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TAKING CONTROL FORWARD

Organisational sustainability transition

Utilisation of the Backcasting theory to increase sustainability in the organisation CPAC

Master's thesis in Product Development

David Andersson, Jakob Eriksson

Department of Industrial and Materials Science
CHALMERS UNIVERSITY OF TECHNOLOGY
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Supervisor: Göran Gustafsson, Industrial and Materials Science
Industry Supervisor: Erik Roos, CPAC
Examiner: Göran Gustafsson, Industrial and Materials Science

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Department of Industrial and Materials Science
Division of Product Development
Chalmers University of Technology
SE-412 96 Gothenburg, Sweden
Telephone +46 31 772 1000

Cover: Logo of the organisation CPAC where the thesis was performed

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Abstract

CPAC is a company located in Mölndal, Sweden, that develops electrical control systems for Volvo Group. They strive to always be one step ahead in development and now they want to confirm that they are sustainable and perform activities that actually contributes to a positive change. This thesis aims to expand CPACs awareness of their environmental footprint, to create an action plan for how to increase internal motivation and strive to develop products that contributes to a sustainable future.
This study uses the back-casting methodology to reduce the risk of getting caught in current problems the organisation is facing today. By creating a framework of principles based on the company's values and aspirations, it is possible to trace those goals backwards to identify a strategic path to achieve those goals. This methodology is backed up by the self-determination theory that is used to understand what motivates people as individuals and as a group to strengthen the results that will come from this project.
Together with this methodology different strategies to gather information has been used. Dialogues were performed with employees from different segments and levels within the organisation to gather information about the current situation. Different workshop setups were organised to determine the wanted future state of the organisation and to identify the gaps and challenges in between those two states.
The final result is an action plan for how to reach the desired future state and how to implement sustainability throughout the organisation. Though the final result of implementation will not be visible in this project due to the time it will take to perform, it will give a recommendation of how to raise the awareness and implement sustainability with a natural approach.

Keywords: sustainability, development, sustainable development, organisation, organisational management, CPAC

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Thank you all.

David Andersson, Gothenburg, May 2020 Jakob Eriksson, Gothenburg, May 2020

Contents

1
Introduction

This thesis aims to expand CPACs awareness of their environmental footprint, to create an action plan for how to increase internal motivation and strive to develop products that contributes to a sustainable future. Thereby encouraging the individual to contribute to a societal change by increasing the understanding of what sustainability is. To increase the awareness of the entirety, to reduce the risk of neglecting positive contributions. The process is based on the foundation utilised in the course Leadership for sustainability transitions SEE040. The methodology consist of seven coherent steps and is supported by additional literature.

1.1 Background to CPAC

CPAC is a technical innovative company located in Mölndal, Sweden, that develops advanced electronic products and system solutions for the vehicle industry.
CPAC develop products for Volvo group and their branches Volvo Penta, Volvo Trucks, Volvo Buses and Volvo CE, which they are loyal towards. Volvo Penta have only produced inboard motors in the past and therefore, an exception has been made for the external company Yamaha to gain market share on the outboard motor market. CPACs organisation is divided into three different segments, construction, industry and marine. The construction segment focus on functions concerning "yellow" vehicles that includes excavators, compactors, wheel loaders, pavers, and haulers.
Industry focus on trucks and buses while the marine segment is responsible for all functions regarding Volvo Penta and Yamaha. CPAC have assisted with developing innovative products. For example, they have developed an electronic control system for easy manoeuvring of boats over 30 feet, an on-board display for industrial vehicles, that delivers real time information of loading and vehicle performance to the machine operator. These projects have features that assists the operator and decreases the fuel consumption.
CPAC strives to nurture the environmental question and they develop products with different attributes where the majority of the products affect the environment positive. The need within CPAC is to identify where a change can affect emissions related to the organization positively. Currently CPAC is aware that their product releases emissions during development and manufacturing, however some solutions also decrease the release of emission in the usage phase. Hence, some products are environmental friendly due to their functionality, where other are not. Therefore, a need of understanding where an adjustment can contribute to an environmental

change has risen and to develop further understanding of the products impact.

1.2 Volvo Group

CPAC is owned by Volvo Group which is a company that is active within the vehicle industry. Volvo Group develop the products to the end customer where CPACs products are implemented. Volvo Group has its own aim where they have focused on three different sustainability dimensions, social, economical and environmental. They have also affiliated to the United Nations initiative for responsible accountability called "Global Compact", and their ten principles about human rights, work, environment and anti-corruption (Group, 2020c). Through this policy together with other initiatives they try to minimise their negative impact on the environment and at the same time create a sustainable development together with the society. Volvo Group also have an aim to contribute to the 17 strategic development goals for Agenda 2030 by the United Nations where they focus on the goals that is closest to their business (Group, 2020b).

1.3 Aim

The aim of this master thesis is to expand CPAC awareness of their environmental footprint, to create a mentality where the entire organisation will strive to develop products that contributes to a sustainable future. The idea is to implement a plan for action that will increase intrinsic motivation for the employees and promote CPACs positive impact on the environment towards their stakeholders. Finally it will result in a positive change towards a more sustainable future.

1.4 Limitations

The project is not required to yield results before it has ended, because the implementation of the solution could require a long adjustment period. The project is limited to stay within the organization of CPAC and a proposal for change is not supposed to directly involve CPACs stakeholders. The change should be made internally and should be carried out without aid from external resources. However, the effect of the change can affect suppliers and customers. Finally, the project is limited by the time scope of 20 weeks, including project writing, background research and execution.
When performing evaluations whether the impact is positive or negative on the environment the aim is to only consider the effect that CPACs systems contributes to the over arching functionality. Hence, excluding the contribution of the machine that it is positioned in. An example of this would be for the Co-pilot system developed by CPAC system, which improves the productivity and reduces the carbon footprint by approximately 15%. The system connects vehicles on a site digitally and provides the drivers with real time information of the site. Additionally it consists of numerous subsystems that aids the processes, by providing information and digging guidelines,

loading capabilities and connectivity. Then the performance increase is regarded to be positive, since the same work has been performed faster in comparison to a machine without the system. The negative impact on the environment would then be if the contractor chooses to perform 30% more work with the machine, resulting in a negative effect. However, that is regarded to be outside CPACs reach and that type of reasoning is therefore excluded in the evaluation of the systems.

1.5 Issues for investigation

- How is the current working situation at CPAC regarding environment interpreted?
- Where can a change contribute to a positive impact for increased sustainability?
- What change can provide a positive impact on CPACs savings and releases of carbon dioxide?
- How do we want the future working situation at CPAC to be interpreted internally and externally?

1.6 Arguments for using the method Backcasting from non-overlapping sustainability principles

Backcasting from non-overlapping sustainability principles— a framework for strategic planning, is the adequate method to use since it is particularly useful while working with complex problems where the what, when, and who is uncertain. The framework developed by John Holmberg and Karl-Henrik Robèrt is therefore a suitable choice. The framework sustains a structured path for management of complex issues related to sustainability (Holmberg & Robèrt, 2000). To answer the four questions, triple loop learning will be implemented. A thought process developed by David Bohm and further elaborated by Isaacs in his practise on how to perform a dialogue (Bohm, 2014; W. N. Isaacs, 1993). The supporting theory is presented in chapter 2.

2

Theory

How can we as master students affect a large fully developed organisation with its own perceptions and values to become more sustainable? This is the challenge and the daily struggle we are facing each day, as this thesis progresses. The answer is not straight forward and simple, instead it is rather complex and curvy. Though there are methods and theories that can be combined to aid the process of transforming the giant. The backbone that supports later process and the key to succeeding, is the self determination theory. With the SDT as the core, the back-casting framework constructs guidelines to navigate the curvy path and make the complexity manageable.

2.1 Self determination theory - *SDT*

The *"Handbook of Self-determination Research"* encapsulates the understanding as following, SDT provides evidence that humans have an urge to participate in and engage with internal resources for personal development and self-regulation (Deci & Ryan, 2002). The theory become particularly useful in the investigation of how to regulate and initiate intrinsic motivation and personal growth. To foster the positive processes and increase the internal motivation, three areas were introduced. Interjection, Identification and Intrinsic motivation, each consisting of separate variables that unite over commonality to increase internal motivation.
The intrinsic motivation is sustained by three needs. The need for curiosity, the strive for a challenge and competence development. These three needs are often demonstrated when a person pursue a goal or activity because it is fun.
Internalisation refers to the urge of integrating and participating, to establish a social value. If achieved, the internalisation fosters a behavior that help people to work efficiently within their social groups (Koestner & Losier, 2002). The interjection then addresses the situation where the process is not interpreted of social value, rather referring to individual regulation of self esteem. Interjection can than often be seen in cases where people strives to demonstrate the abilities to feel valuable or avoid failure. Hence through interjection the intrinsic motivation can be affected by external means (Deci & Ryan, 2000).
Identification is connected with how a person accepts the result of their work, how it is connected to their self esteem. With successful identification, a person can relate to the importance and value of their work and interweave their achievements with personal values, aspirations and goals.
The self determination theory is regarded as a vital part for succeeding with the

project. By engaging a large number of people where they can feel autonomous and vital to the process is regarded as a necessity for the project to be continued. To engage people across the organisations segments to establish a common platform regarding sustainability is important to move towards an increased collaboration. Sandow and Allen describes a trivial and important piece of knowledge in their paper *The nature of social collaboration*, the importance of relationships. They state the following - *"In an organization where relationships are strong, as an engineer develops a new product others will usually contribute their skills, resources, and knowledge to accelerate the product's development. This phenomenon is commonly called " collaboration" and relies on knowledge and learning."*. It is the collaboration with autonomy that is desired to achieve and not the forced collaboration (Sandow & Murray Allen, 2005). The collaboration that occurs spontaneous relates to the internalisation that increases internal motivation(Deci & Ryan, 2000). With a successful implementation a knowledge platform could be introduced for sharing information across segments. The benefit could be the following design know-how, technology applications and limitations, production techniques, mathematical models and testing methods (Robertson & Ulrich, 1998).

To recognise that there will be oppositions to the suggestions and the introduced methods along the process is also a necessity to understand, since if it is managed properly can contribute to new opportunities. Bernard Le Roux presented a short method for ensuring engagement and acceptance from the opposers. Which was to ask them, what could we do to ensure that you are happier with the outcome? He argued that that the engagement and the listening to their proposal would help ensuring a more positive outcome, and at the meantime possibly receive valuable knowledge from experts (Le Roux, 2019). This methodology is further emphasized by David Kantor in his *Four player model*, that demonstrates the relations between, mover, followers, opposers and bystanders, see figure bellow. Kantor argued that to new proposals and ideas there will be inquisitions from the opposers and that the movers need to defend the proposals with advocacy. In the advocacy the movers learn the importance of their work, possibly identify obstacles presented by the opposers and gain new perspectives on the effects of their proposal (W. Isaacs, 1999).

