks. According to the same source (ERP Advisors Group., 2021), risks within supply chain are often due to the Just-In-Time inventory concept. Just-In-Time is a supply chain management approach that seeks to minimize the amount of inventory in stock to reduce inventory costs and ensure items are available only when needed by the manufacturing company. However, maintaining low inventory levels means that in the event of an unexpected disruption, it will impact the end customer's satisfaction, as there is a risk of shortage leading to not meeting customer demands. To minimize the risk of shortage, it is crucial for companies to heavily invest in ERP software that provides efficient forecasting based on previous records, to know when and what to order in a

timely manner (ERP Advisors Group., 2021).

As an example, according to internal stakeholders from Alfa Laval, some of the unexpected disturbance faced by the company was the Covid-19 pandemic that massively disrupt the flow of goods from China to the rest of the Alfa Laval manufacturing sites. Another major disruption was the Ever-Given block of the Suez Canal where a ship was blocking the rest of the canal for six days. This shows that one of the main challenges in supply chain management is the disruption that can occur during unexpected incidents.

### 3.3.2) Benefit of using ERP in supply chain management:

According to the web source "Netsuite" (Jenkins A., 2023), using ERP systems in supply chain management provide six major benefits as seen in *Figure 4*:



**Figure 4: ERP's 6 main benefits in supply chain (Jenkins A., 2023)**

According to the same source (Jenkins A., 2023), firstly, it improves supply chain management efficiency by providing a comprehensive view of different activities, which facilitates faster decision-makings. Secondly, effective ERPs satisfy customer demands by conducting efficient

forecasting, optimizing production planning, and meeting customer needs at any given time. Thirdly, ERP would facilitate workflow information across a complex and decentralized organization. Automated data workflow prevents some unexpected disruptions by alerting other departments, leading to a quicker response to mitigate risks. Another benefit is related manufacturing cost reduction due to waste and human errors. ERPs promote the automation of various operations such as purchase order processes resulting in a significant reduction in human errors, as well as costs related to incorrect inventory prediction and administration errors. As there is constant innovation towards digital technologies, new cloud-based ERPs have been developed to enhance cross functional collaboration and data transparency. Moreover, efficient ERPs increase the flexibility of the supply chain as all data flows throughout different entities. Disturbances, such as material shortages or machine breakdowns can be addressed more promptly as those risks can be easily detected by the software. Finally, supply chain ERPs reduce bottlenecks. Given that supply chain activities are interdependent, a disruption in preceding steps will most likely affect the rest of the chain. An ERP system has the ability to identify those bottlenecks and alerts other stakeholders who could potentially be impacted by them (Jenkins A., 2023).

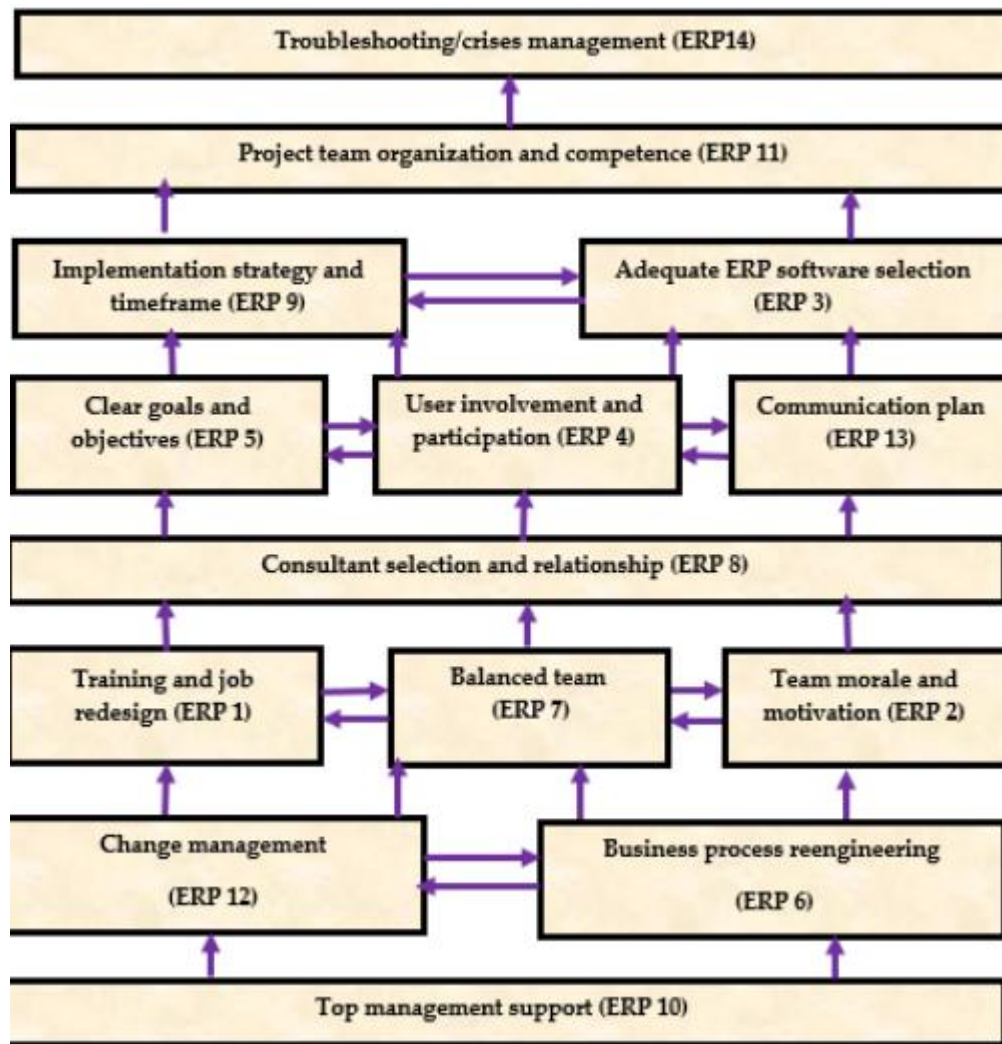
### 3.3.3) Requirement for a successful supply chain ERP integration:

All relevant information about benefits of using SCM ERP are taken from this research paper “Evaluating Enterprise Resource Planning (ERP) Implementation for Sustainable Supply Chain Management. Sustainability”. (Qureshi, M. R. N. M. 2022)

In order to successfully implement an ERP implementation, the organization needs to first identify critical success factors (CSFs). It is essential to rank the CSFs from most to least important and to distinguish the interdependence between each success factor. Firstly, CSFs need to clearly be identified. A common practice is to select different CSFs through brainstorming, surveying key end-users, and other qualitative research methods. In this case, the research paper made a list of fourteen CSFs based on previous articles and selected the most relevant ones (Qureshi, M. R. N. M. 2022).

Secondly, the researcher conducted an Interpretative Structural Modelling (ISM) method. The ISM method helped to identify the direct and indirect relationships between different CSFs. This provided a hierarchical structure and roadmap for the ERP implementation. By identifying the relationship between different CSFs, the organization can rank which CSFs should be prioritized

in terms of resources. An example of a list of CSFs are shown in *Figure 5* (Qureshi, M. R. N. M. 2022):



*Figure 5: ISM for CSFs of ERP implementation (Qureshi, M. R. N. M., 2022)*

After completing an ISM, the next step is to conduct a MICMAC matrix then is used to measure the level of dependence between each CSF as seen *Figure 6*. The description of the matrix characteristics is taken from the research paper "Modeling interrelationships between CSF in ERP implementations: total ISM and MICMAC approach" (Nagpal, S., Kumar, A. & Khatri, S.K, 2017). The matrix has four main quadrants, the top left quadrant contains all the critical success factors (CSFs) with high driving power and low dependence. Independent CSFs have a high driving force because they have a significant impact on the success of ERP implementation. They also have low dependence as many other CSFs depend on them. Therefore, they must be monitored closely to



successfully implement an ERP. Next, the bottom left quadrant includes CSFs with low driving force and dependence and are considered to have the least impact on ERP integration. Then, the top right section is called "linkage" as it contains CSFs with high driving force and high dependence. The upper right quadrant includes factors that have high driving power but low dependence. These factors are considered to be "linkage" factors that can be leveraged to enhance the impact of the independent factors. As they have a high driving force, they can provide additional support and enhance independent CSFs. Finally, the lower right quadrant includes factors that have low driving power and high dependence and need to be managed very carefully (Nagpal, S., Kumar, A. & Khatri, S.K, 2017).

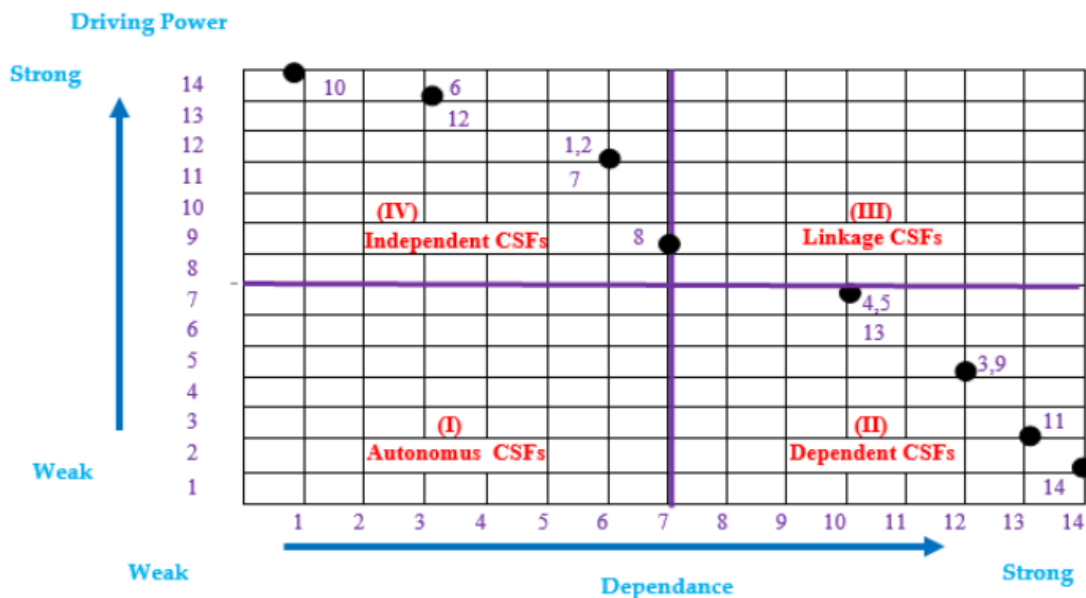
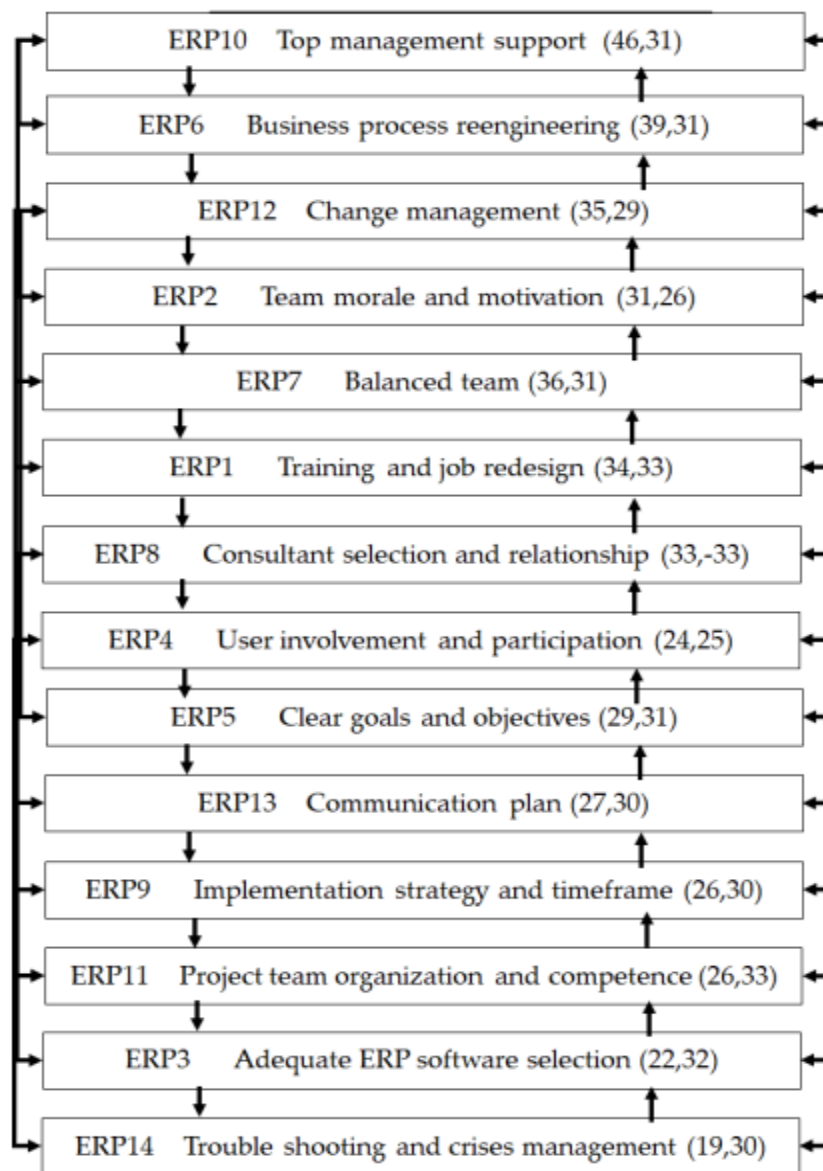


Figure 6: MICMAC dependence diagram (Qureshi, M. R. N. M., 2022)

After conducting the MICMAC matrix, the next step is to use the "six performance criteria" to evaluate the different CSFs based on six criteria's which are: service quality, cost and productivity, lead time, product design, brand value, customer satisfaction (Qureshi, M. R. N. M., 2022).

First, service quality refers to the level of customer service provided by the ERP system, such as how quickly customer inquiries are responded to and how effectively problems are resolved. Secondly, cost and productivity focus on the cost-effectiveness of the ERP implementation, including the cost of implementation and ongoing maintenance, as well as the impact on overall productivity. Third, the lead time measures the time it takes for products or services to be delivered, including the time it takes to process orders and manufacture products. Fourth, product design

evaluates how well the ERP system supports the design and development of new products, as well as the ability to customize products to meet customer needs. Then, the brand value looks at how the ERP system impacts the overall brand value of the organization, such as how well it supports the organization's brand image and reputation. Finally, the last criteria evaluates the level of customer satisfaction with the ERP system, including how well it meets their needs and expectations, and how easy it is to use (Qureshi, M. R. N. M., 2022). Once the CSFs have been ranked according to the six performance criteria explained just above, the final ranking process model is represented as seen with the most important CSF presented at the top of *Figure 7*:



*Figure 7: CSF ranking model (Qureshi, M. R. N. M., 2022)*

### 3.4) Change management:

As mentioned in *Section 2.4*, one of Alfa Laval strategies is to work in an agile method where employees constantly look for possible improvement in their business processes in order to gain a competitive edge. The need for change in operations will require efficient change management to reduce employee resistance. Due to the fact that implementing a new ERP solution involves change management, some relevant research have been conducted in this section to investigate the benefits and challenges of change management in a supply chain ERP improvement context.

Change management is an organizational concept that guides stakeholders through a new transformation journey of their business processes. In the context of this thesis, change management occurs when a company decides to switch from one ERP system to another. In this case, employees may not understand the needs and reasons behind the change or the benefits of the new ERP system. These concerns from end-users may affect the adaptation of new changes in the organization. Efficient change management ensures that employees are onboard and that their voices and concerns are heard at the top management level regarding the new changes in processes (Kingstone, I., 2021).

According to the research paper *“The Relationship between BPR Strategy and Change Management for the Sustainable Implementation of ERP”* (Park, K. 2018), implementing an ERP system is not always a success as it brings radical changes within the organization by changing the information system environment and overall business processes. Moreover, according to the same source, it is even more challenging to switch to a new one as they may resist the change since employees are already familiar with the previous system. Therefore, change management is crucial for successful ERP integration to reduce employee resistance. For instance, poor change management can lead to project delays, additional costs associated with those delays, decreased employee motivation, increased resistance to change, and inability to meet project deliverables. On the other hand, effective change management can increase the return on investment by ensuring that all stakeholders are onboard and working efficiently, resulting in delivering projects on time and with the highest quality ( Park, K. 2018).

A literature review was conducted to identify five main key steps to successfully adopt change when implementing a new ERP system (Such, R. 2021):

- **Step 1: Obtain approval and full commitment from key stakeholders:**

It is important that stakeholders understand the needs for new changes in their business processes. Gaining the engagement of end-users is even more important in a decentralized organization where physical distance and time zones between different sites can be challenging. By convincing managers of different business units that the change will benefit them, they can guide their teams and support them to reduce employee resistance (Such, R. 2021).

- **Step 2 - Understand the impact of a new ERP project:**

New ERP implementation has a massive impact on the organization and its stakeholders. Therefore, it is important to understand how the day-to-day tasks of key users will be impacted by the change (Such, R. 2021).

- **Step 3 - Communicate efficiently:**

Communication is another important criterion of change management. It is essential to communicate the right information to different stakeholders depending on their role in the project. Fast response can give an indication of how effective communication throughout a decentralized organization can be. However, it is also important to communicate the right information through workshops dedicated to specific topics of ERP implementation (Such, R. 2021).

- **Step 4 - Create a clear roadmap:**

Structure in a project is crucial to minimize delays of different project milestones. It is important to include every end-user from different teams or business groups in this roadmap so they understand exactly where the company is right now, where they would like to be with their new ERP system, and what potential challenges different stakeholder groups may face (Such, R. 2021).

- **Step 5 – Provide training:**

The last step will be providing training. Once a structure is put into place, stakeholders are aligned with the new changes, and a clear roadmap is created, it is time to provide training to end-users for the new ERP system. Early training is important for a successful learning curve in using the new ERP system. Ongoing training is also essential, as ERP systems are constantly improved as a valuable and competitive asset for manufacturing companies. New updates from identifying gaps and enhancing ERP capabilities will be discovered continuously. Ongoing training will help end-users to handle those new changes (Such, R. 2021).

### 3.5) Business process reengineering

Business Process Reengineering (BPR) is a business activity often used by companies to make sure that the new solution would contribute to improving supply chain processes. It is even more relevant to apply a BPR when deciding to integrate new supply chain ERP solutions as ERPs have a high installation cost but also, other cost related to maintenance after installation. BPR is a design change of business processes aimed at increasing value-added activities and reducing waste. It allows companies to streamline their processes and make them more efficient. The common steps to conduct BPR are as follows (Bain & Company. 2023):

- Identify the organization's value and customer needs by reducing non-value-added activities.
- Standardize business processes.
- Facilitate procedures using contemporary technology and information.
- Find the optimal and productive setting for tasks.
- Restructure the company by forming teams that oversee a process from start to finish.
- Review fundamental aspects of the organization and personnel.
- Identify suitable roles for third-party vendors or outsourcing, emphasizing their value-addition potential.