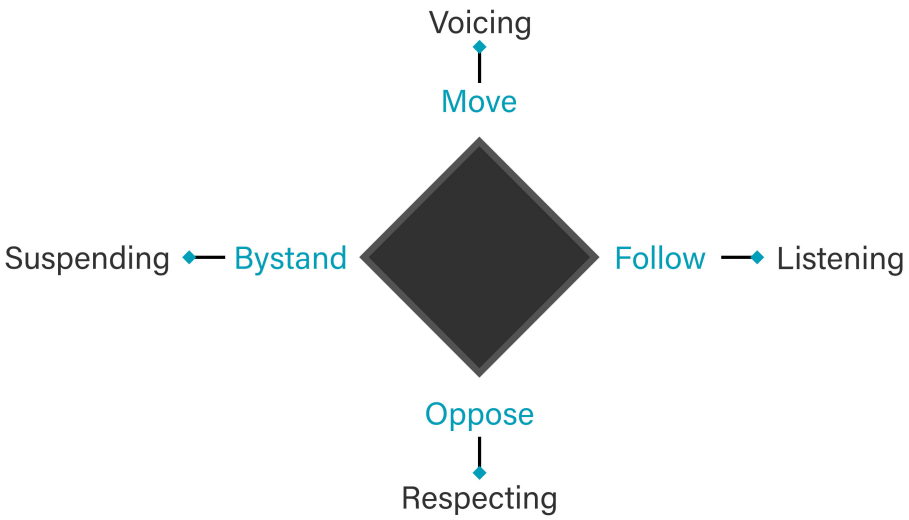


Figure 2.1: 4 player model by David Kantor (W. Isaacs, 1999)

2.2 The overall framework

Supporting tools for the mapping of clients and suppliers, will be the Back-casting frame-work. To identify a broad view of CPACs current impact on the environment, the goal is to identify a pattern or unique cases where communication or activities deviates from the perceived situation and identify gaps from a sustainable process. Further the dialogues will establish a transparency and indicate how the communication is performed both vertically and horizontally within the organisation. To achieve this the dialogues requires a minimum of the following participants, though for improved results a wider range of personal is needed to participate.
Hence, every head of department and at least one employee from each department, are set as the minimum participants in the mapping of impacting processes. The purpose is to identify potential areas for improvement. After these areas have been identified the investigation will continue to elaborate one of these ideas. This comprehensive investigation will be performed with workshops according to the Back-casting from non-overlapping sustainability principles developed by John Holmberg and Karl-Henrik Robèrt (Holmberg & Robèrt, 2000). The framework consists of several steps in a systematic order, which is presented below.

2.3 Back-casting

Back-casting is a methodology used to reduce the risk of getting caught in current problems the organization is facing today. Often organisations views the future through past, hence the prediction can carry problems from today to the future. By creating a framework of principles based on the company's values and aspirations, it is possible to trace those goals backwards to identify a strategic path to achieve those goals. Determining of where the company wants to be and the goals is therefore key to a well defined process. A clear statement of where the company wants to be and what it would like to represent is the foundation for further development. Once

stated, the back-casting process can continue, with a lower risk for carrying over the problems of the past into the future.

2.4 Identification of thematic area

The first step is to collect data and search for certain patterns that stands out to find areas that are of interest for further development. This process is performed with the mapping and the pre-study. The need is to establish an understanding of the organisation CPAC to make a decision for where a change can make the largest positive impact. The process is performed in several steps that are explained from section 2.5 to section 2.7.

2.5 Pre-study

Before performing the dialogues it is necessary to perform a pre-study of the organisation, to develop a deeper understanding of how CPAC operates. Particularly how the organisation manage sustainability. The information found in this step acts as a foundation for the dialogues in addition to a support for our understanding. The pre-study orbits around CPAC Quality Management System, which acts as a foundation for development and structure for CPAC operations.

2.6 Dialogues

Gregory Bateson introduced the triple loop learning as a thinking process to guide dialogues and to elevate the questioning one step further. The triple loops purpose is to identify the *"Why?"*, why are we needing to change? Followed by the need for identifying the *"What?"* (Bateson, 1983). William N. Isaacs further argued that by introducing this way of thinking, could encourage a dialogue to become more free and effective. He insinuated that all organisations, no matter of how well the organisation was performing, has an intuition and meaning. If the people in the process has an awareness of their importance, they can see value in their beliefs and be rewarded for their performance by their colleagues. They are then able to establish a common strength as a group and develop core capabilities. The dialogue further aids the organisation to potentially find new patterns and procedures. Which might be needed, since it is possible that the organisation has developed a process with regards to a former breakthrough. Which over time has been outdated, inadequate, and potentially could lead the organisation into a pit fall (W. N. Isaacs, 1993).
David Bohm elaborates on a procedure for how this can be managed in his paper *On Dialogue*. He expresses that larger groups of people have difficulties to present their opinions and assumptions, without a facilitator to lead the meeting and distributing the word and purpose. Without the facilitator, there is a great risk that the dialogue will contain emotions and arguments used to create a trajectory for individual interest. An issue that needs to be avoided, for this setting to function accordingly. David Bohm further explains the importance of maintaining neutrality

in the dialogue, since the different backgrounds and cultures can initiate a distinct difference in opinions and priority (Bohm, 2014). Which ties back to Isaacs practice of how to perform a dialogue, and the need of a facilitator. The facilitator should initially establish the incentives for why the dialogue is performed and under what principles. Thus referring to the need of neutrality and subjectivity (W. N. Isaacs, 1993).

Jon Burchell and Joanne Cook further defines the role of the facilitator accordingly - *"..the role of the facilitator, can be central in this respect, creating a safe environment in which people can be encouraged to function slightly differently to normal."*. Then participators can continue to elaborate on the importance of maintaining trust throughout the entire project. If the trust is broken and opinions and self interest are introduced the process is weakened. Thus hindering neutrality and lowering the creativity. (Burchell & Cook, 2007). The facilitator will distribute the word, ensure the focus maintains on the subject and helps everyone to get heard. The facilitator can utilize methods like "summary" to ensure that the information is understood correctly and confirmed equally among all parts. The method also works to ensure the dialogue participator elaborates on the subject to provide greater insight and clarity. The summary is performed by the facilitator and includes a short description of the current statements (Le Roux, 2019).

2.7 Analysis

Multi-level perspective is used for defining innovation systems at different levels. The lowest level is called micro and are formed by niches, created in protected work spaces separated from the norm and this is where the innovation commonly starts. Second level is called meso and forms the standards that are integrated in the infrastructure. At this level rules are followed more strictly than at the micro-level. The last level is the macro which covers a greater perspective of a bigger environment. This level is more difficult to affect and change than the earlier mentioned levels due to the extent of stakeholders that are involved at this point.(Geels, 2005).

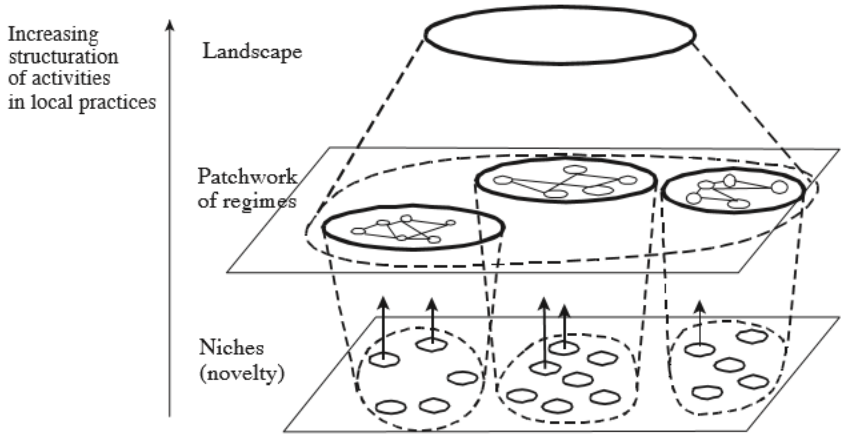


Figure 2.2: Multi-level perspective by Geels. F (Geels, 2005)

Geels also explains different phases in transition processes. The first phase is where the innovation starts at the micro level. It exists several solutions where no one is dominant. Second phase is where the innovation starts to grow and more people are getting engaged in the solution. As more people are getting involved it also starts to shape rules and creating a more dominant solution. In the third phase there is often a breakthrough of a new solution and it is ascending to a meso-level which leads to the fourth phase. At this point, the new solution will replace the old solution. this will affect a greater span of the meso-level and it will happen over a longer time period due to the creation of a new innovative solution takes time (Geels, 2005). This process is initiated once the back-casting procedure has started. The back-casting process establishes the foundation upon where the first micro level changes can take shape. After time if commitment permeates the organisation, they follow the path into the desired future. To get there it is important to understand how the processes work.

2.8 Mind map

To gain a compact summary of the organisation structure with a tool that visualises patterns and commonality, the mind map tool was regarded useful and well proven. Hence it was decided to move forward with mind map as an adequate tool. A mind map is used to understand how the organisation operates today. To aid this process, a mind map technique explained by Cynthia Young is used to visualize the broad overview of the organisation structure. Cynthia Young describes the technique in a six-step process. This process supports in understanding how an organisation is structured in a compact view (Young, 2019). Cynthia's version is focused on costumers and relationships while this thesis will focus on internal segments and relationships within the company. This mind map will act as a support in future developments within the organisation.

2.9 The lighthouse - Establishing a framework

The lighthouse is a tool used for creating principles for a desirable future. There are four dimensions in the Lighthouse that captures all of the sustainability aspects. In the article, social, economic and ecological are the three core dimensions that creates the prerequisites for the fourth dimension, human needs and well-being. Human needs and well-being is the dimension that tries to capture what is desirable to thrive and have a good life. All the dimensions are shaped around Brundtland's definition of sustainability "*meeting the needs of the present without compromising the ability of future generations to meet their own needs*" together with a broad question connected to the specific dimension, which are stated in the picture below (Brundtland, 1987). The dimensions are elaborated and used accordingly in this paper.
This definition is used by United Nations where it is stated "*The overall goal of sustainable development is the long-term stability of the economy and environment; this is only achievable through the integration and acknowledgement of economic,*

environmental, and social concerns throughout the decision making process".The principles that are formed within every dimension are put together and creates a conceptual framework to work towards. It is important that all dimensions are revised as time goes by to be relevant due to that the world is constantly changing. It is possible to select which of the four dimensions that should have the spotlight, then the other three dimensions works as the prerequisites for the future state. John Holmberg and Johan Larsson created the lighthouse as an elaboration of the future state that is described in the backcasting method by John Holmberg and Karl-Henrik Robért (Holmberg & Larsson, 2018).

Figure 2.3: Lighthouse by John Holmberg and Johan Larsson (Holmberg & Larsson, 2018)

2.9.1 The lighthouse - Identification of the future state

To identify the future state and receive the desired state from the organisation, there is a need for a workshop to create the wanted future state together with employees from within the organisation and make each one engaged in the transition. The workshops purpose is to identify the building blocks that is regarded as core for the vision. Goals and acting guidelines that ensures that work progresses in the desired direction. The participators are the developers, Key Account Manager further known as KAM and the management of the organisation that works together to establish a common picture of where the company aims to be.
The workshop should be constructed to mimic the one used in the course *SEE040 Leadership for sustainability* at Chalmers University of Technology (Linnea Johansson, 2019). Where they first develop important issues individually during a certain time limit, followed by a presentation of the ideas. Thereafter the ideas are placed on a wall to make them visual, this is repeated for all the three categories. This approach is further motivated in the Future workshop format constructed by *MediaLAB Amsterdam*. They argue that the method is suitable in scenarios where defining the future is key issue (MediaLAB Amsterdam, 2020). Thereafter the pro-

cess for narrowing down and identifying the important issues starts with elimination of the subjects that are not necessary. Hence immediately narrowing the amount of issues down to a more manageable size. The workshop continues with identification of the key values, which are used later for formulation of the future state, goals and principles.
The reason why this process is performed by the employees is simple and is directly linked to the SDT 2.1. This due to the intrinsic motivation the employees can perceive once they engage in the workshop. They see value in their contribution, and it becomes visual that the vision comes from inside the company and not as an external demand. The workshop fosters communication across borders in the company and opens a discussion for what is important for each section. Finally it leads to a common vision that is developed internally by the organisation, that a majority of the employees can accept and enables the Backcasting methodology to proceed to the next step.

2.10 Identification of gaps and challenges

With the gathered information on the current situation and aspirations for a desirable sustainable future, it is time to determine how to achieve it. The next step in the process is to identify the gaps between the two situations. The gaps between CPACs current situation, and where they aspire to be in the future. These gaps contains leverage points which can sustain an opportunity for great impact. Acting on the leverage points can result in closing of the gaps and realisation of the aspiration.
The task is to, find gaps between the framework for a sustainable future and the present situation at CPAC, and identify challenges + ongoing processes (Holmberg & Robèrt, 2000; Geels, 2005). The referred framework is the one stated in the lighthouse, section 2.9.

2.11 Workshop

With the identified gaps and challenges, a plan for a workshop can be developed. The workshop is performed to develop new solutions and ideas to fill gaps and provide insight to challenges. The workshop will operate around the leverage points to find solutions that can make the greatest impact. These workshops intend to be open minded and no ideas are considered to be bad, all ideas are welcomed.
The people that will attend these workshops, are the developers of the product, product owners and stakeholders. A person or a set of persons that can represent one or multiple phases of the products life cycles. All persons with interest in the product, should be able to participate, provide opinions and share their insight. The aim of the workshop is to establish an environment which feels welcoming in order to adhere the greater mass of the organisation. To strive for collaboration and communication across segments for sharing of knowledge and ideas.
A first step is also to insinuate the communication of what sustainability is to the entire organisation. A step towards a common understanding and sharing of the

same principles. An understanding that is necessary to have in order to participate in the workshop and contribute to an extent where the results can be interpreted as useful.
The exact format of the workshop can not be determined in advanced since it needs to be adopted to suit the circumstances of the organisation. Though adhering to the SDT is key to achieve a successful operation yielding in many creative ideas that can be evaluated further on.

2.12 Elimination of solutions

The solutions that were developed during the workshops will be analyzed to identify which solutions that can be eliminated from the process. To evaluate the solutions, expertise within the different functions of the organisation will be used in form of employees that possesses knowledge within the functions. The solutions will be weighed in terms of difficulty and the time it takes to perform. The solutions that are perceived to have lower impact relative to another and are not necessary to perform for reaching the goal are eliminated and not further developed.
Thereafter, a feasible solution or solutions with large potential will be further developed. It is necessary to keep all the stakeholders involved to increase the motivation for the project within the organisation and for the reason that they are the source of knowledge about the processes and working situations.
The solutions are thereafter eliminated according the relationship between input and output. A project that yields low input and can result in a great outcome is perceived important to keep. Whereas the other way around is determined to be possible eliminations. However there might be situations where these difficult tasks are necessary to perform with another task that is of higher importance. Which means that operations might be linked and therefore be dependent on another. Hence the evaluation with elimination is a process which is not straight forward and a terminated project might be revived.

2.13 Developing the action plan

The solution or solutions that still remains after the elimination process will be elaborated to the extent where the organization has clear documentation of what is needed to implement a change or improvement. This will be visualised in an action plan with several implementation steps that begins with the most fundamental steps and continues with more advanced steps. These steps will include profound information of what is necessary to perform to fulfill the purpose and in which time period.
The action plan will be determined with help of employees that posses the knowledge for how to accomplish the generated solutions within the organisation. The aim is that the final result will lead to a bigger commitment throughout the organisation as a consequence of the continuous participation and collaboration of the employees during the development process of the action plan.

3
Execution

What has been performed? How has the project been executed? These are some questions that will be answered in the following section, where the execution of the mapping process is described. The theory supporting the structure and the execution were introduced in the former section.

3.1 Mapping of CPAC

CPAC is an organisation divided into three sections, construction, industry and marine. Each division operating with different products and functionalities. Hence being independent of another. To gain insight in the organisation, studies were needed to understand how the organisation operate. What are the key values and priorities?
The answer to that question is the following: CPAC manages its organisation through three core values. The human being, responsibility and value adding activities. These three variables therefore became a vital part in the research and mapping of CPAC. To understand how they actively worked towards these values, and to capture the different interpretations of these guidelines, 15 semi structured dialogues were conducted, with one to three employees. CPAC develops solutions that are used in integration with machines and products. Making the systems multi functional and long lasting. Hence making it difficult to determine a direct translation of what the product is affecting. However, by pursuing a systems functionality and evaluating its effects during a life cycle results in another interpretation of the system. An example of this is the co-pilot system that is integrated into construction machines. The construction of the hardware and power supply is affecting the carbon dioxide emission. Though the savings related to the functionality of the system can improve the performance up to 15% for construction machine. Hence situations is similar in many cases, functionality was regarded as the factor that needed to be evaluated.

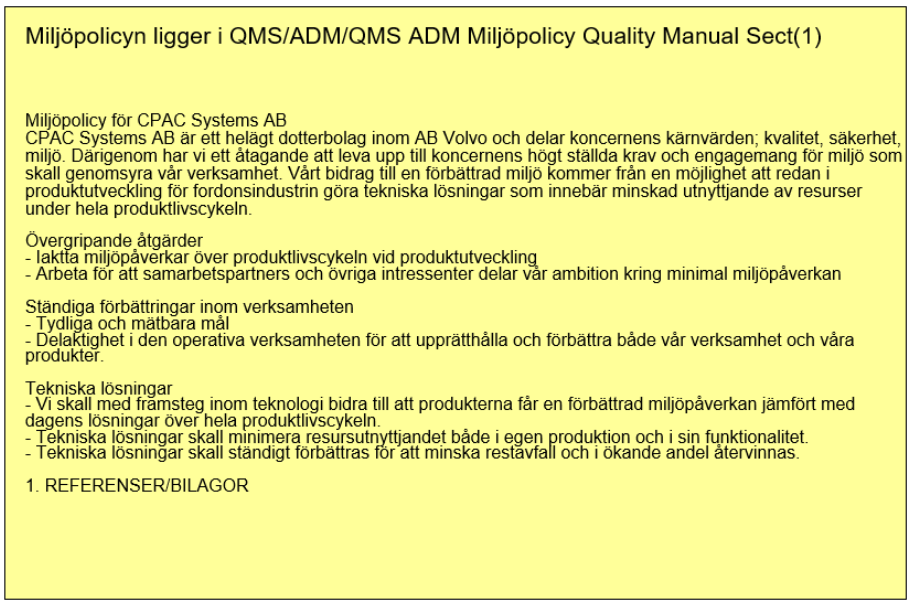
3.1.1 Dividing the mapping

A natural way of dividing the process was to use the existing divisions of the company. Then to analyse if sustainability is communicated in the same manner in the different divisions, and if the guidelines been interpreted equally. Furthermore, it was a natural split when it came to study use cases. Scenarios where the functionality of the product becomes visually and quantifiable. Though the logistic division

was separated from the other divisions. Production was directly linked to the different use cases and evaluated with carbon dioxide release in production in relation to the increase or decrease of carbon dioxide during the usage phase.

3.1.2 Understanding the organisation CPAC

Before the dialogues started, a pre-study was performed where information was gathered about current documentation around sustainability. Documentation was found with origin from 2009 and with revision up to 2016, including environmental laws and identification of areas where CPAC can impact the environment. The documentation also included calculations of carbon dioxide emissions from certain use cases and goals for how CPAC should improve their positive impact on the environment. The CPACs environmental policy can be viewed in figure 3.1 and their goals are inserted below:


Miljöpolicyn ligger i QMS/ADM/QMS ADM Miljöpolicy Quality Manual Sect(1)

Miljöpolicy för CPAC Systems AB
CPAC Systems AB är ett helägt dotterbolag inom AB Volvo och delar koncernens kärnvärden; kvalitet, säkerhet, miljö. Därigenom har vi ett åtagande att leva upp till koncernens högt ställda krav och engagemang för miljö som skall genomsyra vår verksamhet. Vårt bidrag till en förbättrad miljö kommer från en möjlighet att redan i produktutveckling för fordonsindustrin göra tekniska lösningar som innebär minskad utnyttjande av resurser under hela produktlivscykeln.

Övergripande åtgärder
- Iaktta miljöpåverkar över produktlivscykeln vid produktutveckling
- Arbeta för att samarbetspartners och övriga intressenter delar vår ambition kring minimal miljöpåverkan

Ständiga förbättringar inom verksamheten
- Tydliga och mätbara mål
- Delaktighet i den operativa verksamheten för att upprätthålla och förbättra både vår verksamhet och våra produkter.

Tekniska lösningar
- Vi skall med främsteg inom teknologi bidra till att produkterna får en förbättrad miljöpåverkan jämfört med dagens lösningar över hela produktlivscykeln.
- Tekniska lösningar skall minimera resursutnyttjandet både i egen produktion och i sin funktionalitet.
- Tekniska lösningar skall ständigt förbättras för att minska restavfall och i ökande andel återvinnas.

1. REFERENSER/BILAGOR

Figure 3.1: CPACs environmental policy

- KAM should aim to indicate positive environmental aspects and consequences in every offer to clients.
- The goal is to decrease the energy consumption with 30% at a generation change compared with the same functionality
- Operations should investigate issues as soon as possible to avoid long lead times. Operations should also decrease lead times for quality errands.

Further more it was identified how CPAC operates to create value for their customers. How they communicate with the end customer to adhere to their needs to develop products for Volvo Group. How that value process is established is visualised in the image bellow 3.2. The costumer finds value in performing tasks easier and with more control, which they can do with help of applications, control systems and new technology that CPAC develops to meet their demands.