In an ERP implementation project, a BPR can be performed depending on the organization's strategy. There are four main strategies (Park, K., 2018) as seen in *Table 1*:

*Table 1: Different BPR strategies (Park, K., 2018)*

<b><u>Strategy</u></b>	<b><u>Advantage</u></b>	<b><u>Downside</u></b>
Not performing a BPR	Reduce time and cost	End user resistance
Conduct BPR then implement new ERP	Reduce employee resistance	Might design redundant process
Implement BPR and ERP simultaneously	Solve redundancy issue	Increase project time
Implement ERP as a part of BPR	ERP only used as a backbone system	No particular Downside

In conclusion, BPR is utilized to identify various areas for improvement within an organization. Once these areas are identified, the organization can proceed with change management to implement the necessary improvements. This involves preparing the company and its employees for the changes through support, effective communication, and comprehensive training programs.

### 3.6) Conscious competence learning model

This section will help understand the different stages of learning process that employees go through when learning new skills. In the context of this thesis, when implementing a new ERP solution, end users need time to adapt themselves to the new changes, and often go through different stages of their learning process.

When learning new skills or competences, there are two main factors affecting the learning process: consciousness and skill/competence level (MindTools., n.d.). Around the 1970's, Noel Burch developed a learning competence model where employees usually go through different stages of their development process when learning a new competence. Below is a brief description of the different stages of the competence model (Peel, J. L., & Nolan, R. J., 2015):

- ***Stage 1 – Unconscious / incompetence:***

In this stage, the employee is usually excited about the new competence that he or she is about to learn. They are unconscious about the complexity and specificity of the new skill. Due to that unconsciousness, they do not necessarily demand for full support as they are simply just enthusiastic to learn new competences (Peel, J. L., & Nolan, R. J., 2015).

- ***Stage 2 – Conscious / incompetence:***

Here, they realize that they are aware of how difficult it can be to master those new skills, and therefore, require high assistance from experts. They need to be strongly monitored in this stage of the learning process in order to guide them and see if they know about the new skill than they were before (Peel, J. L., & Nolan, R. J., 2015).

- ***Stage 3 – Conscious / competence:***

In this stage, employees can successfully accomplish a task but are still not confident about the new learnt skill. Managers need to fully support the employees so that they gain in confidence (Peel, J. L., & Nolan, R. J., 2015).

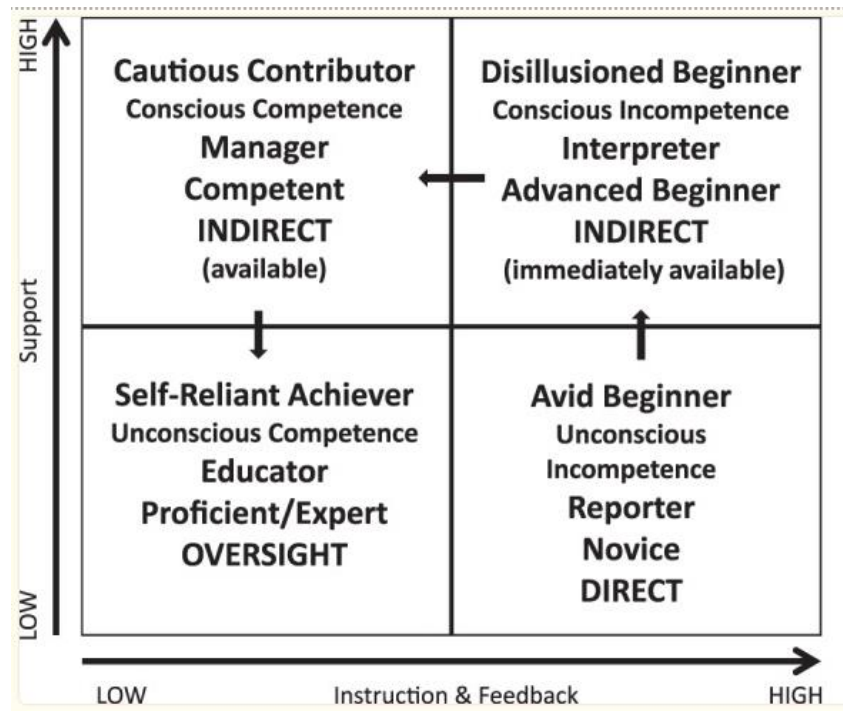


Figure 8: Learning competence model (Peel, J. L., & Nolan, R. J., 2015)

As seen in Figure 8, The competence learning model is related to change management. During change management, monitoring the learning process of the employee will allow managers to know how much support or tools employee would need in order to adapt to the new changes regarding business operations. Some of those tools can be CoPs. In the context of the thesis, CoPs would enhance knowledge sharing between different stakeholders, and thus increase the competence and consciousness of the new ERP solution, and how to use it.

#### 4) Alfa Laval's organizational structure:

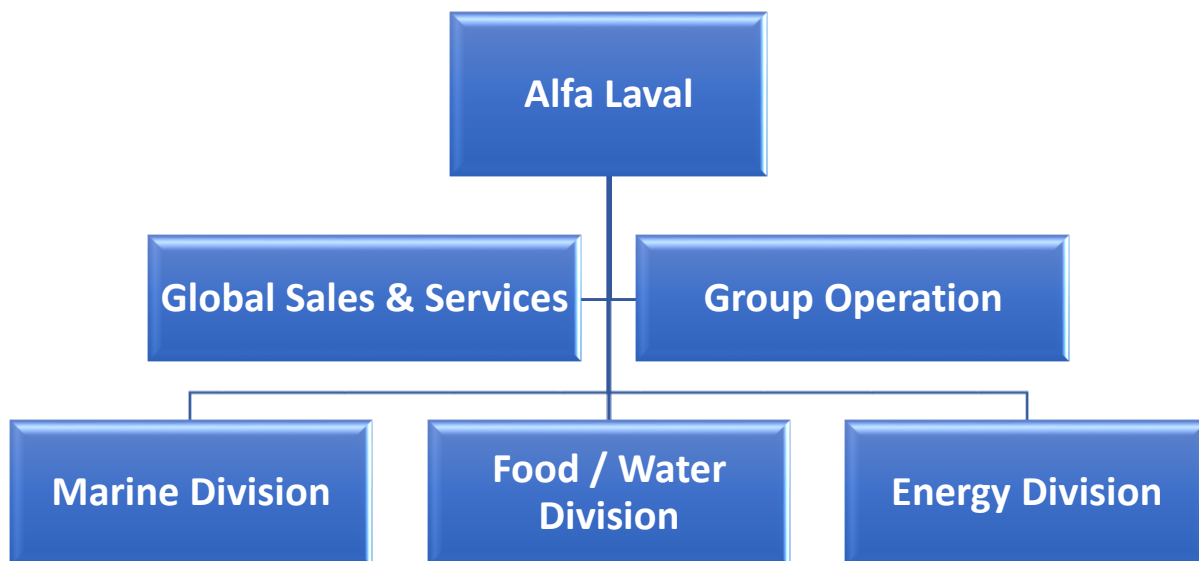
*This section will cover the structure of the different Alfa Laval organizations. This section will also help the reader to grasp relevant information regarding the stakeholders and departments involved in the collection of empirical data in "Section 6: Case Study"*

*Most of the relevant information and figures about the Alfa Laval organization are taken from the company SharePoint only accessible by Alfa Laval employees. Some other information was also taken from Alfa Laval employees throughout the course of this project. Any other source used to explain the harmonization of business operations will be cited at the end of each statement.*

#### 4.1) Alfa Laval's central organization - Global sale & services and Group operation:

With over 17,000 employees and 42 manufacturing sites across 14 countries, Alfa Laval has established a global presence. As the company has diversified its product range since its inception in the late 1800s, its activities are divided into three main divisions based on product application, as depicted in *Figure 9*: the marine, food & water, and energy divisions.

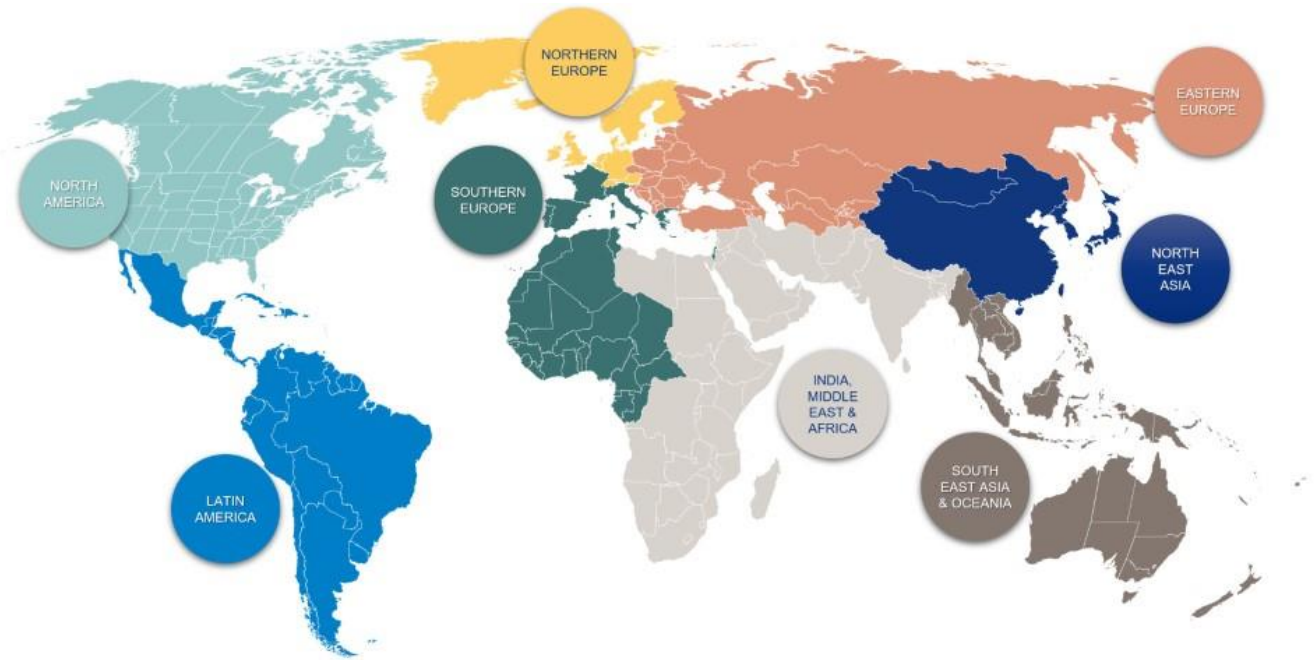
Within each division, there are specific business units (BUs) responsible for distinct product groups. In total, there are 14 BUs: five for the marine division, five for food & water, and four for the energy division. Each BU is accountable for its own supply chain operations, including sourcing raw materials and services, manufacturing finished goods, and delivering them to the end customer.



*Figure 9: Alfa Laval's organization's structure*

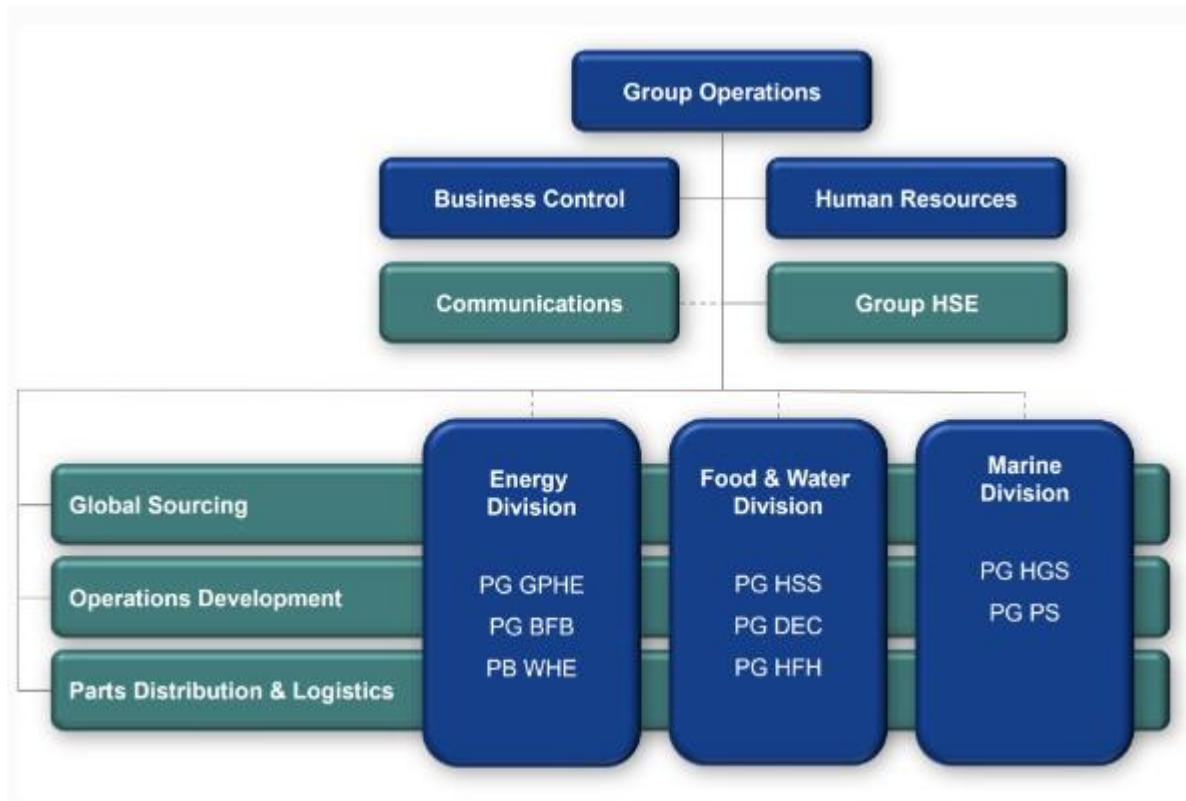
Nonetheless, when it comes to strategic and tactical decisions, all BUs are centrally supported by two organizations within Alfa Laval: the Global Sales & Service (GS&S) and the Group Operations. The GS&S is divided into eight markets, as shown in *Figure 10*: North America, Latin America, Northern Europe, Southern Europe, Eastern Europe, North East Asia, India/Middle East/Africa, and South East Asia & Oceania. GS&S functions as a sales company, assisting the business divisions in their sales and service activities, thereby strengthening their local market presence. GS&S ensures the delivery of optimal services to meet customer needs.





**Figure 10: Global sales and services sub-entities**

On the other hand, Group Operations plays a vital role in supporting all business decisions as they are responsible for strategic decisions aimed at enhancing the business divisions’ supply chain processes. As seen in *Figure 11*, The Group Operations team is in charge of global sourcing, operation development, and parts distribution and logistics. Then, all the BUs need to execute the decisions made by this department. For instance, it was the group operations team who decided to invest on the Dynamics ERP system or D365.



*Figure 11: Group operation's organizational structure*

A decentralized structure offers great advantages in terms of sourcing and purchasing operations. Not relying on one central decision policy allows more employee self-empowerment which leads to a direct responsibility during purchasing operations. Moreover, there is a close communication with the customer increasing customer satisfaction, but also, close collaboration with the supplier. However, there are some drawbacks to a decentralized structure especially when it comes to standardizing and harmonizing business processes (Van Weele, 2014).

Hence why, harmonizing the supply chain ERP across a decentralized organization can be quite challenging as each site has its own work methodology, and the physical distance between different business units makes it even more difficult to collaborate. Therefore, it is crucial for organization to implement efficient CoP that will facilitate knowledge sharing, help finding common needs and requirement to standardize the operations within the ERP.

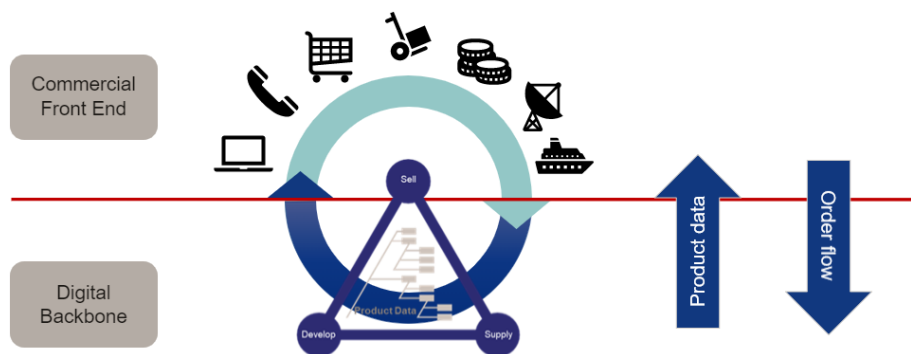
#### 4.2) Digital Enterprise:

“Digital Enterprise” is Alfa Laval’s IT organization whose purpose is to harmonize the organization’s IT solutions in order to gain greater visibility into their company’s values streams

by allowing the management team to better identify value-added and non-value-added activities the supply chain. Alfa Laval is undergoing a transformational journey to make their supply chain more flexible and resilient by reducing redundant and manual processes. Another driver is to reduce the cost of IT solutions used across the organization supply chain, also called overprovisioning. Overprovisioning occurs when organization decide to purchase more IT tools or licenses that is needed (Virtana, n.d.). As mentioned earlier, the Digital Enterprise contributes significantly to the different value streams of the organization, which are sets of actions adding value to the customer from the initial request to the end customer. A clear understanding of value streams is beneficial as it enables a comprehensive view of all the business processes of an organization. Business processes are triggered by business events to achieve business goals. To continuously identify gaps and improve capabilities, the organization works in an agile manner through iteration involving cross-functional collaboration, since digitalization tools constantly need to be improved. Having a clear value stream will enable the organization to function more cohesively and deliver greater value.

#### 4.2.1) Global Trinity organization:

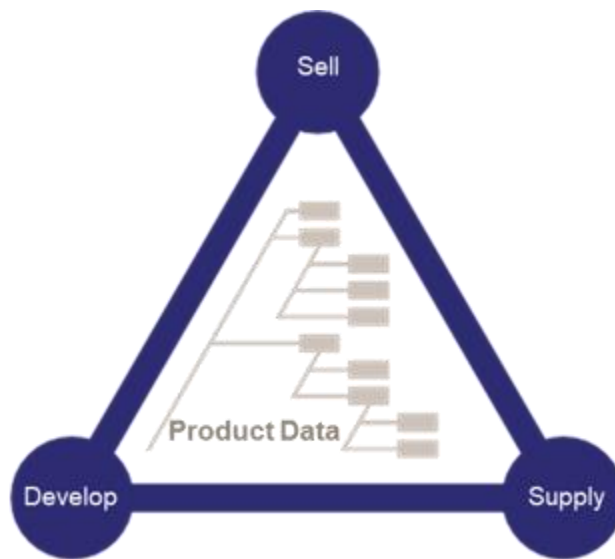
Global Trinity is a department within Digital Enterprise that provides digital solutions for the backbone of Alfa Laval’s supply chain as seen in *Figure 12*:



**Figure 12: Commercial front and back end of Alfa Laval’s supply chain**

It is called Global Trinity as some BUs would also have a local Trinity team specific to their business units. There are three main capability areas that Trinity is focusing on. Trinity provides solution to improve IT processes related to: Product development, product configuration and supply chain. Each of these entities are represented in *Figure 13*:

- **Sell:** The entity responsible for sell is also called OneConfiguration. An online product configurator that can be used at any time by internal or external users is used to customized Alfa Laval products based on the customer needs.
- **Develop:** This capability area also called OnePLM is responsible for the product life cycle management. OnePLM provides the digital footprint of the different technologies offered by Alfa Laval to its customers.
- **Supply:** the supply chain entity aims to standardize, streamline, and digitize processes within Alfa Laval, increasing supply chain transparency.