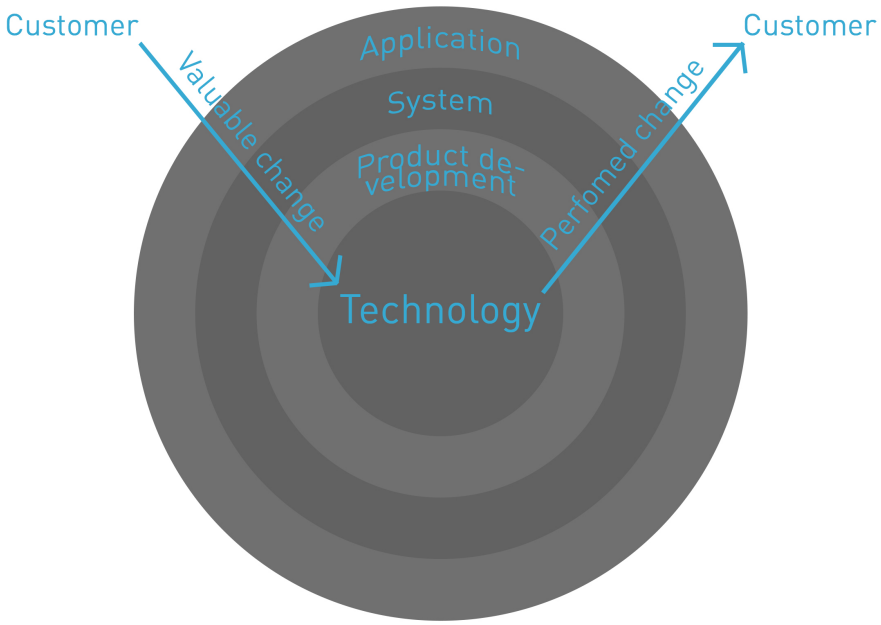


Figure 3.2: How CPAC creates value for their customers

3.1.2.1 The three core values

As mentioned in 3.1, CPAC works with three core values, which are value creation, human being and responsibility. The following summing descriptions are taken from a CPAC document called *"Vision, values and principles"*. CPACs existence lies in the ability to create value. Their role is to do the right things at the right time and not only to fulfill a specification or follow a process. They should strive for something more and give the customer an overwhelming feeling. At CPAC, each one of the employees should take their own responsibility and feel engaged in the projects. To take responsibility is to *"do what is right, even when no one is watching"*. Together they stand for the work that they have performed. Dignity and value creation is something that goes hand in hand, and CPAC have chosen to be dependent by people before organisation and processes. To thrive and perform, CPAC believes in a culture based on honesty, openness and a community where everyone can be themselves. Everyone at CPAC has an important voice that is heard and has the opportunity to take their own responsibility of creating a working situation to thrive in. Within each value they also have principles which works as guidelines for how co-workers at CPAC should behave and manage these values. These are similar to the principles that are presented by Holmberg & Larsson in their paper *Sustainable lighthouse*, the big difference is that CPAC's principles is more about how to manage the current situation rather then the desirable future (Holmberg & Larsson, 2018). However, the principles are a good tool for getting to the future state where they want to be. These values were later considered when creating the future state principles.

3.1.2.2 Quality Management System (QMS) & ISO 14001

To gain insight in how CPAC operates, their QMS system was studied and it was visualised in a flow chart as well as in detailed documentation how the organisation is operating. The system acts as a framework for the employees to rely on, if uncertainty rises during the development phase. It includes documentation for how to manage the different steps in the development, what should be included and important values that can not be overlooked. The QMS also acts as the current courier for the environmental policies. The QMS is accessible for everyone at the company, though can only be edited by a few. If a change is needed a ticket request is sent to the teamleader for Quality Assurance, who can accept and make the change. The QMS acted as the foundation for the ISO 14001 certification which CPAC has earned. The ISO 14001 is a management system standard for performance within the environmental field. It is designed to decrease organisations negative impact on the environment. This means that CPAC has guidelines for how to work with environmental subjects and that they have been approved (Swedish Institute for Standards, 2020).

3.1.3 Dialogue preparation - *A plan for mapping*

To collect the necessary information needed for mapping of CPACs organisation and their impact on sustainability, it was important to contact the right personnel. The supervisor at CPAC acted as a support with information of who to contact and with the structure of the dialogue to get access to necessary information. It was decided to have dialogues with personnel from different levels and divisions within the organisation to get a broad perspective and not to get biased opinions and statements. Agendas were prepared for the dialogues with the purpose of acting as guidelines. These agendas were personalized depending on the participators of each dialogue and their position within CPAC. However they were standardised to an extent where they could be compared in advance. The participators included personnel from logistics, top management, key account managers (KAM), and developers. The dialogues were semi-structured however, they were also open to give the personnel a mindset of that they could speak openly around the topics that were presented during the dialogues. The dialogues were booked in an interval of two weeks to be able to analyze the information quickly and get a profound picture of how the situation at CPAC is looking today regarding sustainability. In the following sections, the differences and commonalities between dialogues within different divisions is explained more thoroughly.

3.1.3.1 Top management

For top management, three dialogues of 30 minutes each were booked. One dialogue each with the President, head of R&D (Research and Development), and the Strategy Director. The agendas for these dialogues were shaped in a holistic perspective and aimed more at CPACs organisation overall and not targeting any specific division. The idea was to get a view of the vision and core values of CPAC.

3.1.3.2 Key account manager - KAM

For the key account managers, three dialogues of one hour each were executed with two KAM from the same division. The agendas were formulated holistic on a divisional level. Information from KAM was necessary to see the connection with clients and how to manage the complexity of customer value regarding sustainability and also to collect information of how the organisation works within the divisions.

3.1.3.3 Developer

The Developers possessed more information related to the products and functionality that CPAC supplies the customers. Developers also have a good insight in the working process and how sustainability is managed by the personnel. Therefore, the agendas were shaped around the impact of the products and their features. The dialogues took up to one hour each and were divided between the different divisions of construction, industry and marine.

3.1.4 Execution of dialogue - *The process of mapping*

The dialogues were performed in meeting rooms at CPAC facilities with access to whiteboards and screens. This made it easy to conduct the dialogues and the personnel felt comfortable in their home environment. The dialogues were performed in an order of the divisions where the Logistics was the first segment, followed by Construction, Industry, Marine and Top Management.

3.1.5 Meeting agendas

With three different variations of the dialogues, it was necessary to develop unique agendas adopted to suite the participators. The agendas were developed according to the three sections above. Though, common denominators between the dialogues were the holistic perspective on sustainability, individual contribution, responsibility and the relation to the three core values. The three agendas is visible in appendix C.

The agendas were distributed between the participators in advance to spark the thought process before the meetings. However the agendas were not visual during the dialogues, with regards to one particular reason. Which was to maintain an open dialogue and not provide the dialogue participators with a structure that could hinder their creative thinking. For the dialogues to yield the best result it was regarded important to maintain a neutrality and openness. Which former experiences had proven to be true, from the course *SEE040 Leadership for sustainability* at Chalmers University of Technology, where the visual agenda made participators to think that their thought was off topic. Which resulted in information loss and answers constructed to suit the agenda.

3.2 Analysis of dialogues - *Presenting the map*

The organization of CPAC and its divisions have been mapped according to appendix D. Where each segment have been analyzed with regards to its functions or use-cases. The map illustrates an overarching theme of how the different cases manages and interprets information regarding sustainability and functionality. The map is constructed to highlight important features and aspects related to sustainability for each case. The advantage of having a common theme for analysing the information, is that patterns and deviations easily can be identified. Though the entire map is overwhelming it will with future steps be reduced to a manageable system. Accompanied with each division follows a description of the important findings and commonality between projects. A comparison between the developers interpretation and the key account managers is also stated in the sections below.
The management and logistics department follows a different theme that is adjusted to suit their specific alignment.
The calculations that follows to each section acts as support to confirm that CPAC has a major impact on the environment. The calculations further illustrates where the largest impact is located, and where a potential increase in sales or change can contribute to a positive impact. The calculations consists of approximations and not considered as definite. This is considered acceptable, since the data is used to gain an approximate understanding of size of the carbon releases and savings. In the calculations following bellow, data that has no reference is data retrieved internally from experts within the area.

3.2.1 Office

The office space that is utilized by CPAC and all the supplies within it together with the personnel's contribution are calculated accordingly to gain insight in the release of carbon emissions. CPAC is currently located in an environmentally friendly building that has 50% lower energy use than the average building. The office is utilizing $50kWh/(year * m^2)$ and with a area of $2000m^2$ it yields a yearly consumption of $100000kWh/year$, the energy consumed is equivalent to $3,7ton_{CO_2}$. The office category also includes the travels to and from work and business related traveling. According to CPACs environmental plan the business travels releases $11ton_{CO_2}$, the transportation to and from work is $42ton_{CO_2}$, which means that the entire office contributes to a releases of $56.7ton_{CO_2}$ each year (appendix A).

3.2.2 Production

The production for each component is outsourced to manufactures distributed globally and the team for each project are responsible for the manufacturing. An approximation that in heavier direction consists of the assumption that each product has an carbon dioxide release equal to an iPad 32Gb 2018, a number that was used internally for rough approximation. The foot print represents both the materials in the iPad, the manufacturing processes for electronics and machining. CPAC did during 2019 manufacture approximately $n = 330000$ units and the carbon dioxide

footprint for an iPad is equal to $C = 99kg_{CO_2}$ (inc., 2018). Which yields a carbon dioxide release of:

$$Production = n * C = 330000 * 99 = 32340ton_{CO_2}$$

The carbon emission released from production is needed for evaluation of CPACs footprint together with the releases from logistics and the office to determine how large the release are in comparison to the savings from functionality.

3.2.3 Logistics

The dialogues with the logistics department gave insight in their operations and priorities. The logistics department provided information on the size of the different departments, transportation options, routes and responsibility during deliveries. The dialogues were transparent and honest, which resulted in the self instinct that the environmental aspects of the transport was not fully developed. They presented their strategy, with the centralized storage facility in Yusen, Netherlands and that a majority of the transports were delivered with trucks. Though, there where also deliveries between Hong Kong and Los Angeles to Rotterdam that were transported by sea.

3.2.4 Carbon dioxide release during transportation

To determine the effects of the logistics department an approximation of the transportation's by truck was calculated accordingly. The prerequisites were the following: The mean distance for a transportation was, $\bar{D} = 1011km$ the average distance of all transportation from 2019. The freight mass for all the truck transportation's 2019, $m \approx 337ton$. According to the logistic department almost all transport was performed with heavy trucks, hence euro class 4 and 5 was regarded as standard. The average carbon release per ton per kilometer is, $C = 56.8gram/(km * ton)$ for Euro class 4 + 5, with a payload of 20 ton and 80% load efficiency, which is considered to represent the variations of trucks and their conditions during the freights (Cefic & ECTA, 2011; Pier2pier, 2020). The calculation of the emission follows:

$$Emissions_{CO_2} = \frac{m * \bar{D} * C}{1000} = \frac{337 * 1011 * 56.8}{1000} \approx 19,3ton$$

The transport by sea originates from two ports, Hong Kong and Los Angeles port and ships to Rotterdam. The carbon dioxide release from these cargo's are calculated using *Pier2pier.com*, with the destinations and mass as input. The mass of the cargo from Honkong is equal to $9,8ton$ and Los Angeles cargo of $4,7ton$. The result yielded in that the cargo from Hong Kong released $2,7ton$ carbon dioxide and the cargo from Los Angeles released $1ton$.

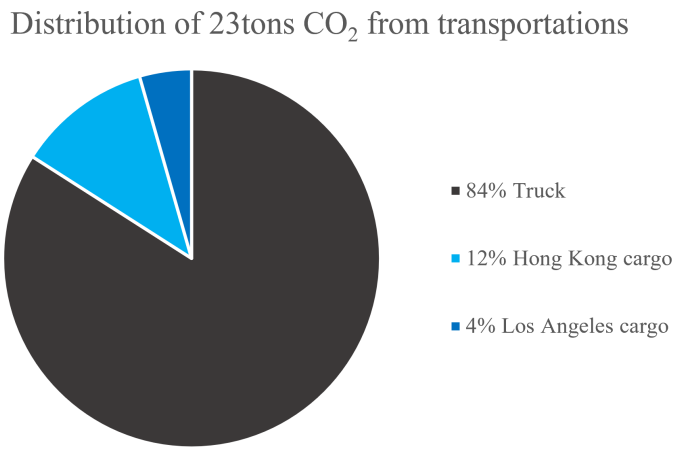


Figure 3.3: Distribution of carbon dioxide release from transportation's

The conclusion is that logistics releases 23*ton* carbon dioxide through transportation and roughly 16% is released by sea transportation and the remaining during truck transportation. Even though the calculation is performed using large approximation it can be used to determine the size in comparison to the segments at CPAC.

3.2.5 Analysis of dialogues for construction

Construction is the biggest segment at CPAC and provides functions to machines that operates within construction sites. This segment was divided into the five projects that was under operation within the segment.
The dialogues were performed with respect to the plan that was introduced in 3.1.5, where the employees had the opportunity to speak free about the current situation at CPAC regarding products, working processes and sustainability.

3.2.5.1 Findings

After analysing the identified patterns related to the construction segment, it could be identified that there was a lack of communication regarding sustainability and how it could be implemented into new innovations. However, upon further reflections from the dialogue participators, they confirmed that they subconsciously worked with sustainability. In the construction sector, the functionality and efficiency improvement was directly related to either reduction of carbon dioxide or usage of material. An example that illustrates the effects is the system pave assist. Which is a system that aids pavers and increases efficiency, by connecting trucks, visualizing the degree of compactness of the asphalt, the temperature of the road and more. The result of the system is that it decreases the idling since, just in time delivers are implemented, thus reduces the need for a queue of trucks carrying asphalt. The system further increases the quality of the pavement, hence extending the life of the road. Finally the systems can reduce the amount of carbon dioxide needed to build roads, increase its life, hence reducing the need for maintenance and unnecessary usage of material.

Present during the dialogues was also a sense of commitment from the developers. It became evident during the dialogues that the developers had an enthusiastic approach towards sustainability. Upon elaborating on the effects of the projects it became evident that more and more functions and sub functions had positive effects on the environment in multiple aspects. Which raised engagement and commitment to widen the creative thinking even further.
Communication around sustainability was also brought up in the dialogues with the developers, to see how it is managed in current projects at CPAC. It was identified that it is not actively communicated within projects in the construction segment. There is a focus on economy and efficiency and how to improve those areas. As mentioned before, sustainability is a subject that is managed subconsciously and as a reaction of efficiency. There is no present focus and communication around the subject.
Regarding the three core values of CPAC, value creation, human being and responsibility, they are present within the CPAC organisation. The three core values are incorporated into the daily process according to the engineers. They act upon them unconsciously and implement them into their work. The first contact of the principles was during recruitment process and then they were further communicated during the CPAC day and yearly follow up meetings. Among the developers the core principles were not a subject for daily visitation, however they were not forgotten. Further the engineers did not feel the need for increased communication regarding them, though incorporating them more in the daily work could be possible.

3.2.5.2 Differentiation between KAM and developers

After all of the dialogues were performed it became evident that sustainability was not communicated to the same extent. Even though there is a natural differentiation between the two, referring to relations between KAM and customers. The communication of sustainability between the KAM and the developers where slim to non existing. The key account managers however interpreted that there was a passive implementation of it in their discussion between one another. This indicates a gap in the communication and connecting it to the environmental policy one could find a second gap. In the policy it was stated that KAM was responsible for communicating the positive effects of the environmental contribution to the customers.
Regarding the three core values, both parts, developers and KAM, agreed that the values are something that everyone learn to appreciate and pursue even though they have different experiences of how it is pursued. Developers felt that they were not communicated in the daily work as the KAM thought. Nevertheless, the core values are integrated and are an important part of CPAC and helps them to differentiate from other companies.

3.2.5.3 Carbon dioxide calculations

For the construction segment the W-ECU product has been evaluated in terms of the savings it can assure. The W-ECU is a product that minimizes the need for sending a service technician out to the field for troubleshooting. Hence, there are

savings in eliminating the need for travels and transportation to the machine. The following values are provided by experts, though are estimations used to establish a large approximation.
n = Number of units sold year 2019 = 29800
x = Round-trips during each machines life (One visit every other year, with average life of 10 years) = 5
$\bar{D}$ =Average distance per service round-trip = $200km$
$\bar{Q}$ =Average consumption of petrol per 100 km = $5.8L/100km$ (Naturvårdsverket, 2020)
C = Carbon footprint petrol = $2.8kg_{CO2}/l$

$$Emissons_{CO_2} = n * x * \bar{D} * \bar{Q} * C = ton_{CO_2}$$

$$Fuelconsumption = 29800 * 5 * 10 * 200 * 0.058 * 2.9 = \approx 4840ton_{CO2}$$

This saving is however excluded, with the reason that this is not a unique product, that has been develop by many other suppliers. The technique is considered a basis function and exists in competitors solutions as well.
The Co-pilot system includes several applications to support various systems that aids in steering of construction vehicles. For the calculation of the impact that the Co-pilot system has on the environment, an average fuel consumption have been calculated. No fuel consumption was found regarding pavers and compactors but an assumption was made that they have a similar fuel consumption as the other machines in the system. An assumption was also made regarding the carbon footprint and that all machines had a similar footprint as the excavator, and that number is used in the calculations. All the systems has different efficiency grade but an average on 15 percent was used in this case. Thereafter the following calculations yields the result:

- Fuel consumption wheel loader = $19litres/hour$
- Fuel consumption excavator = $26,5litres/hour$
- Fuel consumption hauler = $30,3litres/hour$

$\bar{F}$ = Average fuel consumption = $(19 + 26,5 + 30,3)/3 = 25,27litres/hour$
t = Hours/year = 1600
L = Life = $10years$
C = Carbon footprint diesel = $2,9kg_{CO_2}/l$
I = Improvement = 15%
n = Number of units sold year 2019 = 3500

$$Co - pilot_{pp} = \bar{F} * t * L * C * I = kg_{CO_2}$$

$$Co - pilot_{pp} = 25,27 * 1600 * 10 * 2,9 * 0,15 \approx 176ton_{CO_2}$$

$$Co - pilot_{tot} = n * Co - pilot_{pp} \approx 616000ton_{CO_2}$$

3.2.6 Summary Construction

Developers within the construction segment experienced that sustainability is not actively communicated. Even though the key account managers had a good communication regarding sustainability with clients and purchasers, they did confirm that sustainability is not actively communicated internally. It is a positive chain effect and reaction from the focus on efficiency. Nevertheless, both developers and key account managers think that sustainability is an important subject and want to be a part of creating a positive impact regarding the environment.

3.2.7 Analysis of dialogues for industry

During a dialogue performed with the industrial segment a deviation occurred with a product in relation to the other segments. This product was the Volvo dynamic steering unit, a system that provides better ergonomics for the driver. Valuating the system according to sustainability it can be viewed as a system that improves the drivers health and well being. The effect will culminate to increased productivity, though whats differentiates the VDS is that the effectiveness is not the primary focus. Rather the safety, functionality, maneuverability and ergonomics (Lina, 2020).
For future implementation the VDS system will work as a bridge between a driver and autonomous driving. In the future, the system can therefore be a vital part in ensuring safety and quality in steering of autonomous trucks. An example of where the system is currently operating under these circumstances is in a mine shaft located in Brönnöy, six hours north of Trondheim in Norway. Where the entire mine shaft is operating autonomously without any human interference. Where the VDS is the system that bridges the signal from the sensors and translating them into movement. Which makes the VDS a vital part in the future if the assumption is made that autonomous trucks are something that will be seen on the roads in the coming years.
Hence making the industrial segment an important part for ensuring safety and enabling the possibility of autonomous vehicles.

3.2.7.1 Commonality and patterns

A distinction in the industry segment was that the general view of sustainability is a subject that is not directly and actively discussed, it is more of a reaction from the topic of efficiency. The focus is instead shed on economy and therefore, efficiency is of high interest for the customers. The customers has high demands on the products and the industry segment seldom has any room for making new requirements regarding sustainability. Though, they do have a continuous discussion with the customer about the products and how it could be improved. KAM insinuated that it would need law changes to influence the customers and make them follow the direction of sustainability. The customers would not be interested of projects whose aim is to make it more sustainable if it is not more efficient with a reasonable price. Hence, the need for a law change or increased competitor advantage regarding sustainability.
Regarding the three core values, both developers and KAM had the view that they

are communicated continuously and are a part of the everyday life at CPAC. Human being and responsibility were seemed as self controlled and no extra attention needs to be put on those values. Value creation is the core value that is brought up the most. Every task that is performed touch upon value creation to make sure that value is always added.

3.2.7.2 Functions and improvements

The KAM insinuated that Volvo has taken a big step forward in the development with electrical buses. No other stakeholder is near Volvo in the development process. A trend is forming where silent vehicles may be required in city centers in the future. This is a trend that is connected to sustainability where the cities aims for lower noise to increase the human well-being and a side-effect is that carbon dioxide emissions would decrease as well. This could act as an ignition and lead to more projects in the future concerning sustainability.

3.2.7.3 Carbon dioxide release and savings

During the dialogues, information was gathered regarding different use cases and their impact on the environment. In the industry segment those use cases were the Volvo Dynamic Steering (VDS) and the Sugar Cane. Sugar Cane is a system that helps the harvesters track their seed with support of a Global Navigation Satellite System (GNSS). Hence the truck is equipped with numerous amount of other systems that enables autonomous navigation and ensure that the crop will not be over run. The result is that 6 percent of each yearly crop is saved (Group, 2020a). The calculations are made with information gathered from personnel with expertise in the area. This system is active within seven sites with 10 hectares each. The savings are approximately 10ton sugar canes for every hectare and year. The VDS system do not have a direct impact on the carbon dioxide emissions, nevertheless it is connected to the sustainability in terms of human well being. The VDS system is positioned between the steering wheel and the wheel axle and filter the vibrations between the systems. This gives the drivers the same steering feeling as in an automobile which increases the comfort and reduce personnel injuries connected to driving trucks. The VDS is integrated in the suger cane system to ensure a precise autonomous driving, where no crops are over run. The VDS ensures that the vehicles can stay on course and locate the crops, for exact precision and increased performance. The sugar cane system on the other hand can be connected directly to carbon dioxide emissions. The calculations that can be seen down below consists of not only emissions from the Sugar Cane, it consists emissions from the whole agricultural process to include all the resources that are being wasted on the earlier mentioned 6 percent of the crops.
m = Tonnes of savings in sugar canes/(hectare and year) = $10ton/(hectare\&year)$
y = Amount harvested= $70hectare$
A =Agricultural release of carbon dioxide per ton cane = $34,3kg_{CO_2}$(Rein, 2020)
L = Life = $15years$

$$Sugercane_{yearly-saving} = m * y * A = ton_{CO_2}$$

$$Sugercane_{yearly-saving} = 10 * 70 * 34,3 \approx 24ton_{CO_2}$$

$$Sugercane_{Life} = L * sugercane_{pp} \approx 360ton_{CO_2}$$

There are also big savings in the economy every year because of the crops that can be harvested instead of being wasted. For every ton of sugar cane produced there is a profit of 70 000 Brazilian Real. The Brazilian Real is equivalent to approximately 2,24 SEK. This leads to a profit of 156 800 Swedish SEK for every ton of produced sugar canes.
M = Savings in SEK/ton sugar cane = 156800
m = Tonnes of savings in sugar canes/(hectare and year) = $10ton/(hectare\&year)$
y = Amount of hectare harvested= $70hectare$