*Figure 13: Trinity's three main entities*

#### 4.2.2) Global Trinity's Purpose

The main purpose of the Global Trinity department is to support internal and external users by reducing database processes and increasing transparency of product information more efficiently. The Trinity Value Stream is constantly seeking new opportunities since organizations need to keep up with digital innovation. Many stakeholders from the organization would benefit from the Trinity department, particularly the sales, product development, and supply chain teams, as these three entities are connected from the moment a customer places an order to the final delivery. IT tools will connect those teams and other IT systems surrounding the manufacturing ERP (mERP).

As mentioned earlier, the main focus of this project is related to the supply chain capability area. It is in “Supply” entity that the harmonization process of mERP is currently ongoing. By implementing one harmonized supply chain mERP, the organization aims to standardize processes

and allow a global cooperation as all employees will speak one common “language” which is the new mERP solution Dynamics D365.

#### 4.3) Business unit structure:

Alfa Laval’ business organization is a decentralized organization when it comes to business operations and local decision-making. The organization shifted from centralized to decentralized activities due to the fact that the manufacturing company is market-driven, providing solutions to different markets. These markets are represented by three divisions within Alfa Laval: Food & Water, Marine, and Energy. Each division has different Business Units (BUs) in charge of one or more product groups. It can be seen in the *Figure 14* that there are 14 BUs in total. A BU can have one or more products classified into different product groups.



**Figure 14: Alfa Laval's business units across the company's division**

A decentralized supply chain has the characteristics of being responsible and taking ownership of their business processes without necessarily waiting for headquarters to dictate and make decisions for the BU processes. This organizational structure is quite popular amongst manufacturing companies operating in a global supply chain. Nonetheless, the headquarter still makes strategic and tactical decisions, but the different sites have a certain degree of autonomy regarding how they want to operate their business processes (Unleashed Software, 2021).

As mentioned in *Section 4.2.1*, the Trinity department has three pillars (Sell, Develop, and Supply Chain). However, some BUs also have their own local Trinity team within their BU. The local Trinity team allows the BU to be more agile and take ownership of their digital processes which

means that they rely less on the Global Trinity department for support. *Table 2* shows the different management level of a BU relevant for understanding the findings in *Section 6*:

**Table 2: BU's management level**

<b><u>Stakeholder</u></b>	<b><u>Role</u></b>
Business unit (BU) manager	Overviewing operation of a whole business unit.
Product group (PG) manager	Responsible for all factories part of a specific PG
Factory manager	Overviewing operations of one factory only.
Process owners	In charge of a specific business process within the mERP

## **5) Harmonization of Alfa Laval mERP systems:**

*All information and figures about the harmonization of ERP systems are taken from the company SharePoint only accessible by Alfa Laval employees. Some other information was also taken from Alfa Laval employees throughout the course of this project. Any other external source used to explain the harmonization of business operations will be cited at the end of each statement.*

*This section will cover the drivers for harmonizing a supply chain ERP, the benefits of harmonization, Alfa Laval's new mERP solution, and the different mERP processes known as "tracks".*

### **5.1) Alfa Laval's mERP scattered landscape:**

Over the years, Alfa Laval has operated as a decentralized organization in conducting its business operations without a consistent IT strategy to enhance ERP capabilities in a unified collaboration between all the BUs. Consequently, each BU has adopted its own approach to using their mERP, resulting in a non-standardized manufacturing system. Furthermore, although some BUs use the same type of mERP, they would utilize different templates, customizations based on their individual needs. For instance, the ordering process of component from the same supplier may vary from one factory to another which leads to confusing suppliers who receive different purchase order templates from the same company. This inefficiency affects the delivery process and lead time. Unfortunately, the level of standardization in business processes has not improved as Alfa Laval continues to acquire and integrate other companies and facilities. Upon integration, these organizations do not receive a common policy on how to use the mERP, further contributing to the

fragmented IT landscape of the company. *Figure 15* illustrates the various mERPs used across Alfa Laval's Factories, including AX2012, Axapta, BPCS, D365, Jeeves, and Movex HSS.

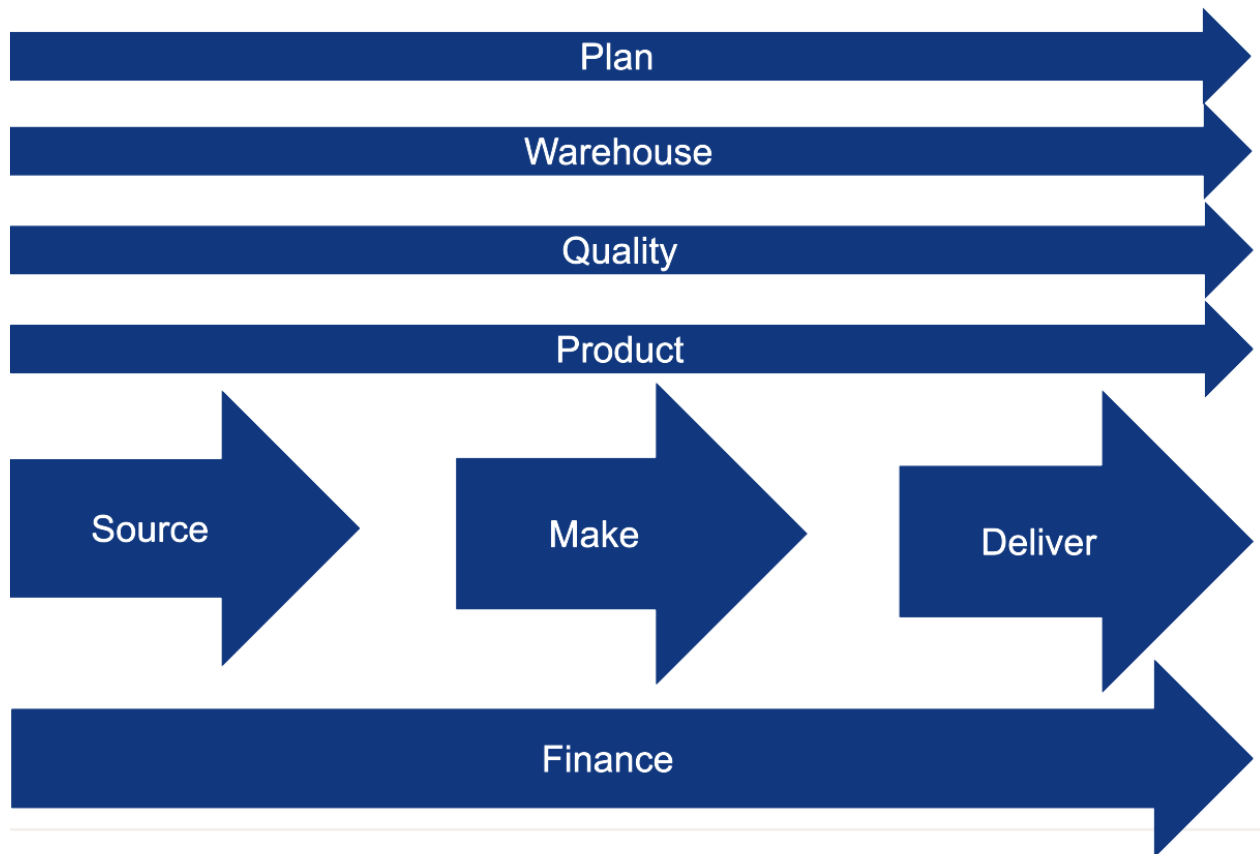
Solution Area	Solution
mERP	AX2012
mERP	Axapta
mERP	BPCS
mERP	D365
mERP	Jeeves
mERP	Movex HSS

*Figure 15: Alfa Laval's current mERP solutions*

Alfa Laval has recognized that to fully benefit from these acquisitions, the company needs to harmonize its supply chain operations to enhance planning, flexibility, resilience, and collaboration. Consequently, Alfa Laval has been working towards standardizing its business operations to improve efficiency and reduce redundancy in certain activities. In fact, the company has decided to harmonize its mERP processes by adopting one single ERP solution: “Microsoft Dynamics ERP” also called “D365 mERP”. To achieve this goal, Alfa Laval initiated the harmonization project in 2019 to implement the new D365 mERP solution in one of their manufacturing site for the HSS BU (high speed separator). Alfa Laval has begun the process of harmonizing their mERP with the goal of achieving 80% harmonization. Currently, global Trinity is supporting many other BUs with their new mERP solution. As an example, this project will focus on the implementation of new mERPs within the GPHE BU and investigate how CoPs help stakeholders to improve business processes within the mERP.

## 5.2) mERP’s supply chain processes: Tracks

The tracks are the different business processes from when the customer starts the ordering process of a particular product to delivering the finished goods to that same customer. Those tracks were identified thanks to the SCOR (supply chain operations reference) model. As supply chain is a complex flow of series of actions with many internal and external stakeholders involved, the SCOR model helps towards standardized descriptions of processes, measurement metrics and KPI performances (Delipinar, G. E., & Kocaoglu, B., 2016). As seen in *Figure 16* Alfa Laval then identified eight main tracks based on the SCOR model technique: Source, Make, Deliver, Warehouse, Quality, Plan, Product, operation finance.



*Figure 16: Track defined by the SCOR model*

- **Source:**  
The Source track relates to all the operations related purchasing goods in order to manufacture the final product. This track also provides a data set of items being or planned to be purchased. The purchasing of goods is decided through forecasting from breakdown of sales forecast based on historical data. This track focuses on optimizing purchase order, delivery data management, and involves close collaboration with the vendor before during and after the item being purchased.
- **Make:**  
The Make track relates to all the processes or activities within the warehouse. It possesses data related to scheduling and releasing production orders of purchased item, internal logistics and supply within the shopfloor, optimize factory capacity and maintain BOMs (Bill of Materials). This track mainly focuses on data collection, optimize production planning and increase



visibility of the different processes within the factory in order to improve the value stream of this particular manufacturing site.

- **Deliver:**

This track is involved in different processes such as setting up order received, verification, delivery dates, planning action on sales order, invoicing, return orders, manage sales price and date related to item being delivered.

- **Warehouse:**

It involves processes such as receiving purchase orders, materials being picked up or put away. The warehouse track is an important part of the supply chain process as it provides a traceability of a specific item at any given time within the warehouse. It is important to have an efficient traceability to reduce transportation waste when picking an item from manufacturing process to another. *Figure 17 and 18* representing the device and barcode used to trace the item within the site.



*Figure 17: Scanner used for warehouse management system*



Figure 18: Barcode used for warehouse management system.

- **Quality:**

This track oversees all the data regarding quality control of items being purchased and securing product quality compliance with various regulations. Checking the quality of purchased goods is time consuming due to the number of product being delivered on a daily basis. Therefore, this track is focusing on the automation in creating and saving quality reports into their IT systems.

- **Plan:**

This track involves any processes related to sales and operation planning, optimizing forecast activities. Sales and operation planning involves four main steps described in Figure 19.



Figure 59: Sales and operational planning process

- **Product:**

This track looks at all the processes of the product digital footprint and the product life cycle management as well as the bill of materials management. The focus area is related to optimizing data migration from the OnePLM software to the mERP.

- **Operation Finance:**

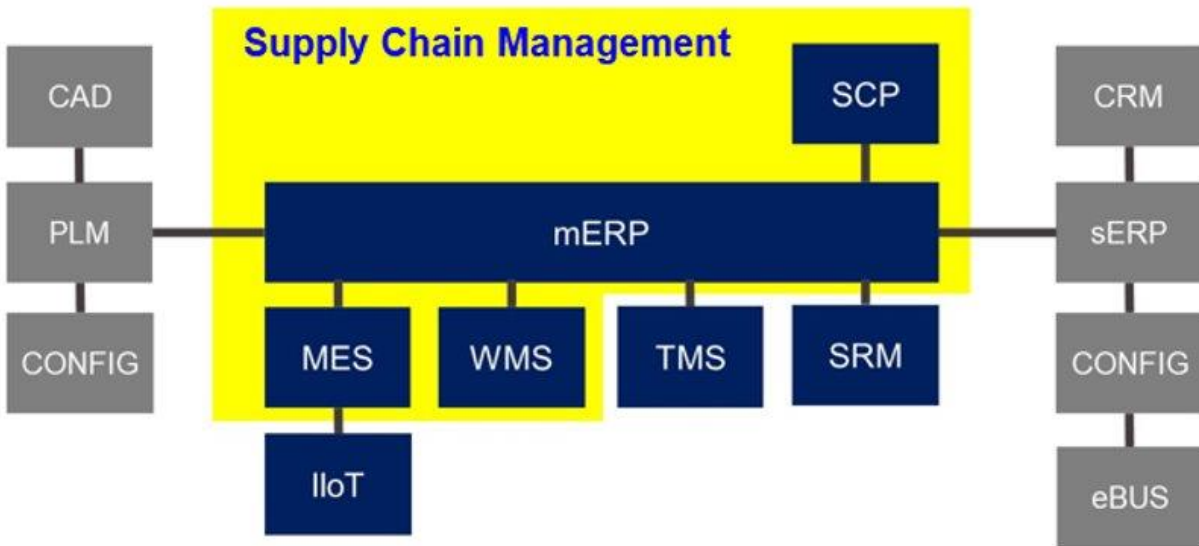
This track looks at data related to financial information and reporting represented by BI tools. The focus area is to improve the visualization of finance results in order to take the correct decision that will add value to the company.

### 5.3) Benefit of mERP harmonization:

According to stakeholders from the Trinity department, there are several advantages into having one single mERP for all manufacturing sites from an IT and business point of view:

- **Easier integration of the whole IT environment:**

Harmonizing the mERP will make it easier to integrate other systems with the IT environment. As seen in the *Figure 20*, there are many other systems used for specific processes around the main mERP. The mERP is used to track different product information across the supply chain from all the surrounding systems. For example, one business unit (BU) may have different factories with a different mERP for each location. Without harmonization, it would be challenging to execute planning, ordering, producing, delivering, or improving goods in each of the sites. Moreover, it would also be challenging to suggest common business improvements as end-users compare and analyze non-harmonized business insight data from different locations. The management team would take time to execute orders as data from all systems are fetched, integrated, and analyzed in a different way.



*Figure 20: IT environment of Alfa Laval's supply chain*

*Table 3: IT tool description*

<u>IT Tool</u>	<u>Description</u>
CAD	Tool used to design product essential for product development as it offers great visualization in 2D and 3D.
PLM	Business solution to support collaboration and share of product information regarding its life cycle management
CONFIG	Program to improve configure product to order business process. Allows customer to easily customize Alfa Laval's product according to their needs.
MES	Manufacturing Execution System to help standardize and digitalized processes related to the product's making phase.
IIOT	Industrial Internet of Things: enhance smart manufacturing by increasing connectivity between different manufacturing process.
WMS	Warehouse management system helps towards optimization of warehouse operations.
TMS	Transport management system: manage and optimize transportation operations
SRM	Supplier relationship management: manage interaction with suppliers in order to improve relationship with supplier.
mERP	Manufacturing ERP
SCP	Supply chain Planning: tools used to optimize supply chain processes and reduce cost of operations.
CRM	Customer Relationship Management: helps business to gain insight about current or potential customer needs
sERP	Sales ERP
eBUS	eBusiness: digital tools used to conduct activities such as transaction, invoicing, ordering.

- **Better customer experience:**

Harmonizing the supply chain IT environment will provide a better customer experience as the interface between the customer and sales company or internal stakeholders would be the same templates for all BUs. It will increase the simplicity, use and coherence of the IT tools handled by internal and external users.

- **Increase resources' flexibility:**

Third, using one mERP will increase the flexibility of the workforce. For example, if employees from a site need to support other Alfa Laval factories, there will be not adaptation time to get familiar with the mERP of the new site as they are all using the same mERP.

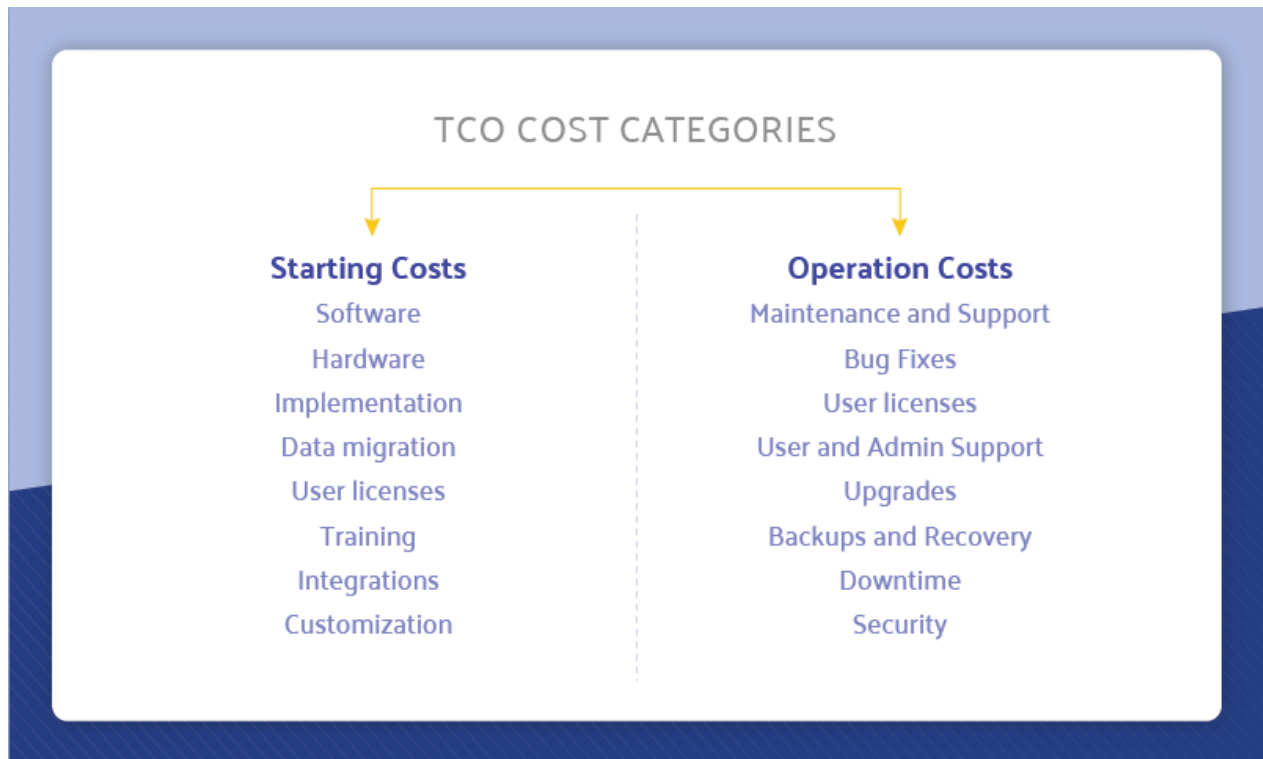
- **Minimize waste:**

Then, from a management perspective, a harmonized mERP landscape will allow the management team to have a better view of the value stream and allow to easily identify waste within the supply chain as all factories would be following the same business processes. Hence, ERP harmonization is a competitive advantage, as poor decision-making processes can increase lead time and waste of resources.

- **Reduce IT tool total cost of ownership:**

Multiple mERPs will require time and resources to update continuously those systems to avoid any security breaches. Finally, using one mERP solution would massively reduce the total cost of ownership of the mERP system.