$$Sugercane_{pp} = M * m * y \approx 110MSEK/year$$

$$Sugercane_{tot} = L * sugercane \approx 1650MSEK$$

The result is that the decrease of wasted crops from a system is approximately six percent. This presents big savings with the functions that the sugar cane system provides. CPAC systems saves up to 24ton carbon dioxide emissions and approximately 110 million SEK yearly because of the crops that are being saved every year. The thought of making the whole process autonomous is not necessary due to the operators low salary. It is more expensive to create a completely autonomous process than to keep the operators and challenge the working culture. The future potential therefore lies in the possibility to improve the performance and flow of the machines.
CICU is a part of a system solution that enables electrical drive of buses. A bus with a combustion engine has a similar fuel consumption as a truck and therefore, a trucks fuel consumption is used in the calculations. The energy consumption of an electrical bus is equivalent to approximately 14kWh per 10km which is used in the calculations to compare how much is saved in carbon dioxide compared to a bus that runs on diesel.
$\bar{d}$ = Average distance travelled per year = $60000km$
$\bar{F}$ = Average fuel consumption = $0,3l/km$(Mårtensson, 2020)
C = Carbon footprint diesel= $2,9kg_{CO_2}/l$ (Cefic & ECTA, 2011)
$\bar{E}$ = Average energy consumption electrical bus = $1,4kWh/km$
e = CO_2 emission per kWh in Sweden 2020= $0,045kg_{CO_2}/kWh$(Electricitymap, 2020)
L = Life = $10year$
n = Units sold 2019 year = 221

$$CICU_{pp} = \bar{d} * (\bar{F} * C - \bar{E} * e) * L \approx 484ton_{CO_2}$$

$$CICU_{tot} = n * CICU_{pp} \approx 107000ton_{CO_2}$$

In a future scenario the sales could increase from 221 units a year to 1000 units each year. An increase of approximately 450 percent. This product is not only sold to Volvo units which increases the future potential. If the same calculations is

made for the potential sales as the previous calculations, it leads to the following approximately savings in carbon dioxide emissions:
p = Potential sold units = 1000

$$CICU_{pot} = p * CICU_{pp} \approx 484200 ton_{CO_2}$$

The conclusion is that the potential savings in carbon dioxide emissions is equivalent to approximately 485000ton.

3.2.8 Analysis of dialogues for marine

During the dialogues within the marine segment a deviation from the other segments occurred. The focus was on the experience for the customer rather than efficiency which is the common denominator for the other segments. An example is the SUS which is an actuator that enables the drive of Volvo Penta's Inboard Performance System (IPS). It increases the amount of space that is available inside the boat, increases the performance and at the same time it decrease the emissions with 30% (Penta, 2020a). Although the IPS improves in all these aspects, it is still not sold as a standard engine system, because of the high price and the unique driving experience. The consequence of this is that sustainability is not the main focus and can easily be forgotten. The focus maintains on the customer experience as a reaction from the bigger focus on the leisure market rather then the commercial market that is over arching in the other segments.
The view on sustainability is similar to the construction segment where the KAM think that it is implemented daily even though it is not brought up as often. The developers on the other hand thinks differently, that communication around sustainability is close to non existing. Regarding the three core values, the developers and KAM agree that they are not spoken out loud, though they are implemented daily and is the base of all the work that is performed. It is a constant awareness around these core values, which is reflected in the performed work and the products that are provided to the customers.

3.2.8.1 Deviations

A dierence from the other segments is that the marine segment has a more extensive product responsibility in relation to their customer. All development is financed internally. Which is not the case for the other segments, where they for some development get this financed from the customer. The marine segment on the other hand nance all their own projects. Employees of the marine segment feels that the responsibility thereby is increased and which further emphasizes the role of ownership. Which finally culminate into intrinsic motivation and a projection of their pride.

3.2.8.2 Functions and improvements

The marine segment collaborate with a team at Volvo Penta to plan and determine future activities and objectives. Together they inspect and review the market in search for future trends. Identifying new concepts to create and evaluating what

projects to perform to add value to the business model. The marine segment also have a team that is currently focused on developing electrical solutions and try to make an impact on the market. This shows that CPAC is sitting on an opportunity to make a bigger impact on the future business due to the research that is performed early on.

3.2.8.3 Carbon dioxide calculation

During the dialogues it became apparent that there were two use cases that were of interest. The first being the Electronic Vessel Control (EVC), which is the total electric control system of boats and includes all electronic components. The EVC system does not have a severe impact on the environment. The information gathered from CPAC gave an efficiency improvement degree of 1%, since it makes the process for maneuvering boats less difficult and increase the comfort and safety. The second system is the SUS which is considered an enabler for the Inboard performance system (IPS), which is a propulsion system for boats. The IPS system has a major increase in fuel efficiency and decreases the fuel consumption with 30%. The SUS, that CPAC develops enables the steering of the IPS system and is a key component for the system to work. For the IPS system to be able to operate it needs an EVC system, though there is a difference in sales volumes between the two cases. Therefore, the EVC system and the SUS has been separated in the calculation of carbon dioxide emissions. The calculation for the contribution of an individual EVC and the impact of a years sales is presented below. The data without a source are gathered from CPAC documentation and experts within the area.
t = Average travel time/year = $100h$
L = Life = $20years$
$\bar{F}$ = Fuel consumption = $40l/h$(Penta, 2020b)
C = Carbon footprint diesel = $2,9kg_{CO_2}/l$(Cefic & ECTA, 2011)
I = Improvement = 1%
n = Number of units sold year 2019 = 12469

$$EVC_{pp} = t * L * \bar{F} * C * I = ton_{CO_2}$$
$$EVC_{pp} = 100 * 20 * 40 * 2,9 * 0,01 = 2,32ton_{CO_2}$$
$$EVC_{tot} = n * EVC_{pp} \approx 29000ton_{CO_2}$$

The per piece savings of an EVC is then equivalent to approximately 0,8 tanks of diesel for a boat with a capacity of 1000 litres. The total savings is equivalent to 9975 tanks for the sales of year 2019.
The SUS enables the usage of Volvo Pentas IPS system that have an efficiency degree up to 30%. This degree of improvement have been used in the approximations of the impact that the SUS has on the environment. The IPS system also enables longer range, lower noise and it takes up less space than its predecessor. This adds to the comfort which is strongly connected to the human well-being dimension of sustainability. It can also be argued that the IPS system is better for the economy in the long-term perspective. A SUS has a life of 5000 hours, though a boat is usually only used in average for 1000 hours which is the data that is used in the calculations below.

L = Life = $1000h$
$\bar{F}$ = Fuel consumption = $40l/h$(Penta, 2020b)
C = Carbon footprint diesel = $2,9kg_{CO_2}/l$(Cefic & ECTA, 2011)
I = Improvement = 30%
n = Units sold year 2019 = 1232

$$SUS_{pp} = L * \bar{F} * C * I = kg_{CO_2}$$

$$SUS_{pp} = 1000 * 40 * 2,9 * 0,30 = 34,8ton_{CO_2}$$

$$SUS_{tot} = n * SUS_{pp} \approx 43000ton_{CO_2}$$

The per piece savings of a SUS is then equivalent to approximately 30 tanks of diesel for a boat with a tank capacity of 1000 litres. Taken into account that there are approximately two and a half SUS system per boat, the total savings is equivalent to 14784 tanks including every unit that was sold in the calendar year of 2019. Concluding the calculations confirm that the systems that CPAC develops contributes to major savings during the life of a boat. When the two solutions are compared side by side in the diagram below it becomes visual how large the volume impact is of the system with smaller impact. A reminder of the importance of the entire sales volume in relation to impact, highlighting the importance of viewing the entire system.

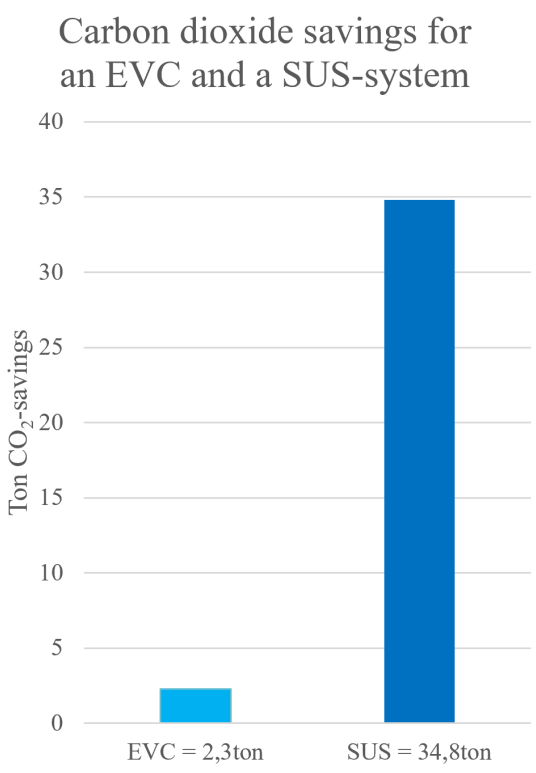


Figure 3.4: Carbon dioxide savings from a single product

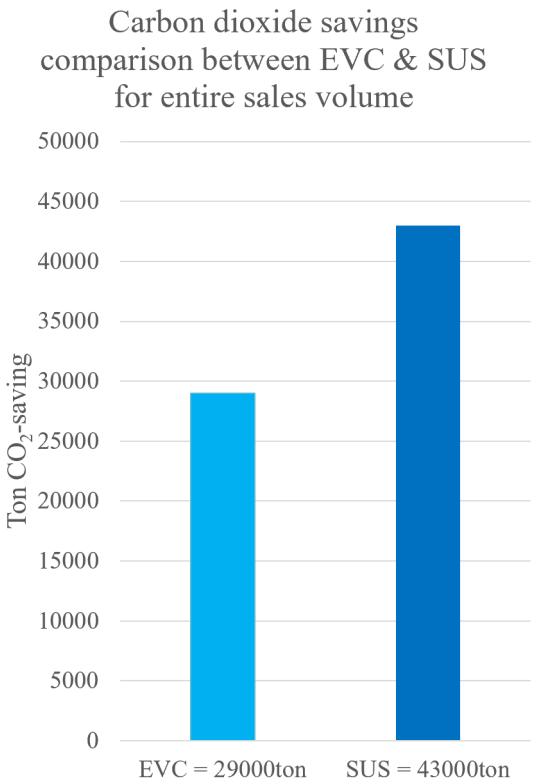


Figure 3.5: Carbon dioxide savings from the entire sales volume

3.3 Summary of carbon dioxide footprint

The summary is considered an approximation that can differ, though it indicates in an comparison CPACs contribution to the environment. The carbon release acts as a reference in coming evaluation of the savings from product functionality. The savings are calculated with the assumption that the savings are equal to the prevented carbon release due to a more effective system. The average release for a system without CPACs solution included, in comparison to an equipped system. The calculations used a years sales, accompanied with the life of a system as a foundation for comparison. Hence, comparing the effects of a years release of emissions with the effect of a years sales savings.

A summary of the release of carbon dioxide follows through the addition below. Additionally, this study have not included a complete comparison life cycle analysis, since it would require to much time and to many resources. Further it was considered to be acceptable with approximations to identify the size of the different systems. The need for this parallel study is connected with confirming that CPAC indeed is affecting the environment in a positive manner.