Many costs are involved before, during, and after implementation of the mERP. *Figure 21* shows a list of different costs of an mERP's total cost of ownership. There are three types of cost. First, the starting cost groups all the costs associated when implementing a new mERP into the system. Second, the operation cost is the continuous expenses a company would spend for any activities related to maintenance and software update. Third, the retirement cost is associated with the expenses when retiring an old mERP. For example, there are cost associated when an mERP is removed from the system as there is need to export data from the old to the new mERP (EasyERP, 2016).



*Figure 21: Total cost of ownership of ERP system (EasyERP, 2016)*

Hence, mERP harmonization is a competitive advantage, as poor decision-making processes can increase lead time and waste of resources. By harmonizing the use of the mERP, it will not only be possible to establish a standardized procedure for all supply chain operations across different factories; but it will also increase the pace of improving the mERP capabilities instead of having multiple different mERPs. By establishing CoP across multiple locations, stakeholders can focus all of their resources into sharing knowledge towards making improvement on one type of mERP only.

- **Enhance quality and cybersecurity:**

Another advantage of using one ERP solution is that it will also increase the quality of the system and its cybersecurity. As of now, Global Trinity spends a lot of time, financial and human resources into updating different mERP systems which leads to not being updated to the highest level as it is impossible to keep up with many different systems. The lack of update can lead to possible systems vulnerabilities.

- **Enhance horizontal collaboration between tracks:**

As mentioned in *Section 5.2*, the tracks are the different business processes used by end users

within Alfa Laval's mERP system, a stakeholder from the "Plan" track was interviewed to discuss the benefits from harmonizing the use of their mERP across all manufacturing sites. The stakeholder mentioned that there are two major issues when it comes to having a non-harmonized mERPs for planning operation.

First, it is challenging to decide on a common decision or policy for all the BU factories. An example of common decision and policy would be the launching of a new product and inventory through all the production sites. Secondly, not standardizing ERP processes will increase the risk of not preventing manufacturing failures on a global level. As a matter of fact, factories tend to solve problems related to planning locally. However, as supply chain is a sequence of entities that are interdependent, if failure occurs in one factory, the same problem will most likely occur in another location. Therefore, harmonizing the use of Alfa Laval's mERP would benefit the stakeholders from a business point of view.

First, standardizing ERP procedures will promote sharing of knowledge through CoP and improve the ERP capabilities more efficiently. According to the stakeholder, CoP will also reduce the learning curve of using a new IT tool as key end users can ask for support from multiple ERP experts. Secondly, operators within the factory can mitigate the impact of failure as all the stakeholders from different locations work in harmony. By being connected to one another and using the same mERP template, if a problem occurs in one location, it will be possible for this particular problem to not spread out through the rest of the supply chain as it has been noticed in advanced through one singular use of mERP. Third, harmonizing the ERP would also contribute to make manufacturing operations leaner. It will improve the flexibility of the production, and meet customer demands with a much more improved and harmonized ERP system.

In conclusion, from the IT perspective, standardizing mERP processes will provide a global cooperation and one single source of data allowing the organization to promote employee self-empowerment as all the stakeholders participate to sharing information in order to improve the capabilities of the mERP through different CoPs. From the business perspective, the use of one singular mERP enables will facilitate the standardization of supply chain processes which will lead to an increase in supply chain flexibility, and reduction of redundant activities and waste.



#### 5.4) Alfa Laval's new mERP solution "Dynamics D365 mERP":

As mentioned in *Section 4.1*, The decision to select Dynamics 365 ERP (D365 ERP) was made by the Group Operation Department. According to a stakeholder from the Global Trinity Organization, the selection of this particular ERP was based on several criteria.

Firstly, Microsoft was the most favorable option for Alfa Laval because they are committed to further improving in their current mERP solution compared to other companies by continuously making their product more performant. Secondly, partnerships with external suppliers are based on trust and long-lasting relationships where both parties benefit. Microsoft is a strategic partner of Alfa Laval, and they have been collaborating for many years, offering various competitive products such as Microsoft Teams or Microsoft Office. Finally, the other criteria to take into account was the investment cost. Other suppliers offered mERP solutions with higher efficiency and capabilities compared to D365. However, the Microsoft D365 mERP solution was less costly to invest in comparison to other ERPs while meeting the organization's quality requirements. *Figure 22* illustrates the ideal IT landscape solution for each BU's supply chain, where all surrounding systems trace back to one singular D365 mERP.

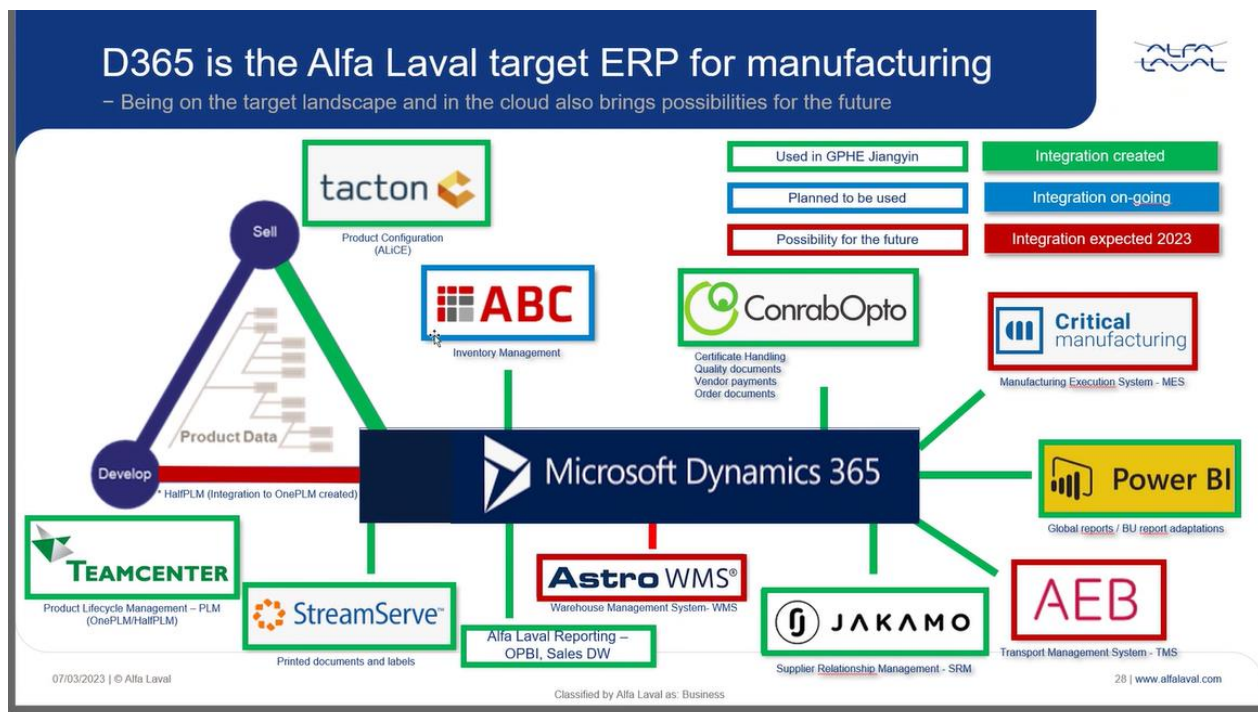


Figure 22: IT landscape of the new harmonized solution

## 6) Case study:

*To learn more about ongoing projects with the GPHE and DEC BU, an interview was conducted with stakeholder from both BU's in charge of implementing the new mERP solution. This section will cover the level of maturity of CoP and harmonization of the new D365 ERP solution. It will also cover how both BUs deal with organizational change through change management and business process reengineering.*

### 6.1) Case study 1- Investigation of the GPHE BU:

*The stakeholder being interviewed is the project office manager in charge of operation development regarding the implementation of mERPs across the different GPHE factories.*

#### 6.1.1) Description of gasketed plate heat exchanger (GPHE):

The GPHE Business Unit (BU) is the largest BU within Alfa Laval. They specialize in manufacturing gasketed plate heat exchangers as a part of the energy division. GPHE BU aims to optimize energy consumption, minimize total cost of ownership, and increase environmental sustainability. Since heat exchangers are designed to meet specific customer needs and industrial applications, the GPHE BU offers mass customized products within their supply chain which leads towards a high variation of products. One of the driving cultural values of the GPHE BU is to deliver high-quality plate heat exchangers. If the products do not operate efficiently, it will result in poor customer satisfaction and high maintenance costs. *Figure 23* shows an example of how a gasketed plate heat exchanger would look like.



*Figure 23: Gasketed plate heat exchanger (Alfa Laval, n.d)*

#### 6.1.2) GPHE's mERP transformation journey:

As previously mentioned, Alfa Laval is undergoing a transformation journey as they plan to harmonize their use of mERP across their entire supply chain. Even if the the decision to integrate the new D365 mERP was made centrally by the group operation organization; it is up to each BUs to take on responsibilities, and work on implementing the new mERP with support from Global Trinity. Within this BU, there are three main sites: Lund, Jiang Yin, and Richmond. The GPHE BU was one of the first department to harmonize their new D365 mERP as they showed their readiness to embark in this new transformation journey. Since the GPHE BU had a clear plan of how the new mERP solution would fit their needs, Global Trinity provided them with support during the implementation process of the D365 mERP.

The stakeholder mentioned that there has been a change in the organization, where business units should not fully rely on the Global Trinity organization for implementing IT solutions. In fact, business groups are expected to take ownership of their ERP systems by identifying gaps and potential improvements. However, even though Trinity does provide daily IT support, it is up to the BUs to know what templates or capabilities they will require in order to efficiently use the IT tools. In fact, only BUs know what business benefits they are expecting to get from the new mERP solution. Global Trinity pushed the GPHE BU to take on more responsibility and gain knowledge

about the use of D365 mERP because Trinity lacks the human and financial resources to fully support all the BUs. The GPHE BU expects the new ERP to deliver four main outcomes:

- No-touch order flow
- A central order hub
- A central repository for product master data
- One D365 mERP for all sites

6.1.3) Investigation of CoPs within the GPHE BU:

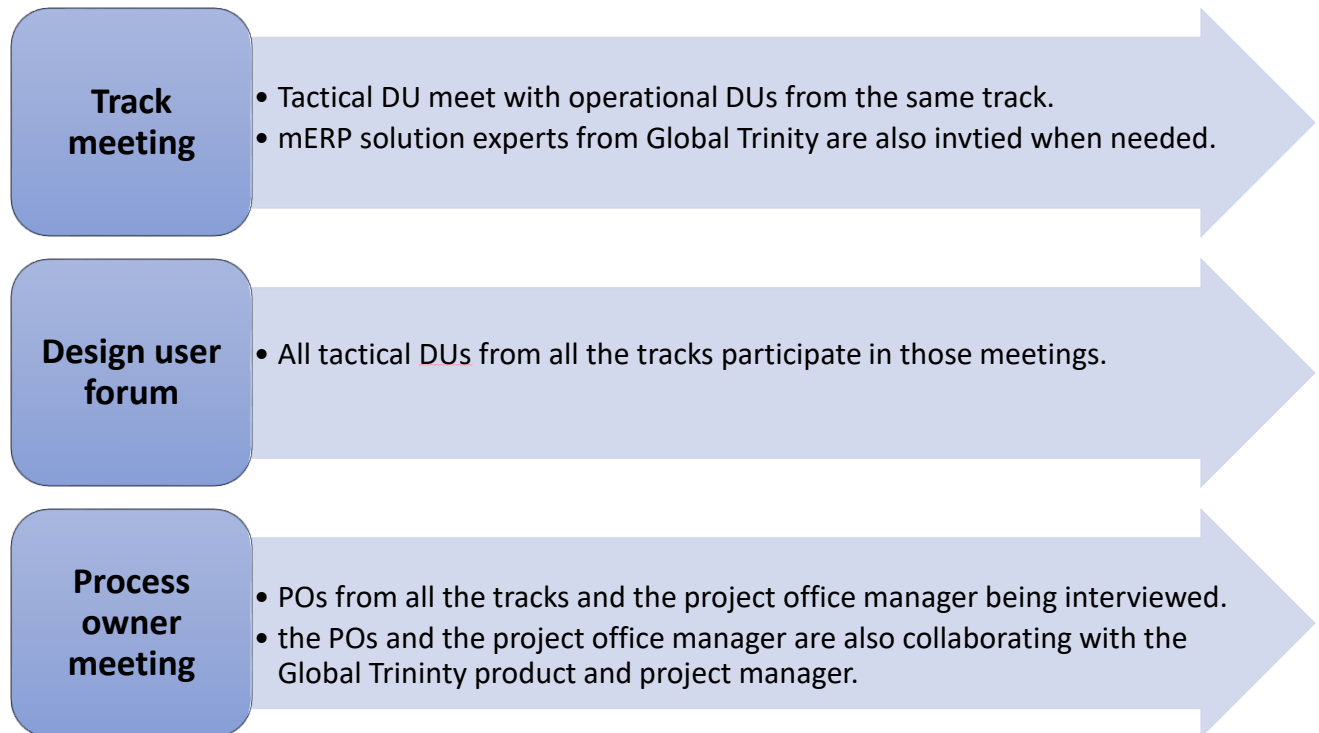
6.1.3.1) *How many CoPs do the GPHE BU have?*

Figure 24 shows the different stakeholders from the GPHE BU participating in the three CoPs.

	Plan	Make	Deliver	Source	Warehouse	Quality	Product	Finance/BI
<b>PG Process Owner (PO)</b>	Plan track PO	Make track PO	Deliver track PO	Source track PO	Warehouse track PO	Quality track PO	Product track PO	Finance/BI track PO
<b>PG tactical Design User (DU)</b>	One tactical DU per track	One DU per track	One DU per track	One DU per track	One DU per track	One DU per track	One DU per track	One DU per track
<b>PG operational/ daily Design User team (DU)</b>	One DU per factory	One DU per factory	One DU per factory	One DU per factory	One DU per factory	One DU per factory	One DU per factory	One DU per factory

**Figure 24: GPHE stakeholders participating in CoPs**

As seen in Figure 25, GPHE currently has three main CoP frameworks: First, the track meeting enhancing horizontal collaboration between operational design users. Secondly, the design user forum where stakeholders from different tracks gather to report progress and discuss track focus. Finally, the process owner meeting where the stakeholder being interviewed is in direct contact with the BU's management team which leads to an efficient decision-making process.



*Figure 25: GPHE CoPs and their stakeholders*

- **Track Meeting:**

The first CoP is called “the track meeting”. They are weekly meetings that each track has with their tactical and operational design users. There is usually one operational design user per site. Operational design users are the voice and ears of key end users using the mERP solutions within the factory. The operational design user makes sure that the end users’ concerns are heard in those meetings. They also report during those meeting if an end user has found new mERP capabilities. The operational design users report to one tactical user who is in charge of tracking progress of any gaps or improvements. The topics are discussed ahead of time, and each track has its own meeting (not across tracks). These meetings are mainly used to track progress of different gaps identified for one specific track. They also provide an opportunity for operational design users who are struggling with a particular problem to reach out to other operational design users from a different location. This CoP greatly enhances horizontal integration. Horizontal integration is a company integration process through the sharing of knowledge of stakeholders having the same role in order to reach an optimized standardized working methodology (Ståhl, J. E. & Windmark, C., 2021). In this case, the operational design users are sharing the same role, which is identifying gaps to improve the ERP capabilities. Their ultimate

goal is to find common solutions so that the use of ERP can be standardized. By having a harmonized ERP, it will be easier to identify potential improvements.

- **Design User Forum:**

The second CoP framework used in GPHE is called the Design User Forum. In this CoP, all the design users from different tracks (on the tactical level) meet and support each other. It is important to note that this forum is not about finding solutions during the meeting, but more about reporting progress and discussing the focus for each track. Each track also shares common improvement as they are interdependent. For example, for the “Plan” track to improve its business processes, they need to collaborate with other tracks as it is very dependent on them. The GPHE BU has started those Design User Forum only recently. Therefore, the members of the track meeting CoP did not feel comfortable speaking out their knowledge for multiple reasons. First, as it is a cross-functional CoP grouping different track members, the participants of the CoP find difficulty at the beginning to voice out their concern as they have never collaborated before. Secondly, as mentioned earlier, the D365 mERP is a new solution that the GPHE BU was not familiar about. Therefore, they did not have much knowledge to share regarding the new mERP solution. However, when conducting this interview, they only had one Design User Forum.

However, the stakeholder being interviewed was met several times during this project and confirmed that they have had several meetings as of now. She also stated that CoP members feel much more comfortable and enthusiastic into sharing knowledge and concern since the first Design User Forum. This example shows that CoP does contribute to improving ERP processes but often needs time for CoP members to share knowledge especially in a cross-functional CoP.

- **Process Owner Meeting:**

Finally, the stakeholder being interviewed also has a process owner meeting where she shares any concerns with the BU’s management team. Thanks to those meetings, decision-making for potential solutions and concerns can be done more quickly as she is in direct contact with the top management level. This CoP contribute to vertical company integration as there is a clear understanding of decisions coming from the top management level. It optimizes communication from top to bottom management and vice versa (Ståhl, J. E. & Windmark, C. 2021). An example would be if the stakeholders is reporting the status of the project and needs a decision to be made, she knows she can go to the management team, and they will give her a final decision on

whether the solution is approved or not. Moreover, if she needs to change the roadmap, she can also discuss it in the process owner meeting. Fast decision making will allow a faster implementation of mERP capability improvement.

In conclusion, company integration has been a massive trend across many organizations. As manufacturing is a very competitive environment, organizations need to find ways to increase the pace of developing the D365 mERP capabilities. CoPs does not only contribute to improving mERP business processes but also adds value as decisions are made more quickly and less time is wasted in the value chain.

#### *6.1.3.2) What IT tools are used during CoPs and are they efficient?*

Regarding the IT tools used in the CoP, the GPHE BU utilizes Microsoft Teams for virtual communication through messages or online video calls. They also upload relevant documents into files within the Microsoft software. The stakeholder being interviewed believes that the technology they currently use is stable and sustainable for the long term. When asked about the fast-changing environment of innovation and digitalization, and whether they will need to switch to a more efficient tool. She mentioned that they are never against innovation and use of new technologies. However, switching to a new communication tool would require extensive change management as her team has already spent time and resources into customizing Microsoft Teams to their specific needs. It is then important to understand what sort of gain or advantage there is to replace a current technology to a new one. Moreover, Microsoft Teams offers numerous capabilities, such as sharing and using different Microsoft applications within the company's cloud-based system, where stakeholders can access documents at any time. One of the common features used in Teams is the feature called Planners. Planners is a template in Teams where member of a CoP can keep track of gaps, tasks left and who is in charge of those tasks. Planners offers the possibility to also measure performances of CoP by identifying the amount gaps solved within a certain time frame. By looking at how long the task has been completed, the team can then investigate how efficient they were to solve the gap, and potentially improve in the future for other similar tasks.

#### *6.1.3.3) Does the GPHE BU participate in cross-BU CoP?*

Regarding cross-BU CoPs, the GPHE department does not have CoPs with other departments. However, the business group collaborates closely with the Trinity department, sharing relevant knowledge from Trinity while the GPHE BU shares their requirements and needs to improve ERP

capabilities. The stakeholder also mentioned that it is too early to collaborate with other business units to improve their ERP capabilities and share knowledge for multiple reasons.

First, not all BUs are in the process of harmonizing their ERP with the new D365 mERP, so having CoPs with members not using the software will not add any value. Secondly, the GPHE BU is not yet mature in terms of fully using and knowing all the functionalities of the new ERP. Thus, the GPHE department is not ready to have CoPs as they still do not feel comfortable sharing any relevant knowledge. However, the stakeholder also mentioned that having CoPs across BUs would be a good idea in the future once most departments have implemented the new solution into their system. She also mentioned that the capability forum is a good start, as it provides great information and an introduction to the proposed new ERP. The capability forum is a CoP that is organized by the global Trinity organization where they invite stakeholders from all BUs using the current D365 mERP. It allows the BUs to keep track of D365 mERP capabilities, and it is an opportunity for stakeholders to share their concern or knowledge with the rest of the audience.

*6.1.3.4) How does the GPHE BU’s knowledge management system relate to the Wiig cycle?*

As for the Wiig cycle, a question was asked about whether the GPHE department uses the Wiig cycle to manage knowledge. The stakeholder being interviewed mentioned that the Wiig concept was never specifically stated or used during change management training. However, she confirms that they usually follow the same step as the Wiig cycle when managing knowledge. *Table 4* shows the comparison of the Wiig cycle step with what the GPHE BU does to create, share and use knowledge. This statement made by the stakeholders shows that theory concept is often use by organizations in a real-life situation without necessarily being aware of it.

**Table 4: Wiig cycle within GPHE**

<b>Steps</b>	<b>In the GPHE BU</b>
Build Knowledge	Built knowledge through professional experience but also during CoPs, training and documentation.
Hold knowledge	Knowledge is stored through documentation in Teams, video Recording, SharePoint
Pool knowledge	Knowledge is pooled from the Planners tool and during group meetings
Use knowledge	Knowledge is used to improve mERP capabilities

*6.1.3.5) Do GPHE members see clear benefits from having CoPs?*

The next discussion topic was about the potential benefits of having communities of practice (CoPs) in place for the GPHE. The stakeholder being interviewed clearly sees the benefits of having



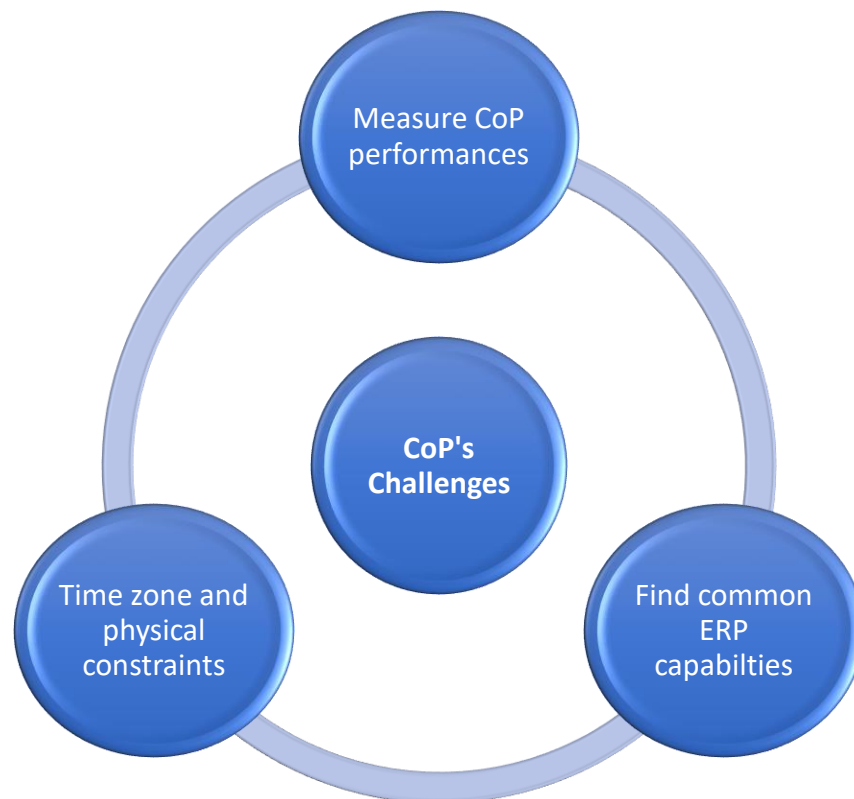
CoPs. However, some other stakeholders from the same BU might not see direct benefits or at least, not early on into the mERP implementation process. For example, different design users will see the benefits of having cross-track CoPs if their track is affected by other tracks. Tracks that are not dependent on other track processes would not see the benefits of collaborating with others until they go live with the new mERP solution. Moreover, some tracks would have CoPs more frequently due to their high level of complexity. For example, the Product track members meet regularly together as they constantly face challenges. The more complex the track, the more CoPs will be involved. Also, in some cases, the factory manager would only see the benefit from having CoPs only when it affects their factory. For example, the GPRHE employees from Lund do not see the needs for having CoPs with other sites as they have not yet installed the new D365 mERP. However, if stakeholders have the motivation to implement CoPs before going live with the new ERP, it will reduce the learning curve of using the new solution, but also, mERP improvements would be found more efficiently. In fact, it would be beneficial to discuss their needs from the new mERP in order to be better prepared for once the implementation of the new mERP is being installed into a factory. Showing the clear benefits of having CoPs to end-users not impacted by the mERP until it goes live is a daily challenge that the stakeholder being interviewed has to face. Nonetheless, the stakeholder confirms that the members of the GPHE BU generally see benefits from having CoPs due to the fact that it increases knowledge transparency as tacit knowledge is spread out throughout different stakeholders. According to the stakeholders being interviewed, CoP implementation also optimizes resources as gathering a group of people to solve one gap is much more efficient than solving problems individually since more ideas are proposed to make the improvements. In fact, she can clearly see that CoPs allow key stakeholders to gain knowledge about the new mERP solution and learn how to use the solution faster than before. By being knowledgeable into using the new mERP, it also helps the global Trinity organization to optimize their support towards the GPHE BU as it will support the business units by delivering solutions for gaps with higher customer value such as: enhancing electronic data exchange between systems and improve process automation.

In conclusion, the stakeholder mentioned that benefits from having a CoP within the GPHE will be subjective depending on the different stakeholder's needs from the GPHE BU. However, the GPHE BU main driver for implementing CoPs is to become self-sufficient and have enough knowledge to know how to improve their new D365 mERP. The goal is to eventually minimize Cop with

Global Trinity and become fully independent. By looking at the conscious/unconscious competence model, the stakeholder mentioned that they are still in the conscious competence stage (stage 2) as they still need support from the global Trinity organization. As of today, there are global Trinity members participating in the Track Meeting when needed.

*6.1.3.6) Challenges in CoP within the GPHE BU:*

Different challenges faced during CoP implementation were discussed in *Section 3.2.5* such as: resistance to knowledge sharing, work overload, lack of management support, technical issues with IT tools, lack of time, unclear benefits, and conflicting priorities between CoP and business functions. However, the stakeholder mentioned that the GPHE BU does not struggle with any of these challenges at this moment in time. Nonetheless, she mentioned that she is currently facing with three main challenges as seen in *Figure 26*:



*Figure 26: GPHE BU's current CoP challenges*

1) **Measure CoP performances:**

One of the main challenges in CoP framework is measuring the performances of communities of practice. It can be difficult to measure the different metrics: system, output, outcome/consequence metrics. Nonetheless, even if the GPHE BU does not have yet a structured framework to measure performances, one way to measure is to see the improvements made on the mERP capabilities from the three different CoPs they have. The only issue is that they do not measure performances on a written document. However, they have a non-written way of measuring performances by simply seeing the improvements made on the new harmonized mERP solution before and after implementing CoPs. However, the stakeholder strongly believes that implementing measurement performances would be beneficial as it gives some sort of feasibility on the performance of those meeting and see if CoPs actually contribute to sharing knowledge and improving ERP capabilities. In fact, the stakeholder mentioned that actually seeing the progress made from using CoP would bring motivation to the team to participate even more in communities of practice.

2) **Common ERP capabilities:**

The stakeholder mentioned that it can be difficult to establish common ERP capabilities as each factory has some differences in terms of manufacturing processes. For instance, for the welding process, one GPHE factory would weld it in house while another factory would source a supplier to weld those parts for them. Moreover, finding common solutions for different business units is even more challenging, as they have different production lines, machines, and manufacturing procedures.

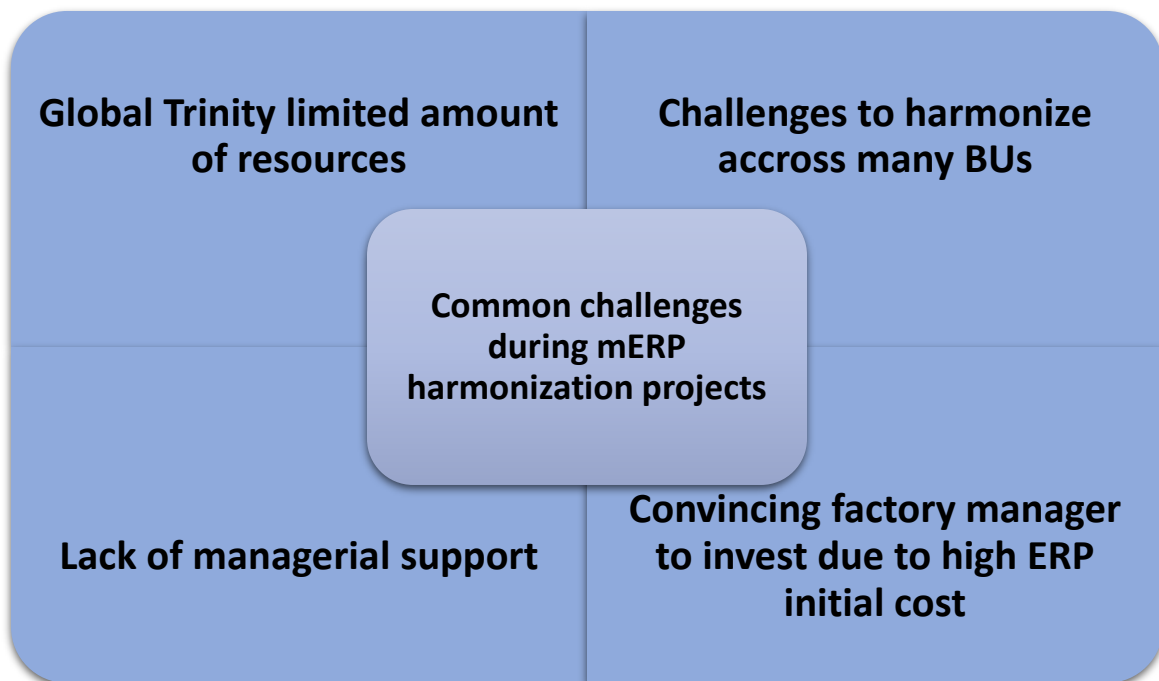
3) **Time zone and physical constraint:**

Finally, another challenge faced with efficient CoP is the time zone and physical distance between the GPHE sites. When the project started in Jiang Yin, the global trinity and GPHE teams located in Lund could not travel to China due to Covid restrictions. It massively impacted the implementation process of the new ERP, as it is important to observe how Chinese stakeholders use their system to compare and find similarities with other GPHE manufacturing sites. Moreover, meeting with the team physically instead of virtually can “break the ice”, and improve social interaction. Even though today's technological tools minimize the lack of communication, it is still important to physically get to know different stakeholders part of this

new community of practice. By doing so, members of the communities will feel more comfortable sharing knowledge to improve mERP capabilities.

6.1.4) What are the common challenges in mERP harmonization project across different sites?

Even if the stakeholder does not struggle at this moment in time, she has identified four main challenges that could potentially occur during the harmonization of mERPs.



*Figure 27: Common challenges during ERP implementation*

1) **Limited resources from global Trinity:**

One of the challenges in harmonizing mERPs across different locations could be the limited human and financial resources from the Trinity department. Due to the lack of resources, Trinity prioritizes the sites that are ready to invest, and have the capabilities to complete this harmonization project. However, Alfa Laval eventually plans to have a single mERP D365 across all business units. If a BU is not ready to invest into the new mERP solution, then the global Trinity organization would support other BUs that have a plan and know what they need form the new IT solution.

2) **Harmonize mERP across many BUs:**

The strategy of implementing mERP per region was suggested by the interviewer as a potential and perhaps more beneficial strategy for the organization. By implementing mERPs per region

and not per business units, the harmonization process would theoretically be faster since other BUs will not have to wait for their turn to receive support from Trinity due to limited resources. Moreover, the implementation per region will promote cross-organizational CoPs across different business units, and more key end-users will share knowledge and potential solutions to improve ERP capabilities. Although it could be a good mERP implementation strategy, the stakeholder also believes that there are still risks and drawbacks to consider. In fact, financial risks need to be considered. If the implementation process per region does fails, the financial impact would be much higher than if the new solution was installed per factory only. The implementation per factory will reduce financial risks as it will have an impact on one site at a time, and therefore, it would still be possible to mitigate the risks of possible ERP implementation failure. Moreover, according to the stakeholder, implementing per region means that all the business units need to be ready to invest and know exactly what they need from the new solution. As mentioned earlier, the GPHE BU was able to implement their new ERP solution because they were prepared to make the change. Therefore, all the BUs within a region need to be all ready to make the changes at the same time but also need to find common mERP capabilities so that the implementation of mERP per region would be efficient.

3) **Convince the factory manager:**

The stakeholder also mentioned that it is challenging to convince factory managers to invest in new mERPs. There is no direct return in investment from implementing a new costly mERP as there are no financial benefits since it is not a product that the GPHE BU would sell to their customers. However, it is crucial for companies to invest in efficient mERPs to stay competitive and adapt to a fast-changing global supply chain environment. In fact, it is essential to keep up with new ways of integrating, analyzing, and interpreting data or product information in order to improve visibility and traceability across all the supply chain operations.

4) **Lack of managerial performances:**

Even if the stakeholder mentioned that the GPHE BU does not struggle with the lack of managerial performances, she also stated that it could be a potential challenge from a general point of view. She mentioned that it is not just the stakeholders with the technical knowledge who needs to perform, but also, the person in charge of the project has to make sure the different milestones of the project are completed on time and with great quality.

#### 6.1.5) What are the critical ERP CSFs according to the stakeholders?

As mentioned in *Section 3.3.3*, a key aspect to minimize the impact of any challenges related to mERP implementation is defining and ranking different Critical Success Factors (CSFs) to achieve a successful mERP installation. The stakeholder agrees with the CSFs found from source literature explained in *Section 3.3.3* that top management support is the most important CSF. By looking at Alfa Laval organizational structure, the management level would be on the level of the Product Group (PG) manager within each BU. Even if the PG managers do not drive the ERP implementation project, they still support the project manager by securing financial and human resources, but most importantly, they also give empowerment to the project manager. Providing empowerment shows that the PG manager fully support the decision of the project manager driving the mERP implementation across different factories. For example, there are many manufacturing sites within the GPHE BU, and each factory factory managers might have different needs that benefit their factory from a lower level. Support from the BU manager will overrule any challenges related to individual needs from factory managers and make sure that the harmonization process of all mERP is completed by the project manager. The stakeholder also mentioned that Business Process Reengineering (BPR) was another important CSF. The GPHE BU conducted a BPR before starting the ERP rollout project. In fact, the BU reviewed all the processes and decided what changes they wanted to have. They proceeded with a BPR first through collaboration with global Trinity, then applied change management. The BPR was conducted only once, and for all the factories.

#### 6.1.6) Investigation of change management and BPR within the GPHE BU:

##### 6.1.6.1) *What are the challenges faced during new changes?*

During the interview, the stakeholder has identified three main challenges when an organization applies changes related to new mERP integration:

##### 1) **Non clear benefit:**

The first challenge when applying change is that end users do not always see the clear benefits. Companies constantly make changes to remain competitive, but these changes may benefit the company on a global level while not necessarily benefiting the stakeholders on the lower level as more tasks might be added into their daily assignments. However, employees need to understand that organizations need to make constant changes on a global level to be competitive

and generate more revenues which will allow the company to secure end user's full-time positions.

2) **Loss of task or responsibility:**

Another case where the company would face employee resistance is regarding the improvement of the mERP capabilities by automating digital processes. By increasing automation, employees may resist change as they fear that they will not have as many tasks as they used to, which may lead to a fear of losing their position.

3) **End user's lack of confidence:**

Another challenge mentioned by the stakeholder is that end users may not be comfortable at first with new tasks and responsibilities.

*6.1.6.2) Stakeholder's recommendations for successful change management:*

According to the stakeholders, there are many change management tactics to successfully drive change related to implanting a new mERP solution. The stakeholder being interviewed mentioned three main solutions that could avoid or minimize resistance to change as seen in *Figure 28*:



***Figure 28: Key concept for successful change management:***

The stakeholder also mentioned that there is not one criterion that is more important than the others since they all complement each other. In fact, she believes that communication and training will provide awareness and acceptance. Moreover, less communication and training will lead to more employee resistance. To convince stakeholders that the new changes benefit them as well, it is

important to communicate the changes, even if they are not beneficial for them on their level, it will benefit the organization on a much higher level.

*6.1.6.3) Was it beneficial for the GPHE BU to conduct a BPR?*

The stakeholder mentioned that it was a good strategy to conduct a business process reengineering (BPR). For instance, if the GPHE BU is faced with resistance from end users who are familiar with previous mERP systems, the project manager can reduce employee resistance as the BPR would be presented like a proof to the end user that the new mERP solution would improve supply chain operations on a global level. The BPR is the preparation to do the change, and change management is used to execute the change by providing support to the end users.

*6.1.6.4) Importance of organizational culture in change management:*

An example of good change management is to have a good organizational culture where employees know that they are safe to ask questions if they do not feel particularly ready to apply changes. The GPHE BU ensures that their stakeholders' concerns are heard by implementing forums. It is possible to keep up with changes with all the different digital tools used by the company, such as documents on Microsoft Teams or SharePoint. However, the stakeholder also believes that face-to-face meetings are the best way to communicate changes, as they provide an opportunity for stakeholders to share their concerns and ask questions directly to the management team. During the interview, the stakeholder was asked if an anonymous survey after meetings could also help reduce stakeholders' concerns. She mentioned that it could be a good idea, as during meetings, stakeholders are sometimes not confident enough to raise their concerns and would feel more comfortable raising them anonymously since it would reduce judgement on a particular employee.

*6.1.6.5) How CoPs contribute to change management within GPHE?*

One of the tactics regarding efficient change management is the creation of mobilization events before rolling out the new mERP into the factory. The GPHE BU has been organizing these mobilization events for all the factories they have implemented the new mERP solution where different stakeholders are invited in this networking event. In this mobilization event, stakeholders from the factory can share their concerns with their managers and the Global Trinity department about the new mERP solution but also clarify their needs from using the new IT solution. Moreover, they also involve stakeholders from other factories currently using the new D365 mERP solution where they can share their experience in adapting to the changes when using the new mERP.



Finally, the stakeholder being interviewed also mentioned that one of her other change management tactics are based on communication. Hence, she strongly believes that CoPs help stakeholders to adapt to change management as it enhances the sharing of concerns among community members. As improving capabilities requires constant change management, changes often occur from the bottom to the top as the organization encourages employee self-empowerment. CoP is an effective tactic to monitor any changes happening on any single management level.

6.1.7) What is the GPHE BU's CoP/harmonized mERP level of maturity compared to other BUs?