$Office = 56,7 ton_{CO_2}$
$Production = 32340 ton_{CO_2}$
$Logistics = 23 ton_{CO_2}$

$$Release = Office + Production + Logistics = 32419,7 ton_{CO_2}$$

The savings are approximated accordingly for each segment:
$Construction = 616000 ton_{CO_2}$
$Industry = 107360 ton_{CO_2}$
$Marine = 72000 ton_{CO_2}$

$$Saving = Construction + Industry + Marine = 795360 ton_{CO_2}$$

Concluding this means that the savings are 25 times the size of carbon dioxide release for the entire company and manufacturing process. Which confirms the belief that CPACs solutions indeed have a large impact on the environment in relation to carbon dioxide even though if large fluctuations in the values would occur. This comparison does however not include a comparison for a future potential, since there was not enough data to make a reasonable approximation. There where however a potential for major increase of sales volumes in many cases which result would lead to larger savings of carbon dioxide. The analysis is not used for highlighting the importance of a project, rather to confirm CPACs positive effects on the environment. The analysis also indicates that the production process has the largest negative impact on the environment, which means that it should not be neglected.

In the diagrams below it is visual how large the impact from the production is in relation to the other carbon dioxide releases. An indication of an opportunity for possible improvement, see figure 3.6.

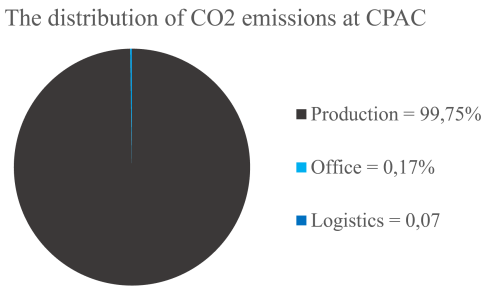


Figure 3.6: Distribution of Carbon dioxide releases for CPAC

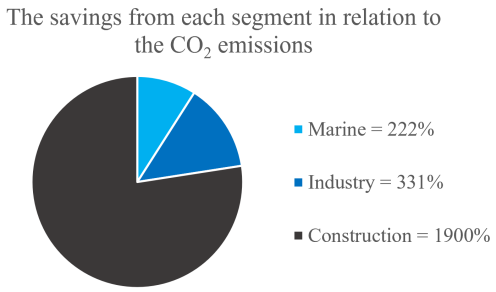


Figure 3.7: Carbon dioxide savings due to CPAC products functionality for the end customer

The result is further used to enlighten the employees of CPAC of the effect of their solutions. At the same time it provides a foundation for the upcoming workshop, where it confirms the direction of the company as well as opening a new path towards sustainable thinking process. The proportions of the savings are visual above and in figure 3.7. In the diagram below a graph visualising the savings in relation to the releases of emissions 3.8. The summary of carbon releases contributes to 100%, whereas the savings that are compared in relation to 100% of the releases.

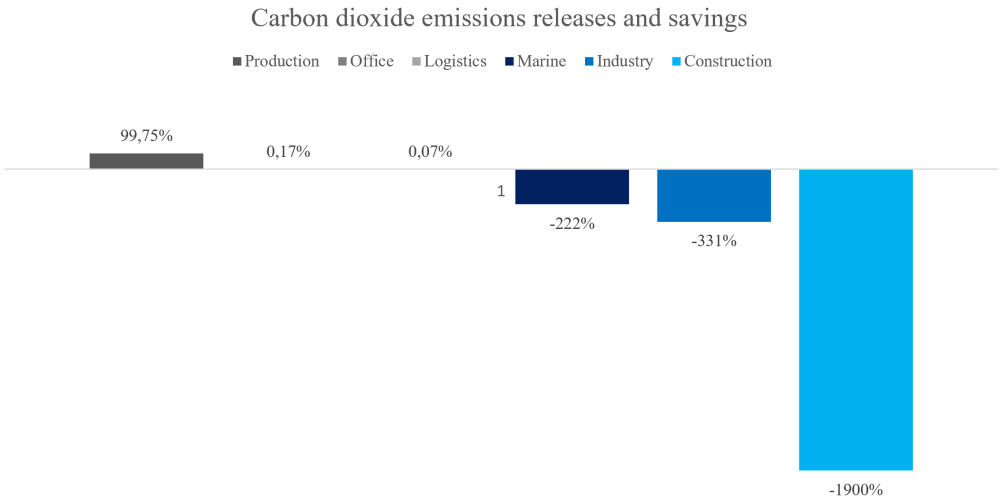


Figure 3.8: Savings of carbon dioxide in relation to 100 percent of the releases

3.4 Dialogue with management - alignment with current policy

The dialogue with the management yielded new perspectives regarding CPACs vision and alignment. Management was keen to emphasise the importance of integrating the sustainability into the core principles. To integrate sustainability to an extent where it does not feel like an external utility. A vision that was not aligned with the existing environmental policy, since policies where counteracting each other. An

overarching subject revisited multiple times during the dialogue, was the necessity of not performing an activity that could be regarded as external or complementary. Which is the opposite according to the current environmental policy, that states the following - *"Key account managers should state the positive environmental contribution in the offer towards customers."* A statement that without accompanied implementation of other functionality is regarded as an addition and thereby counteracting managements vision.
In the environmental plan for 2018, see appendix A, it is also stated that the vice president should during daily and weekly meetings revisit the environmental aspects to maintain a continuous process. A plan that is not followed to the extent it is elaborated in the documentation, according to the VPs and the KAMs perception. Hence creating an deviation in the former plan.

3.5 Summary of dialogues

All of the segments had a similar view on how the work is performed with regards to sustainability. Sustainability have in the past been treated as a external project to get certifications and have never been integrated in the organisation. There is no daily communication around the subject and the general view is that sustainability is a positive effect from efficiency. However the interpretation of the amount of integration with sustainability changes as well. Management and key account managers, were identified to have a more extensive relation towards the thinking process, though still not actively communicating sustainability. It still remains camouflaged by efficiency.
The three core values are easier extinguished in the dialogues with the key account managers rather than the developers. Nevertheless, all employees are fully aware of them and implement them in the everyday working life. Though more actively used by the top of the organisation, which is a natural phenomenon.
Further more the general opinion was that sustainability was accepted and recognized as an important issue for CPAC future and values. The sustainability principles should be regarded as one of the foundations of the organisation. Hence, not being seen as an external function, rather something communicated on a daily and weekly basis. Connections to sustainability were often directly related to increased performance, responsibility, internal motivation, cooperation opportunities, shared knowledge, business opportunities and a common goal.
Finally this confirmed that adapting sustainability into the current process at CPAC could be more than a possibility to effect the environment positively, but also act as an incentive for further inspiration and motivation. A channel to foster new innovation and business, by leading with example and nurturing new processes.
To foster such a process three potential subjects were identified during the dialogues. These subjects are presented and elaborated below:

- Understanding - A common understanding of sustainability that permeate the organisation.
- Communication - Consistent communication at all levels of the effects of sustainability.

- Work - Performing sustainable operations to increase the positive impact of the organisation.

What the three subject shares is the potential to increase sustainability throughout the organisation. However, this needs to be confirmed after the defining of future state of the organisation is developed. Thereafter, this can be confirmed in the chapter Gaps and challenges 3.10. Meanwhile, these are considered important findings, used for enlighten the organisation of possible improvements and topics for discussion.

3.6 External view of CPAC

CPAC does not market themselves outside Volvo Group with students as an exception. CPAC are loyal to Volvo Group and are pleased with that Volvo receives a majority of all the attention of their products and features. An example is the project *"Västlänken"* in Gothenburg where one of CPAC products was the reason of a 30% efficiency increase. The Gothenburg Post wrote an article about the project and praised Volvo for their innovation, meanwhile CPAC was not mentioned once and this is acceptable for them (Kennedy, 2020). Outside Volvo there are not many who knows what CPAC is. Volvo Group knows that CPAC is a company and partner that supports them with innovation and products that improves systems. Volvo Group do have an environmental policy with rules that needs to be follow, which leads to that CPAC needs to follow them as well. Regarding new sustainable thinking, the thought process at Volvo Group is similar to the one at CPAC where efficiency and economy is the primary focus. Volvo Groups view on CPAC sustainability is therefore similar to their perception.

Students are of high importance for CPAC, this is one of their primary recruiting sources. This is also the only platform outside of Volvo Group where CPAC allow themselves to bee seen and heard with a selling approach. Regarding sustainability, CPAC is aware of the lack of communication around the subject towards the students and this is also confirmed by the counter part. Nevertheless, students interpret CPAC as a technical innovation company that cares about their employees. Students see CPAC as an attractive working place which could be identified during CHARM at Chalmers University of Technology (CHARM, 2020), which is a fair for labor market where companies from all over the country attend. CHARM creates an opportunity to start the communication between students and organisations and start discussion around theses etc. This year during the fair CPAC brought an empty whiteboard, that was used to gather the students thoughts about future trends. An act that visualizes that CPAC cares for the students opinions and tries to align their opinions with the projects. The result from this study during the fair further strengthened the importance of integrating sustainability into the core of the organisation. Since the main subject that the discussion circled, was sustainability in different aspects. The sustainability is therefore confirmed important not only by the employees at CPAC, also by their main source of recruitment. Meaning that the importance of sustainability will likely increase over time as more students becomes a part of the organisation.

3.7 Thematic area

With the dialogues performed, the thematic area could be identified. During the dialogues it became evident that the communication regarding sustainability was low to non existing in the majority of cases. Sustainability was discussed briefly by management and KAM, however it was mostly treated in relation to efficiency. Developers on the other hand barely reflected over the different effect the system contributed to the environment. Accompanied to the dialogues was also the calculation of the savings from the functionality and use cases of CPACs systems. A result that indicated that CPACs systems contributes to lower the environmental impact quite drastically in many cases. Even though some systems are developed to function as an enabler or *"exitener"*, rather than increasing the efficiency of a product, they affect other aspects of UNs 17 goals of sustainability (Nations, 2020). Concluding, it can be said that CPAC systems is effecting the environment in a positive manner. However, there is room for increased impact by raising the awareness through the entire organisation. Summarizing from the dialogues it was interpreted that a need to action regarding implementation was needed to develop a higher commitment. Hence, not only raising awareness is the appropriate strategy, rather also implementation and action towards managing it on a daily basis.

3.7.1 Lighthouse at CPAC

The general view at CPAC through all segments and levels is the strong connection between sustainability and the environment. When the subject sustainability is brought up, the discussion often circulates around CPACs environmental impact. There is no connection with the other three dimensions of sustainability that are mentioned in 2.9 other than in the reaction from efficiency where it is clear that it is beneficial for both the economical and ecological view of sustainability. The communication around sustainability at CPAC is currently strongly focused on the ecological perspective which needs to be changed to reach the stated future vision that will be formulated. To succeed with a sustainable transition it is not enough to only look at one dimension and try to achieve the goals connected to that subject. The other dimensions needs to be fulfilled as well for the system to be sustainable, otherwise an imbalance can occur and the process is back at step one (Holmberg & Larsson, 2018). The balance is important for the performance of the transition and the goal is to achieve this balance at CPAC, to include all dimensions in the process and not only the ecological perspective.