Another question that came up was about the level of maturity of the CoP and harmonization process of their D365 mERPs compared to other BUs. The stakeholder stated that it is difficult to compare the maturity level with other BUs due to the decentralized structure of the company when it comes to conducting their business operations. She mentioned that all the BUs operate like a small independent organization within the main organization which is Alfa Laval. Therefore, there is not much contact or collaboration between BUs. However, as of now, she is satisfied with the level of maturity of their current CoP and harmonization process of their D365 mERP across all GPHE factories as it is meeting her expectation. Nonetheless, she also stated that it is always possible to do better. The reason why she is satisfied with what has been accomplished so far is due to the fact that the GPHE BU is showing great sense of responsibility and ownership when it comes to implement the new mERP solution. Even though when Alfa Laval's Group Operation organization decided to implement D365 mERP across all BUs, the GPHE BU did not have a clear idea of what they wanted from the new IT solution. However, it was through collaboration within stakeholders from the GPHE BU that they successfully knew what were their needs from the new mERP. Moreover, thanks to collaboration, the GPHE BU was also efficient into providing a clear plan. The fact that the GPHE BU showed the determination to invest into the new mERP solution by providing clear business cases made the global Trinity organization to focus on providing a clear roadmap for the GPHE BU. Another factor that contributes to having a fast and efficient collaboration with global Trinity is the amount of human and financial resources a BU has in order to provide all the necessary needs, plan and business cases to the global Trinity organization. The GPHE BU is the biggest departments within Alfa Laval with more than 3000 employees. Some BUs do not have the manpower to assign business cases to their own employees as they are already in charge of other projects. As mentioned in this report, there are many systems surrounding the IT environment that need to be taking care of, not just the mERP.

## 6.2) Case study 2 - Investigation of the DEC BU:

*The stakeholder being interviewed is a manager in operation development for the DEC BU. He is responsible for supporting operational development of IT tools used in supply chain across multiple DEC factories.*

### 6.2.1) Description of decanters:

*All the information about the decanters product and the BU have been taken from the company's SharePoint only accessible by Alfa Laval employees.*

Decanters are a technological solution that can effectively separate solids from liquid components in a single and continuous process. They offer high-performance separation with superior quality and exceptional commercial value. Alfa Laval differentiates itself from its competitors by not only separating solids from liquids but also by recycling valuable raw materials, reducing energy consumption, minimizing the company's environmental footprint, and reducing waste.

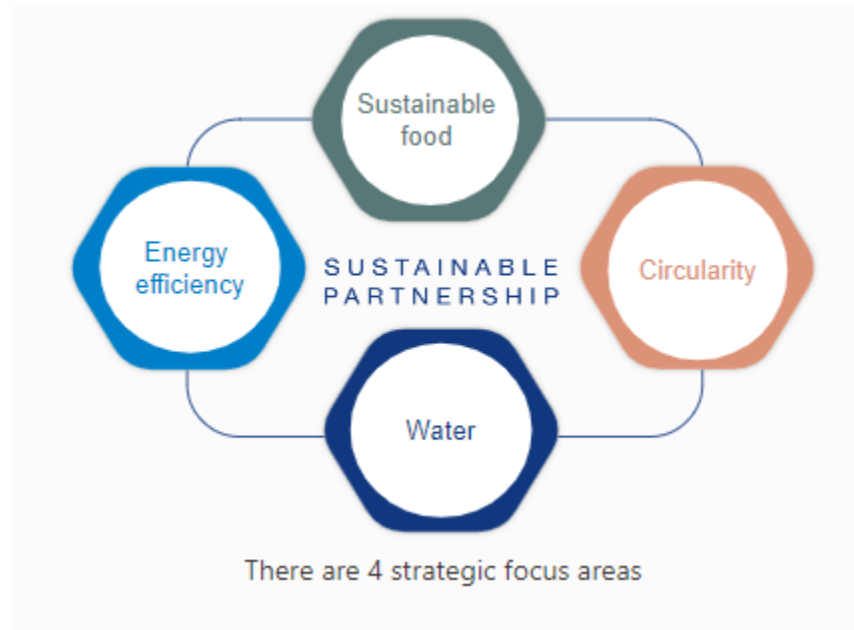


**Figure 29: Alfa Laval Decanter**

Decanters offer a solution for the food and water division, especially with the increasing global population and the need for more sustainable food, water, and medicine production. The DEC BU focuses on achieving these sustainability goals through several initiatives:

- Sustainable food production by reducing the use of water, energy, farmland, and chemicals.
- Optimizing water use in manufacturing and agriculture due to the urgent need for more fresh water, most of which is currently used for irrigation.
- Reducing greenhouse gas emissions in food production, which account for one-third of total emissions, through energy efficiency measures.

- Minimizing waste throughout the food value chain from farm to customer by upcycling leftovers into value-added products, while using less water, energy, and chemicals to achieve circularity.



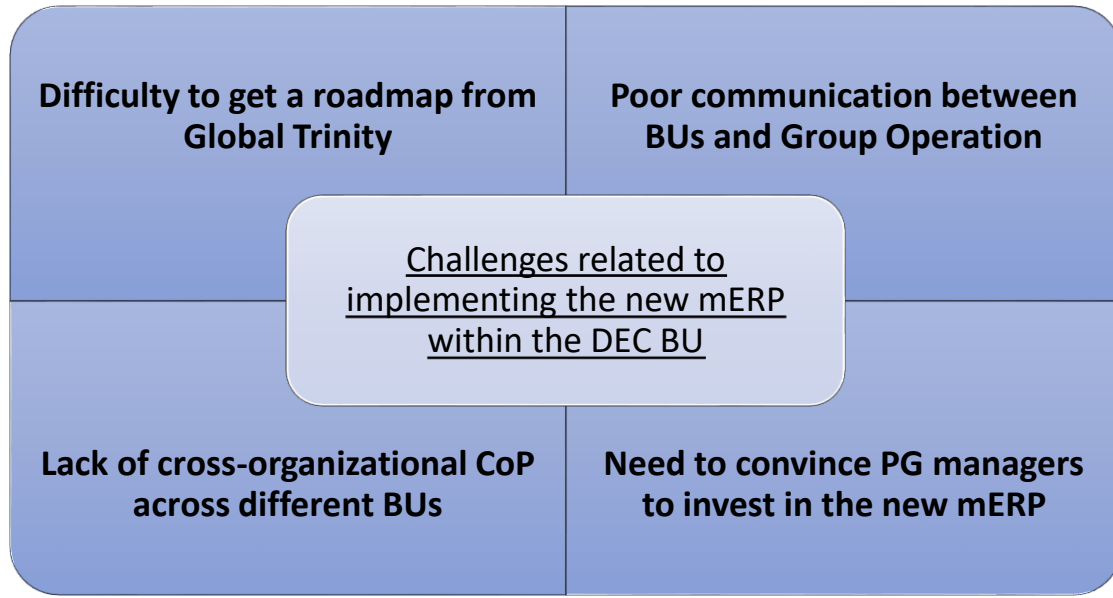
**Figure 30: DEC BU's strategy**

6.2.2) Purpose of this case study:

Another case study was conducted to compare the maturity level of CoP and harmonization process of the new D365 mERP between the DEC and GPHE BU. The stakeholder is responsible for supporting operational development in the supply chain across multiple locations, including Poland, India, China, the USA, and Denmark. All these sites currently use outdated mERP systems in their supply chain operations. The stakeholder is also responsible for investigating how the sites collaborate despite using different mERPs.

6.2.3) What are the challenges faced by the DEC BU for the implementation of the new D365 mERP?

The stakeholder mentioned that his BU is faced with many challenges when it comes to implementing the new D365 mERP solution. There are in total four main challenges as seen in *Figure 31*. These challenges will be explained more in detailed in the paragraph below.



*Figure 31: DEC challenge regarding new mERP implementation*

Firstly, he finds it challenging to obtain a roadmap and plan from the Trinity department for the different stages of implementing the new mERP solution. Although he understands that many factors come into play, such as the limited amount of financial and human resources within the Global Trinity department. Nonetheless, the DEC BU needs to harmonize their mERP systems to minimize waste from a lack of visibility during supply chain operations. The stakeholder mentioned that he agrees that the BU needs to be prepared to make changes, but he also thinks that they lack the resources and knowledge of the new D365 mERP solution to make a plan. Even though the BU needs to have a plan, Global Trinity still knows more than them in terms of IT technical knowledge. Originally, the DEC BU had an original roadmap, but it was constantly changed over time. Therefore, the constant changes in the roadmap will push the project to reach 80% harmonization and take longer than expected. The stakeholder also mentioned that it is always the DEC BU who pulls information from Global Trinity. However, he believes that it should be the other way around, and it is not up to the DEC BU to organize these meetings. The stakeholder also stated that the Global Trinity organization should organize those meetings because they know the BUs that are using the D365 mERP, and their progress in terms of mERP capabilities. As of now, the BU local Trinity manager from the DEC BU is organizing those meeting with Global Trinity.

Secondly, the stakeholder also mentioned the lack of communication across different BUs. He believes that having CoPs with other BUs such as GPHE regarding the use and implementation of

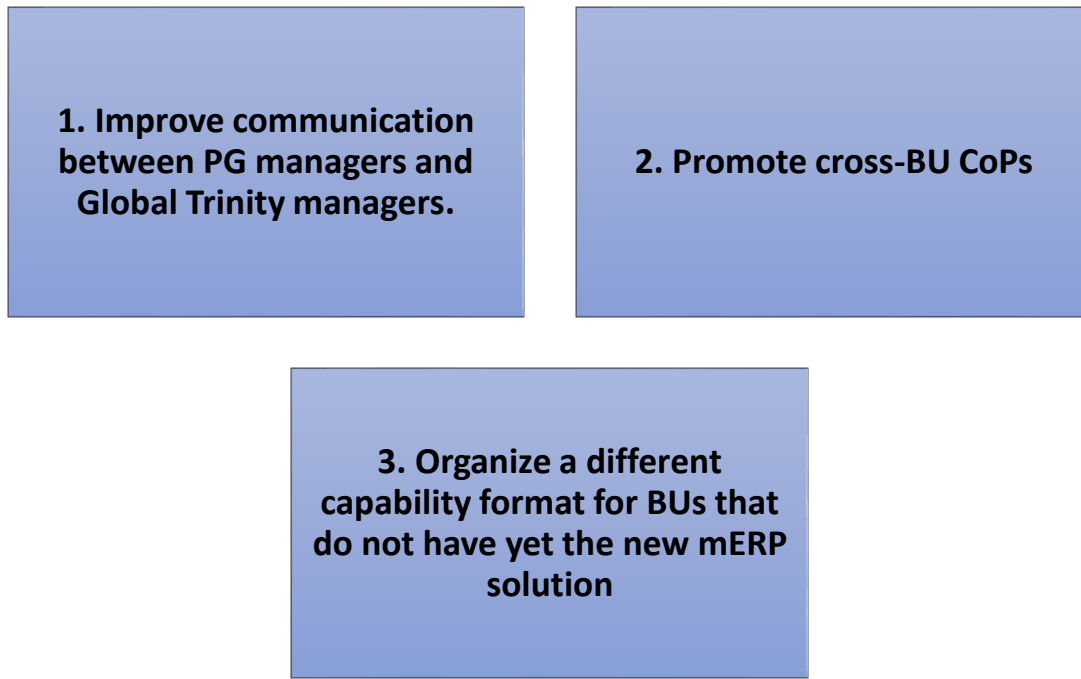
the D365 mERP would be valuable knowledge to grasp since the DEC BU is not as knowledgeable about the new mERP solution compared to other BUs. A question was asked about why he did not initiate contact with other business units to set up cross-organizational CoPs. The stakeholder confirmed that he has organized cross-organizational CoP for the two IT tools of the “Sell” and “Develop” entities. However, he does not have a CoP for the supply chain entity regarding the new D365 mERP. Even though the stakeholder showed great sense of responsibility by taking the initiative to organize those cross-organizational CoPs, he stresses the fact that it is not up to him to organize those meetings. He considers the global Trinity organization should invite stakeholders and key end-users to networking events. It should come from the top management level to organize these meetings as they know the organizational structure and which relevant stakeholders to invite. The stakeholders from the Global Trinity organization in charge of the “supply” entity assured him that he would participate in the “Supply” meeting that happens half a year also called capability forum, but still has not received an invitation. As a matter of fact, he is not aware of those capability forums for the “Supply” entity until it was mentioned during this interview. However, He also does understand that only stakeholders using the new D365 mERP should be invited to avoid confusion amongst CoP members that did not yet get introduced to the new solution, and thus, impact the quality of the meeting. However, the stakeholders from the DEC BU suggested it would be a good idea to find a way for BUs that do not have yet the new solution to get a small introduction of the new mERP. The stakeholder’s testimony shows the importance of the top management's role in conducting efficient CoP and ERP implementation.

Finally, the stakeholder finds it challenging to convince PG managers to invest in the new mERP solution as they do not see clear benefits. Implementing a new mERP requires a high initial cost. However, the current IT environment is very scattered and unharmonized which leads to the DEC BU spending time and financial resources updating very old mERP systems. Moreover, the fact that PG managers were not initially invited to networking events regarding the new D365 mERP made it even more challenging for him to convince his managers to invest in a new system. This made it difficult as Global Trinity who are experts in IT solutions could have better demonstrated the many benefits the new mERP solution offers.

6.2.4) What are the stakeholder’s suggestion to efficiently implement the new mERP solution?

Currently, BUs are doing customization from a non-global perspective since each BU is doing its own customization of its new D365 mERP solution without communicating with other BUs.

Therefore, Global Trinity has many consultants employed to help users and satisfy their needs. Hence, the stakeholder from the DEC BU has proposed three suggestions to address the challenges mentioned above as seen in *Figure 32*



*Figure 32: Stakeholder's recommendations*

The first solution is to improve communication between PG managers and Global Trinity managers to provide a clear roadmap for the DEC BU. Furthermore, the DEC BU has conducted a business case study on one of their factories in Denmark. PG managers can then provide these business cases to Global Trinity so that the IT department can determine the customization and specific templates for the new mERP solution specific to the DEC BU. Additionally, PG managers have shown some concerns on whether the new mERP solution is worth investing on it due to very high investment cost, but also, due to their lack of technical knowledge regarding the use of mERP within supply chain. PG managers would need more proof that investing in a new mERP would be beneficial from a financial point of view. Hence, the stakeholder has been conducting a cost-benefit analysis to demonstrate the benefits of having the new D365 mERP to the PG manager.

Secondly, the stakeholder also recommended some strategies to minimize the problem regarding Global Trinity's lack of resources. He suggested that having cross-BU CoPs will allow stakeholders to discuss about similar matters, issues, and find solutions faster as more tacit knowledge is shared

throughout the company. These CoPs could help standardize common improvements and therefore, allow BUs to not fully implement the solutions, and simply make changes along the way in an agile method. Thanks to cross-BUs CoPs, it will be possible to add the new mERP solution per region instead of implementing it per manufacturing site. This implementation strategy could potentially increase the pace of the harmonization process across the entire organization. However, for cross-BU CoPs to be productive, the stakeholder stated that it is essential to have a roadmap from Global Trinity before conducting those meetings and thinks that it could be a waste of resources since the DEC BU does not have a D365 mERP in any of its factories.

Finally, The stakeholder also mentioned that the Global Trinity organization should think about organizing another format of the capability forum where BUs that do not possess the new D365 mERP solution should be invited in those meetings. In this CoP, Global Trinity should introduce the new mERP by presenting the different business cases that other BUs have made previously. For example, Global Trinity could present what they have done so far to other manufacturing sites such as the GPHE factory in Richmond. Global Trinity could also explain the benefit from the new solution and give a possible approximation of how the roadmap would look like if these BUs are integrated into the roll out project. The stakeholder being interviewed also mentioned that during this CoP, there is an opportunity for Global Trinity stakeholders to share their tacit knowledge related to the new D365 mERP. By doing so, the BUs will have a better idea of how the new mERP system works and will have the knowledge to make business cases. The stakeholder also mentioned that it is up to Global Trinity to organize this CoP as it is the organization that knows exactly which BU has or has not started to integrate the new D365 mERP into their factories.

#### 6.2.5) Current CoP in the DEC BU:

Similar to the GPHE BU, they follow the Wiig Cycle without necessarily being aware of it, indicating a good level of implementation and framework of CoP. There are in total two CoPs but only one is in relation with the sharing knowledge regarding the mERP capabilities.

First, the stakeholder currently organizes cross-BU CoP for both the “Sales” and “Develop” entities of Trinity. Only business units that currently use TeamCenter (Develop) and AllIce (Sales) as their IT systems are invited to these meetings. It is important to limit the number of stakeholders involved in these CoPs to optimize the quality of knowledge shared. During the meetings, there is no set agenda. Local representatives from each BU decide on topics or areas for improvement to

discuss, which are then gathered and shared in the meeting. These meetings stand out from the capability forum as the format is different. In those meetings, it is more of an open discussion of what improvements can be made. Whereas in the capability forum, it is more about showing the latest update of new capabilities implemented into the IT solutions.

Secondly, the stakeholder also mentioned that twice a year, there are meetings between local Trinity departments of each BU and the global Trinity department also called “Extended Trinity core team meeting”. In these meetings, stakeholders discuss different topics. However, they mainly discuss about the roadmap of the next IT solutions being implemented in different Alfa Laval’s factories, but also possible new capabilities that could be implemented in new IT solutions. These networking events could also be a great opportunity for BUs to share their concerns, and for global Trinity to ask what sort of support BUs would require. Finally, cross-BU meetings is also a way for the stakeholder to learn from other improvements from other BUs.

2.2.6) Is there any resistance from employees towards changes?

The challenge of employee resistance was also discussed. The stakeholder confirmed that there is no resistance when it comes to participating in these meetings as employees can clearly see the benefits. One of these benefits is the increase in expertise about different systems through tacit knowledge sharing. He also believes that there will be no resistance to change management when the DEC BU implements the new mERP solution, as they also see clear advantages. There might be some initial resistance, but ultimately, the end-users clearly see the positives from using the new IT solutions, and the resistance does not have a significant impact.

## **8) Discussion:**

*8.1) Theory concepts VS empirical data gathered during the project:*

8.1.1) Do GPHE and DEC BUs have a clear domain, community and practice during COPs:

As mentioned in *Section 3.2.1*, a CoP is composed of three main characteristics: The domain, practice and community. After conducting a thorough investigation regarding the different CoPs organized within different Alfa Laval’s organization or BUs, it is fair to say that all CoPs have a clear domain (purpose), community (collaboration) and practice (learning and sharing knowledge). Before starting a CoP, it is important that the right people are invited, the right knowledge is shared and that there is a clear purpose of having CoP. Organizing CoPs for no real purpose would be a waste of time and resource.



For example, the capability forum that is held to update on new D365 mERP capabilities would have the following characteristics:

➤ **The domain:**

Here the common interest across the Alfa Laval organization is to standardize their business processes in order to improve the organization's supply chain flexibility and efficiency.

➤ **The Community:**

Many stakeholders share a common interest. There are members from all BUs as standardizing supply chain processes would help reduce waste, through common policy and decision-making. Other stakeholders from the IT side would also benefit from joining forces as harmonizing the ERP to only one solution will massively reduce maintenance cost and technological debts.

➤ **The Practice:**

Here, the focus is to update on new common D365 mERP capability improvement across different factories. Nonetheless, Alfa Laval's main driver to implement CoP is to allow more knowledge sharing not just within but also across BUs through a unified mERP solution.

However, as discussed in the report, there are many different CoPs across the organization and some characteristics may vary from one CoP to another. The community might differ depending on what specific mERP capability would be discussed. For example, for the Plan track meeting, only stakeholders in charge of improving the Plan track would be joining this meeting. However, all of the CoPs investigated in this project all share the same "domain" which is making Alfa Laval's supply chain more flexible and resilient through standardization. This shows that even if BU's operate in a decentralized structure, they all share a common goal that would benefit Alfa Laval on a higher level. Moreover, most CoPs also possess the same practice which is sharing knowledge in order to improve mERP capabilities.

8.1.2) Does GPHE CoPs meet needs based on the BTOPP model?

After conducting an interview with a stakeholder from the GPHE BU, it can be concluded that CoPs within the GPHE organization does answers the five critical elements of the BTOPP model. *Table 5* shows how CoPs contribute to the different criteria of the BTOPP model for the GPHE BU when it comes to improving mERP capabilities.

*Table 5: BTOPP model for improving ERP capabilities*

<b><u>Criteria:</u></b>	<b><u>Context of harmonizing of ERP capabilities</u></b>
Benefit	Identifying benefits that members can expect to receive from participating in the CoP, such as improved data quality, more efficient processes, and better decision-making. They can be considered as metrics to measure benefit of CoP.
Tools	Identifying the tools and resources needed to support the CoP, such as a collaboration platform, a knowledge repository, and a project management tool.
Organization	Establishing the organizational context for the CoP, and make sure the BU management team provides all the necessary resources to organize efficient CoP.
People	Identifying the people who will be involved in the CoP, including representatives from each GPHE factories using the new mERP system. Also clarify the benefit from participating in CoP though efficient change management.
Process	CoP members establish the processes and activities that will be used to manage the CoP, including regular meetings, knowledge sharing sessions, and collaborative problem-solving.

### 8.1.3) Change management and BPR within the GPHE BU:

As mentioned in in *Section 3.4*, there are five key steps to adopt change when implementing a new mERP solution. The paragraph below demonstrates whether the data received during interviews with the GPHE stakeholder does satisfy all the five requirements found in the literature review.

- **Commitment from key stakeholders:**

The GPHE BU gets the end user's commitment through different strategies. First, the BU makes sure to get commitment from all stakeholders through different CoPs formats where end users can share their concern about the new changes and ask questions. During the interview, the organizers of these CoPs guarantee a safe space for end users to discuss any worry they might have about the new mERP solution. Thanks to social interaction, the management team can address those concerns by assuring the end user that change is needed to improve company's performances. Secondly, The BU also promotes a culture where end users have more ownership about the improvement of mERP capabilities. By having a sense of responsibility, end users will

be much more committed into the new changes as they understand that their self-empowerment contribute to the organization not just for their BU but also on a global level. End users need to understand that harmonizing mERP processes would help better standardizing supply chain operations and therefore, reduce waste leading to increasing the company's revenue.

- **Understand the impact of a new mERP solution:**

The GPHE BU does understand the impact of implementing a new mERP in their business operations. By collaborating with the global Trinity team, they conducted a business process reengineering to identify potential improvement from adopting the new mERP solution. Moreover, The GPHE BU also conducted business cases before starting to invest on the new mERP.

- **Great Communication:**

During the interview, the stakeholder mentioned that efficient communication is key to rapidly adapt to change regarding a new mERP implementation. In fact, it is important to communicate the right information to the right people. Hence, the GPHE BU has different CoPs such as track meetings, design forums, process owner meeting and mobilization events. Having different CoPs will help filtering the information needed to be communicated to specific stakeholders, and thus communication of specific topic will travel much faster across the BU.

- **Create a clear roadmap:**

The Global Trinity organization is in charge of delivering the roadmap of the implementation project of the new mERP solution. Thankfully, the GPHE works in close collaboration where they update the global Trinity on potential gaps or issues that might occur during a certain date of the project. The Global Trinity organization can then change the roadmap based on the BU's preference. However, the GPHE does understand that only minor changes can be made on the road map as the Global Trinity organization is also delivering IT solutions to other BU's.

- **Training:**

The capability forum offers the opportunity for stakeholders from the Global Trinity organization to show a demo of how new mERP capabilities would work in a real life scenario. Furthermore, in this forum, Global Trinity also provides information of where end users can get training into using the new mERP solutions if extra practice is needed.

In conclusion, the strategy used by the GPHE BU to successfully adapt to changes is aligned with the five change management steps found from theory concepts in *Section 3.4*.

8.1.4) How CoP contribute to achieve critical success factor during ERP implementation?

*Section 3.3.3* discussed the main CSF used for ERP implementation and it can be noticed that the most important CSFs mentioned in the source literature was in accordance with what the stakeholder's CSF. As mentioned in the report, management support and business process reengineering are the most fundamental CSFs. Both CSFs are allocated in the top left quadrant of *Figure 6* and are classified as independent CSFs. Independent CSFs have high riving power and low dependence meaning that they have a significant impact on the rest of the CSFs. In other words, if those two CSFs are not completed, the rest of the CSFs will also most likely not be achieved and the ERP implementation will fail.

CoPs can contribute to making sure there is efficient management support and business process reengineering. For example, the process owner meeting is a CoP used in the GPHE BU where stakeholders are in direct contact with the BU manager and share any concerns or support needed in order to complete the harmonization process of the D365 mERPs. CoPs are also used to conduct a business process reengineering as there is a close collaboration between the GPHE BU and Global Trinity.

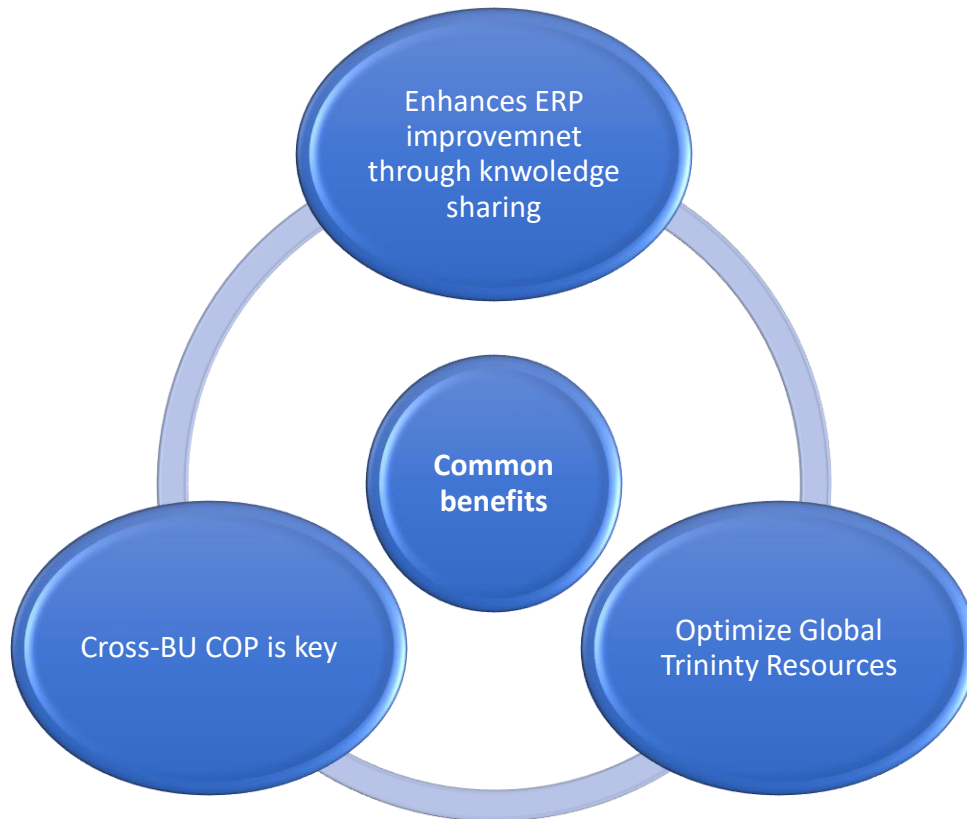
Moreover, as mentioned in *Section 3.5*, organizations do not always conduct a business process reengineering activity when implementing a new IT solution. However, it is interesting to know that the GPHE BU did perform a business process reengineering before starting to implement new D365 mERP in their factories. It then coincides with the theory described in *Section 3.5* where it explains that conducting a BPR before implementing an ERP would increases the chance of successful ERP integration as it reduces employee's resistances and also increase knowledge about the new ERP solution.

Finally, most CSFs are factors that could also be applied for any sort of IT implementation as they include common organizational concept such as change management, business process reengineering or training.

## 8.2) Similarities between DEC and GPHE BU :

### 8.2.1) Common CoP benefits:

During the interview sessions, several common benefits for using CoPs and a harmonized mERP systems were discovered between both BUs. *Figure 33* shows the three common benefits expressed by the GPHE and DEC BU.



*Figure 33: Common CoP benefits between GPHE and DEC BU*

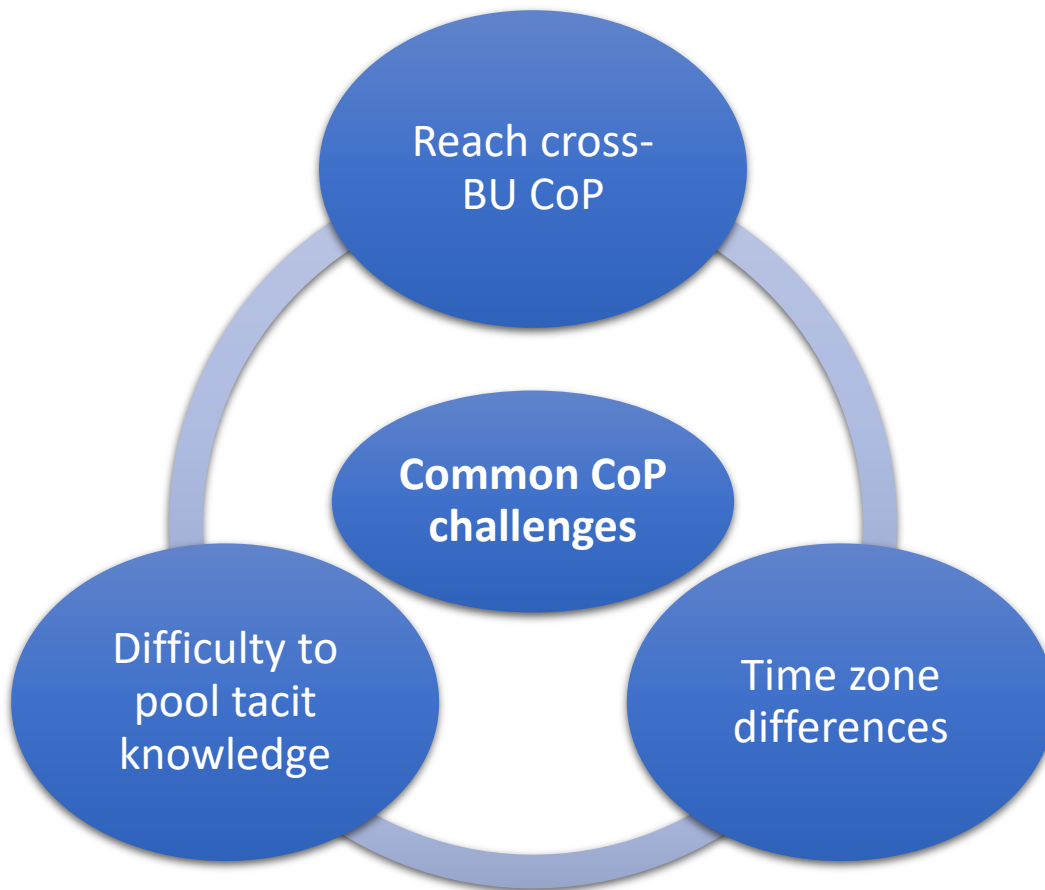
First, the stakeholders interviewed believe that CoP is contributing to sharing knowledge in order to improve new mERP capabilities but also, help towards a faster harmonization process of using only the D365 mERP solution across all the factories.

The second common benefit from implementing CoPs is that it would help the global Trinity and the BU to optimize their resources. Collaborate, and support end users through knowledge sharing will allow them to identify gaps in a more efficient way but also increase the pace of making improvements.

Finally, harmonizing the use of Alfa Laval's mERP will allow the creation of cross-BU CoP on a global level where all BUs can sit down together and discuss on potential gaps and improvement. Both stakeholders believe that cross-BU CoP is a CoP framework that should strongly be invested in the future.

### 8.2.2) Common CoP challenges:

As seen in the figure below, there are three common challenges encountered by the DEC and GPHE BU:



As mentioned above, cross-BU CoP would be a great strategy. However, not all BUs are ready to invest resources into those meetings as not all BUs have the latest D365 mERP solution. Therefore, the challenge is for the BUs to have a similar level of maturity to organize this sort of CoP in order to share knowledge that would be valuable for all BUs. Organizing cross-BU CoP at this moment in time would be a waste of time and resources for BUs as they would have different CoP's needs depending on their level of D365 mERP knowledge. Other than the level of knowledge, each BU has different supply chain processes depending on the product they make. As an example, decanters are a much more complexed product in comparison with heat exchangers. Therefore, decanters require more machining processes than heat exchangers which leads to a difference in "Product" track process within the mERP. Moreover, there is also a difference in the "Make" track process as decanters have much more components leading to a larger bill of material. Therefore, for this CoP format to work, there will be a need for all BUs to discuss on common mERP capabilities

Another common challenge would be the time zone difference and physical constraint especially during the Covid pandemic. As mentioned in the report, CoPs are social activity and even if organizations have the IT tools to meet virtually with other stakeholders anywhere in the world, meeting for the first time in the same physical space would at least break the ice between members of the CoP. Members will then feel much more comfortable to share knowledge with other members as they have met in person and got to know more one another.

Third, both BUs find difficulties to optimize the pool of tacit knowledge. Even if they both have the same knowledge management framework as the Wiig cycle, gathering knowledge from members of the CoP can be a challenge as stakeholders do not always feel comfortable to share all of their personal knowledge.

Finally, both BUs also struggle when it comes to measuring performances based on different metrics. However, they both believed that measuring CoP performances would contribute to optimizing CoP session and knowing the positive impact COPs have on the organization's supply chain processes.

### 8.3) Differences between the DEC and GPHE BU:

In total there are five main differences between the GPHE and DEC BU in terms of CoPs and D365 mERP harmonization process.

#### **1) Different needs from CoP:**

On one hand the GPHE main driver for conducting CoPs is to share knowledge between different GPHE factories in order to improve the new harmonized D365 mERP system. On the other hand, the DEC BU's purpose to organize CoPs is to gain basic knowledge on the new mERP solution so that they can provide a plan and a business case to Global Trinity. By doing so, the IT organization will be able to provide them with a clear roadmap of when Global Trinity will be able to support the DEC BU into their new transformation journey.

#### **2) Level of maturity:**

It is clear the GPHE BU is ahead of the DEC BU in terms of harmonizing their mERP system into the new D365 mERP solution. There could be several factors that lead to this conclusion. First, the GPHE BU is the biggest BU within Alfa Laval in terms of financial and human resources. Hence, they were able spend those resources into providing business cases and make a plan of how they wants to harmonize their mERP systems. Also, it could be that investing in the D365 mERP was a

bigger priority for GPHE than investing in other IT systems. Moreover, the GPHE BU has many types of CoPs frameworks where they discuss different topics and knowledge related to the new D365 mERP, whereas the DEC BU currently does not. Therefore, it does show that there is potentially a correlation between having mERP CoPs and the level of maturity of a harmonized mERP.

### **3) Cross-BU CoP:**

Besides the capability forum, the GPHE BU does not have cross-Bu CoPs where they can focus the meeting towards more in depth knowledge about common. However, the DEC BU has been engaged in cross-BU CoP regarding the improvement regarding the “Sell” and “develop” entities of Trinity. This shows that the GPHE BU is not necessarily more mature in terms of CoPs related to other systems than the D365 mERP.

### **4) Competence learning model:**

The learning competence model was then used to compare the learning stage of both BUs when it comes to their knowledge about the new D365 mERP. After thorough investigation of both business unit through interviews and source literature reviews, it can be concluded that the DEC BU can be placed within the first stage of the learning process as seen in *Figure 35*. However, there is a potential that they move on to the next stage as they have almost finished with making a business case and a cost benefit analysis. When it comes to the GPHE BU, they are between the second and third stage of the learning process. However, as it can be seen in *Figure 35*, the GPHE BU is on the verge to becoming conscious and competent. Even though they still receive constant support from the Global Trinity organization, they do not include them in all CoPs.



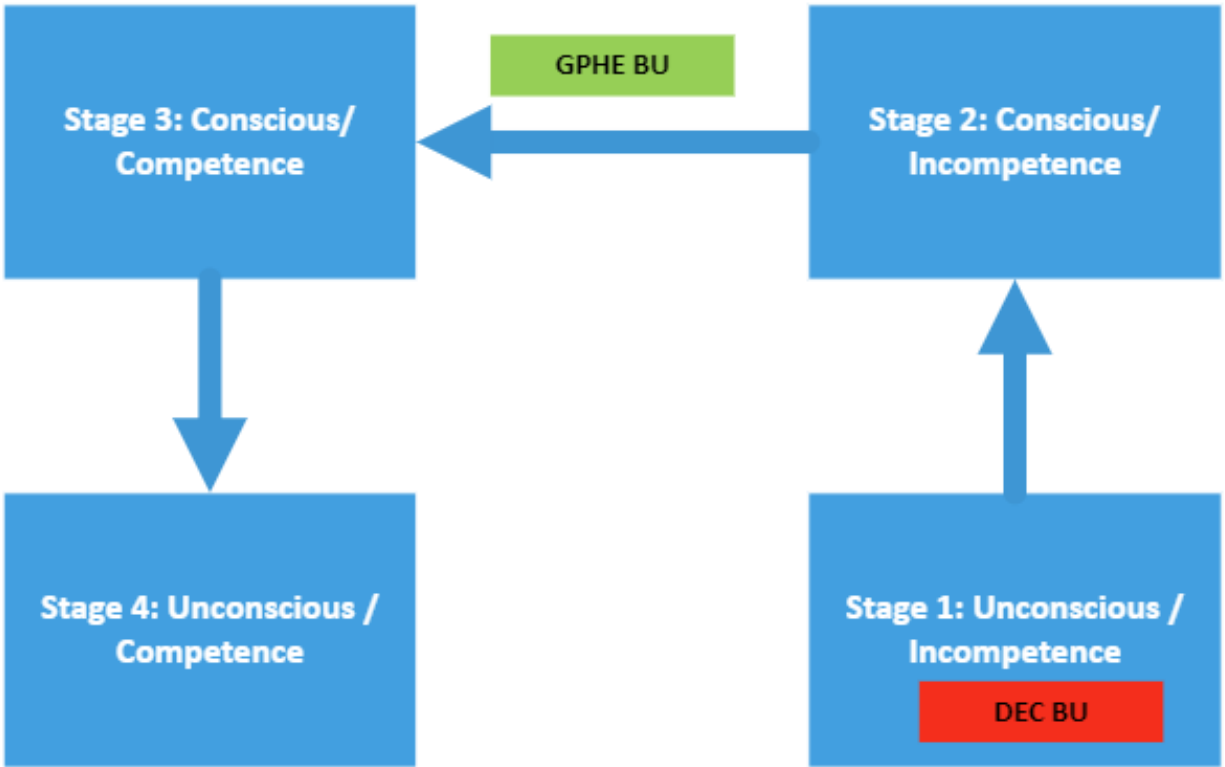


Figure 34: Learning competence model for DEC and GPHE BU regarding new D365 mERP knowledge

8.4) Potential solutions:

Based on the results found during the project, several potential solutions were recommended as seen in Figure 36.

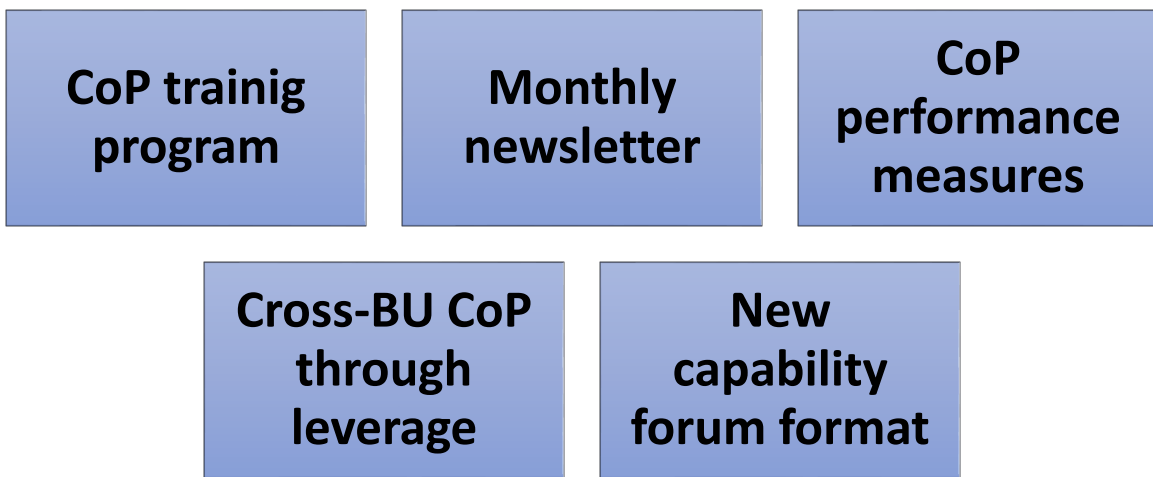


Figure 35: 6 potential recommendations to enhance CoPs and knowledge sharing.

- **CoP Training program:**

Global Trinity and a few other BUs such as GPHE can see that CoP does contribute to optimizing the harmonization and capabilities of the mERP. However, BUs that do not possess the new D365 mERP solution would not necessarily see how CoPs can benefit them. Hence, one way for Global Trinity to make BUs be more engaged in communities of practice is to organize training events. In this training, Global Trinity will show clear evidence that CoPs do contribute to improving mERP capabilities and knowledge sharing. Some evidence could be for instance identifying the correlation between the level of harmonization of the new mERP solution with the number of CoPs involved within a particular BU. To convince the stakeholders, Global Trinity should also work in collaboration with the GPHE BU. In this report, it was clearly shown that GPHE heavily rely on CoPs but also work in close collaboration with Global Trinity. Therefore, the GPHE BU could share their expertise regarding COPs and explain to the other BUs how the implementation of those CoPs satisfy the BU's needs and objectives.

- **Send out monthly newsletter to key BU stakeholders:**

One simple recommendation that would ask many resources would be sending out monthly newsletters sent out via email. Those newsletters will update all BUs on new improvements made regarding the D365 mERP solution. IT is a way for BUs that do have the technology to be up to date with new capabilities. However, it would also be insightful for BUs that do not have the new solutions as they gain more knowledge about what the new solution can do. Moreover, those BUs will also be aware of which BU has been integrating the new D365 mERP solution, and therefore, they will know which BU to contact and implement CoPs to get to know more about the use of the new D365 mERP.

- **CoP performance measures:**

Performance measures would help see if CoPs are efficient by measuring different metrics. First, the system metric could measure different aspects of a CoP such as the number of participants, document and topic being discussed. Results from those measurement will help understand if the level knowledge shared is growing and relevant to the CoP's domain. Secondly, the output metrics focuses on measuring the average time to solve mERP gaps as well as the number of problems being solved. The output metric will allow the stakeholder to evaluate the effectiveness of those CoP by comparing average time to solve gaps before and after a certain

time frame. Finally, the outcome metric would measure the impact on Alfa Laval's supply chain flexibility. For example, it would be interesting to measure if there is a reduction of lead time or manufacturing cost for example. By doing so, it would be possible to understand if CoPs and knowledge sharing do contribute towards more sustainable supply chain operations.

In general, those three metrics, will help understand the effectiveness that CoPs have on improving mERP capabilities and identify area of improvements to make those CoPs even more efficient. However, one potential challenge that the organization could face regarding this solution would be identifying common KPIs to measure, especially during cross-organizational and cross-functional CoPs for the output and outcome metrics.

- **Cross-BU CoP through leverage:**

BU managers should also perhaps promote more cross-organizational CoP through leverage that could benefit all BUs. The two stakeholders from both BUs mentioned that having CoPs with BUs that do not have the new IT solution would not be efficient.

For example, when it comes to improving D365 mERP capabilities, the GPHE BU would not gain benefit from having CoPs with the DEC BU that has not started to implement the new D365 mERP solution. However, BUs need collaborate so that Alfa Laval will benefit on a much higher level. Hence, it would be interesting for the GPHE BU to collaborate with the DEC BU and share their knowledge and expertise regarding the D365 mERP. Then, the DEC BU can do the same by providing knowledge from other IT solution where they are on a higher maturity level than the GPHE BU.

By enhancing cross-organizational CoP, the knowledge about the D365 mERP will exponentially increase across all BUs. It will then possible implement the D365 mERP solutions per region than implementing it individually per manufacturing site. Moreover, to complete the harmonization process of D365 mERP much faster, Alfa Laval should perhaps not implement the new mERP solution at 100% since improvements can be done along the way thanks to the cross-organizational CoPs.

- **New capability forum format:**

The global Trinity should look at promoting more the benefits from having the new D365 mERP solution. Global Trinity should perhaps invest some resources into creating capability forums where only BUs that do not have the D365 mERP can join and learn about the solution. As global Trinity is the organization within Alfa Laval with the most IT knowledge, they should be

inviting those BUs and show them what they have accomplished so far in the harmonization of D365 mERP across different BUs. By providing clear business cases, the BUs will gain knowledge about the mERP solution and thus provide a plan more efficiently for global Trinity so that they can provide a clear roadmap for those BUs.

8.5) Ranking the potential solutions:

In this section, the potential solutions were ranked based on the two criteria: “Implementation effort” and “High benefits”. A score from 1 to 5 was assigned to each solution for both KPIs. The score was chosen based on the current needs and resources of Alfa Laval. Hence, the solutions with high score for the implementation effort will require a lot of resources and commitment to deliver the solution. On the other hand, the recommendation with a highest score for the “benefits” KPI would massively contribute to the organization regardless of the implementation effort. However, a solution needs to be feasible for the company to be able to implement it. *Table 6*, shows the different scores for each recommendation, these recommendations are then presented in a graph as seen in Figure 37 base on the two criteria mentioned above.

*Table 6: Score for each recommendation*

Solution	Implementation effort	High Benefits
CoP training	1	3
Newsletter	2	2
Capability forum	2	3
Perf measures	3	3
Cross-BU CoP	5	5

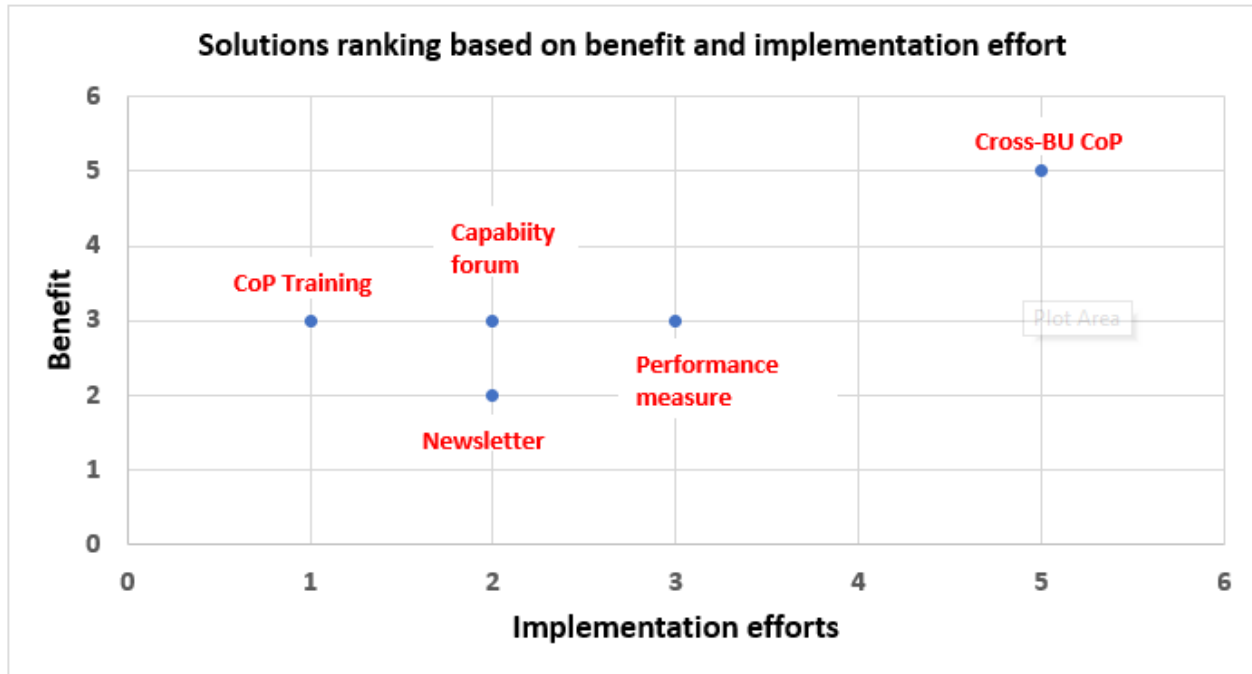


Figure 36: Score model "Benefits vs implementation effort"

If the organization would like to have a balanced ranking where both KPIs are taken into account, then, the most appropriate ranking would be as follows:

**1. CoP training:**

CoP would be the most appropriate solution that Alfa Laval should start focusing on first. It does not require many human or financial resources. Moreover, in this training, Global Trinity can have the opportunity to show to the BUs how beneficial self-empowerment through knowledge sharing and CoPs would contribute towards improving mERP capabilities. Even if the score for the implementation effort is only 1, Global Trinity might have a challenge to motivate the GPHE BU to collaborate during these training programs as they are advanced in terms of CoP, and could explain their experiences and lessons learned so far.

**2. Capability Forum:**

The Capability forum offers high benefits as it allows BUs that do not possess the new D365 mERP to gain knowledge in order to be ready to invest into the new solution. The downside is that if Global Trinity do not put those BUs on the roadmap for rolling out the mERP solution, they might not be motivated to join this forum as they will not be implementing the new solution until years later. However, BUs like the DEC BU does not have the solution but

is motivated to integrate the new solution into their system. Therefore, it would be still a good solution to potentially invest on as there are BUs not having the new mERP but eager to implement it into their factories.

3. **Newsletter:**

Even if this solution has a low implementation effort, it is still ranked third as it does not bring many benefits. In fact, Global Trinity cannot be sure that BUs would open and read the new potential improvements through emails. It is the same problem for capability forum, if BUs do not plan to invest into the new mERP solution, then it will not be an efficient solution. However, like for the capability forum, BUs like the DEC BU do not have the solution but are motivated to implement it into their factory.

4. **Performance measures:**

Performance measures is the sixth best recommendation as it requires investments of better IT tools which then requires high investment costs.

5. **Cross-BU CoP through leverage:**

BUs operates like small organizations and are more focused about solutions that only benefit them. Hence, it is the last possible solution as it is the least realistic one. However, Cross-organizational CoP will extend the network of knowledge sharing and thus gain technical expertise about the mERP. That is why it has the highest ranking in terms on benefit and should strongly be investigated in the near future.

8.6) Future work:

As digitalization is an endless cycle where improvement never stops. Organizations like Alfa Laval should keep looking at new potential IT tools that allows better knowledge sharing and CoPs. The same goes for the new D365 mERP solution that they have just implemented. As in this report, no new IT tools were suggested to be integrated instead of the current Alfa Laval's IT solutions, it would be interesting for future research to look at new IT technologies unknown to Alfa Laval or any company in general.

Another aspect to look at in the future is the investigation of other organizational concepts in terms of knowledge management. In this report, only the Wiig cycle was investigated. However, there are other frameworks that help build, share, and pool knowledge that could be more efficient than following the Wiig cycle.

Finally, as mentioned in the report, BUs mainly see benefits that could affect their own business

activities. It would then be interesting to investigate in future research on how to motivate those mini organizations towards finding common improvement that would benefit the whole company.

## 9) Conclusion:

In conclusion, an investigation of how CoPs improve harmonized mERP capabilities was conducted by using Alfa Laval's GPHE and DEC BU as case studies. After analyzing different source literatures and conducting interviews with Alfa Laval stakeholders; it can be concluded that CoPs does improve the harmonization process and capabilities of mERPs. Moreover, enhanced collaboration between stakeholder, and using only one mERP solution will improve the standardization of business operations leading towards a more flexible and sustainable supply chain.

However, while there are some similarities across the GPHE and DEC BU regarding benefits and challenges of CoPs, there are also some differences when it comes to their CoP needs. In fact, their driver for organizing CoPs vary since they do not have the same level of technical expertise about the new D365 mERP solution. In one hand, the GPHE BU organizes efficient CoP frameworks to exchange technical knowledge in order to better identify gaps and improve their new harmonized D365 mERP capabilities. On the other hand, the DEC BU seeks to have CoPs to gain more basic knowledge about the new mERP in order to know what exact needs the DEC BU would require from the new mERP solution. As mentioned in the report, ERP implementation might fail due to poor change management or lack of quantifiable goals resulting in loss of high investment costs. Even though the Global Trinity organization has the resources to deliver IT solutions for all BUs; it is up to the BU to be ready to invest by conducting a clear plan and business case of what the new IT solution would offer them. Without a clear plan, Global Trinity will then focus more on other BUs who showed their clear interest to invest on the new D365 mERP solution as Global Trinity has a limited amount of resources.

However, for CoPs to be optimal, all the stakeholders need to do more than what they are just supposed to do. In fact, it is important to constantly look for new CoP improvements that would contribute to expanding explicit and tacit knowledge across the whole organization. Hence, several recommendations were proposed in *Section 8.4* that will contribute to improving CoPs and knowledge sharing throughout different BUs. Those recommendations were then ranked based on a score model by giving them a score from 1 to 5 regarding two KPIs: Benefits and implementation effort. Based on the ranking process, the recommendations have been ranked from the best

recommendation to the least favorable based on the order as follows: Training program, capability forum, newsletter, Performance measure, and finally, Cross-BU CoP through leverage.

Finally, this project was a qualitative research with potential recommendations. Therefore, there must be more investigation about what the requirements are to make those solution realistic not just for Alfa Laval but any organizations. Moreover, future work should be done following this project as digitalization is a capability area that never stops improving. Therefore, companies need to constantly apply new changes in their way of collaborating to better grasp any relevant knowledge located within digital documents or individuals. Without change, a company would lose competitive edge as there are other organizations that constantly challenge themselves to improve their business operations.



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## 11) Appendix – Interview questions:

### 11.1) Questions regarding communities of practice:

- What current CoP framework do you currently use?
- What sort of CoP do you have in place currently?
- Do you have meeting with other BU who uses the new D365 mERP solution?
- As supply chain is a rapid changing environment due to constant innovation, unexpected risks and high competition. Do you find difficulties to constantly find better ways or tools to communicate?
- The Wiig cycle is a cycle used in organization to show how the knowledge is built and used by and for key end users. Do you use the Wiig cycle to build, use and share knowledge?
- The main issue with CoP is that people do not see the actual benefit of CoP. Therefore, employees do not feel the need or motivation to be engaged in CoP. What does your BU do to solve that issue?
- Do communities of practice help optimize your resources (in a short or long term) when implementing a harmonized ERP? What about regarding sustainability?
- Is you end goal to minimize CoP and collaboration with global Trinity?
- How would you rank the drivers of CoP in ERP implementation between the 3 options shown below:
  - Willingness to minimize end user adaptation time to new ERP.
  - Share knowledge to identify gaps and improve capabilities of the system.
  - Improve data transparency between cross functional team and locations.
- Would you have other drivers, if so, what are they and how would you rank them?
- What makes the GPHE BU more mature in terms of cross functional communication and harmonized ERP compared to other BU?
- When would you implement CoP and when not to in terms during the different stages of the ERP implementation? Or would you use CoP whenever you have the possibility to do so?
- Based on what do you decide when to implement CoP to share knowledge and discuss gap?
- Do you use CoP to keep track of constant change management?
- What sort of information or requirement would you need to support CoP? What are the main criteria?

- Good knowledge sharing often lead to employee satisfaction and motivation. Do you experience that at within your BU?
- Are people afraid to share personal knowledge?
- Do you have an example where CoP has created concrete value to the organization (directly or indirectly)?
- Do you face any challenges stated below, if yes, how do you cope with them?
  - Resistance to knowledge sharing
  - Work overload
  - Lack of management support: Martin is mainly challenging with this min 30
  - Technical issues using the IT tools
  - Lack of time
  - Non-clear benefits
  - Conflicting priorities between CoP and business functions
- How do you keep track with organizational change (due to dynamic change in the business, staff turnover) in order to keep up with organizational cultures. Does it have an impact on CoP?
- Do you monitor the performance of CoP through different methods (employee feedback, graphics, common KPI etc)? They find gaps quicker so this could be a performance measure.
- Do you struggle with identifying how to measure performance of CoP?
- Implementing CoP with other Bu's would be beneficial or not really as they make different products, and the way they improve their processes cannot be replicated in the DEC BU?

#### 11.2) Questions regarding mERP within Alfa Laval IT landscape:

- Is your final goal to have one single harmonized ERP (i.e D365) for all the sites? If it is, what are the main challenges that your BU could encounter (i.e resources, time constraint, etc)?
- Why not implement the new mERP per region instead of doing per site?
- Do you have a specific requirement in terms of the capability of the new potential D365 mERP?
- Collaborating with other BUs that have implemented the new mERP would help you better harmonize your mERP or not necessarily?
- Could you identify the CSF for successful ERP implementation explained in Section 3.3.3? Do you also have the same CSF when implementing a new ERP solution?
- Why did Alfa Laval decide to use Dynamics D365 as their new mERP solution?

### 11.3) Questions regarding change management:

- How do people follow up with change management? Can we do better?
- Do you also consider that failure in management will lead to failure of ERP?
- Does depth of change management have an effect on ERP implementation efficiency?
- As change management helps reduce resistance to staff members when changing the way, the organization operates (in this case, new ERP implemented), how do you involve staff in this transformation journey?
- 3 major issues faced in change management: awareness/acceptance, communication, and training / education. Do you face any of them in the DEC BU.
- What would be your change management tactics?
- Are you in constant change management as the technology keeps evolving? If yes, how do you keep up, and do CoP help minimize resistance from employees when new change management occurs?