An interesting finding from the dialogues was the focus on human well-being throughout the organisation through their three core values, value creation, responsibility and the human. These core values supports in making employees thrive at their work place and increase their intrinsic motivation. This has a strong connection to the human well-being dimension of sustainability. The three core values creates a well defined foundation where the process for implementing sustainability as one of the core pillars of CPAC can be continued. This subject was brought up in the dialogues consciously, and captured differentiating content from each dialogue. Regarding the economical dimension, CPACs solutions are mainly included in systems

that increases efficiency which leads to financial savings. CPAC is also a growing company that are continuously expanding which leads to the conclusion that the economy is under control as well.
Even though the sustainability view at CPAC is strongly focused on the ecological perspective it is not necessary performed well. Because of the will of pursuing sustainability which includes more perspectives than only the ecological dimension. Compared to the human well-being and the economical dimensions the ecological dimension is treated as something that should be performed to get certifications, which in turn is a contradiction to the core values of responsibility and value creation. The social dimension with the essence of how to work together with these areas are diffuse as well. As mentioned before, different perceptions regarding sustainability and the level of communication around it existed both vertically and horizontally through the organisation. Nevertheless, the communication around economy and human well-being works really well and this shows potential for better communication around the other areas as well. Focus will therefore be directed more towards the ecology and social aspects though, the other two areas will not be forgotten.

3.8 Other studies regarding sustainability

During this thesis three study visits where performed to gain information regarding other projects and how other organisations manage sustainability transitions. The idea was to share experiences and look for different approaches and ideas that might been applicable on this project as well.

3.8.1 Circular and Sharing Economy

Two of the projects that were visited and explored was about circular and sharing economy. The purpose of the first project was to investigate challenges in how to implement circular economy in communities, social enterprises, and business within the automotive and construction industries. Municipalities and governments role in the process was investigated as well. The idea is that waste should not be thrown away, it should be considered as material that can be used in other areas. This project had a different approach to facing the problem in comparison to this thesis. Instead of looking at where it is possible to make a positive impact, the focus was directed more towards who had control over the market and how to impact that stakeholder. (Hjaltadóttir, 2020)
The second project was more about how to share belongings and properties. For example if it is possible to share cars, clothes, food and more. There was another example of how to share sporting equipment between different clubs and teams instead of every team possessing their own equipment. The focus was not on companies in the same extent and was directed more to the everyday life. The purpose of the project was to investigate what a sustainable city is with regards to sharing economy and what municipalities role in the process is. It was interesting to see other approaches for managing sustainability, nevertheless the approaches did not seem to fit the project this thesis handles. Both projects also seemed to look more on the ecological point if view instead of all the dimensions that are mentioned in 2.9.

3.8.2 Royal Engineering Science Academy - IVA

IVA held a seminar where they first explained a study that have been performed since the beginning of 2018 and later on discussed the result with politicians and actors within the different sectors that had been investigated. This study regarded how Sweden can reach the target of being climate neutral by the year 2045 with no net emissions of greenhouse gases and with a strengthen working life for Sweden. IVA have looked in to different sectors, industry, power, agriculture, forestry, building, and how these sectors needs change, to perform in a manner that ensures that Sweden becomes climate neutral by 2045 (Akademien, 2020).
An interesting identification during the seminar was the methodology. It was similar to the methodology applied for this thesis. This methodology is recognised in many sustainability projects and another example of that is the International Institute of Sustainable Development (for Sustainable Development, 2020). The process of IVAs project starts with looking at everything on a system level with more of a holistic view. Large approximations was performed with the help of experts from the different segments. This was needed to reach adequate values for mapping of the current situation and for identification of future goals. Their long-term goal for 2045 is another connection that connects this thesis methodology to another project that has a big credibility. Interesting as well is that they have collaborated with politicians that are active in the decision process in Sweden's government. They highlighted the importance of that this process needs to be a collaboration between all actors within all sectors and inviting the politicians is key for the future development. If this project gets more recognition, it can be a competitive advantage for CPAC and the question is if CPAC should include the climate neutral goal for 2045 in their target? It is a question worth thinking about to move in the right direction of development.

3.9 Future vision

The future vision represents CPAC's desired future state, how the organisation will prioritize and operate in an optimal state. During the former dialogues and the mapping process, thoughts of how the future state could be shaped started to emerge. These thoughts is elaborated in the future visioning. Continuously recurring was the importance of integrating sustainability in to the culture at CPAC as a part of the entity and the daily work, similar to the three core values.
Further investigation of the future state was performed through a future workshop with parts of the personnel. The personnel in these dialogues included KAMs, VP, Strategy Director, CTO, and Human Resource Director. The reason behind the selection of personnel in this workshop is that organisational change needs to be driven from top management to get integrated (Robertson & Ulrich, 1998). This selection was further motivated in *MediaLAB Amsterdam*, Future workshop format (MediaLAB Amsterdam, 2020). The participants were divided in to two bigger groups with approximately five people in each group. The workshop started of with a presentation of the current findings from the mapping and calculations. Thereafter, the workshop was initiated. The workshop consisted of numerous stages with leading

questions to guide the personnel within the discussion areas. The participators got a whiteboard pen and post-it notes at the start to ensure an opportunity to write down any thoughts and make them visible for all participators. This way the important notes could be documented and the dialogue could continue without the facilitators need to focus on documenting. The post-it notes were colour coded to ease the process and the following analysis after the workshops.
The stages of the workshop was the following:

- Stating the time-frame and the vision of CPAC in the future. (Yellow notes)
- Setting measurable goals (Qualitative and/or quantitative) (Orange notes)
- Defining principles (Blue notes)

The following questions were visualised to keep in mind during the discussion:

- How much pressure can we put on the personnel regarding sustainability?
- What are the current trends?
- What are the future trends?
- Should we be trendsetters or trend followers?
- Visibility internally versus externally?
- How much should the organisation actively work with sustainability?

The aim of these workshops was to obtain a shared vision regarding future management of sustainability, a vision applicable for all segments and levels. The aim was to identify the core building blocks for the future state, from different stakeholders.

Figure 3.9: Execution of workshop

Figure 3.10: Execution of workshop

The values found during the workshop where weighted to identify the importance. The first step was to reduce the amount of values into a manageable size. This was insinuated by elimination of the values that was regarded excessive or unrealistic. Hence leaving the achievable values and providing an easier weighting process. The purpose of the weighting was to identify the key goals and reduce the amount of goals to a manageable size. That does not mean that all the other goals should be excluded, though to be able to proceed with the project it was regarded a necessity. Otherwise the scope of the project and the time limitations would have to be adjusted to the greater. Reaching the end of the workshop, an evaluation handed to the participators, to gain feedback on their experience to improve the workshops for the future.
Thereafter, the information was analyzed. Together with the supervisor at CPAC, the vision was established together with a sustainability policy, which was sent out to the participators for confirmation. This information was later used for comparison of where the company currently is located and where they want to be in the future to identify the gaps and challenges in the chapter 3.10.

3.9.1 Analysis of Future Vision - Workshop One

With the first workshop performed it was possible to start the analysis of the gathered data. The data is presented in the order the workshop was performed, starting with the vision followed by the goals and the principles for action. The information from the workshop is translated, though the information still remains true to the source.
The future state of CPAC and the vision could be deconstructed into three subjects. The subjects are categorized with a brief summary to indicate what overarching information regarded. The subjects are presented without an order of prioritisation, and the three subject are regarded as equally important.

- Understanding and knowledge - All personal should have a common understanding of what sustainability is and have an understanding of the impact of their products.
- Climate positive - CPAC should not only strive to be climate neutral, rather climate positive. Meaning that their inventions should save more energy than what they consume to produce and use.
- Relations - CPACs employees should have sustainable relations individually, with family, colleagues and society. The organisation should nurture a safe environment, where personal can develop internal growth as well as relationships.

Figure 3.11: The first workshop, identification of the future state

During the workshop it was identified that the sustainability principles also is highly connected with the three current core values of CPAC 3.1.2.1. Whereas the understanding and knowledge were related to the responsibility to some extent, the positive climate effect is linked to the value creation and finally the the relations to human.

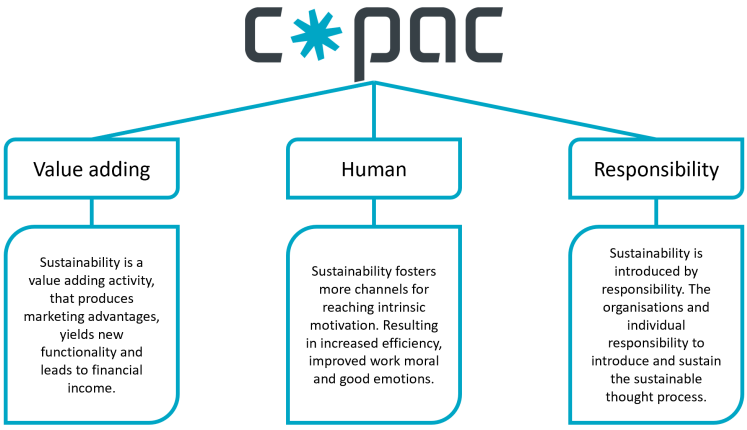


Figure 3.12: How sustainability is linked to the three core values currently adopted by CPAC

After the building blocks for the vision and future state was established, the workshop continued with developing goals. The goals purpose is to make the vision measurable and to make it visual for the employees what employees should work towards. The measures could be qualitative or quantitative, equally as well as a yes or no statement. Though with the common purpose to ensure that the organisation is developing towards the desired state.

Figure 3.13: Identified goals for the future state

- Understanding and knowledge
  - CPAC should be associated with sustainability to the same extent as innovation.
  - CPAC should use a generic model for mapping and measuring of our products environmental impact.
  - CPAC should distribute the information of how to work with sustainability towards its employees.
- Climate positive
  - CPAC should influence their offer, to ensure that there are demands on sustainability.
  - CPAC should influence whats valuable for the supplier.
  - CPAC should measure the climate effect and ensure that trend is always in a negative decline.
- Relations
  - CPAC should be aware of their effects internally and externally.
  - CPAC should ensure that each employee knows how to contribute to a positive environment impact.

The last step of the workshop was to decide the principles for action, which functions as guidelines towards the vision and the goals that was developed earlier in the process. The principles for action manages how to work towards the goals as decision divider in order to fulfill the vision. The principles that were developed during the workshop are stated below.

- Understanding and knowledge
  - A plain template that assist with calculations for a products environmental impact
  - A light LCA-approach for a products life
  - A new quotation template where environmental impact is compulsory
- Climate positive
  - A *"target cost"* for carbon dioxide emissions should exist for every product with a follow-up on PMQA meetings
- Relations
  - Nurture an environment where sustainability is a core value

The workshop was finalised with an evaluation, to gain fast feedback on possible improvements for the upcoming workshop. The received feedback indicated that

the final subject *"principles"* was difficult to determine and was easily confused with plan of action. The argument being that the principles starts to link the future with the past, hence making it difficult to only sustain a perspective on the future. After further discussion with our supervisor, the principles was removed and considered as a step to approach after the generative workshop, focused on filling the gap.

3.9.2 Analysis of Future vision - Workshop Two

The second workshop had the same approach as the first workshop 3.9.1, with difference that the subject principles was removed, as stated above. During the second workshop the following topics was identified for the two subjects.

- Understanding - The organisation understands the effect of the products and services and how they affect the society in a larger perspective.
- Responsibility to challenge - CPAC takes responsibility to foster sustainability and acts as an moderator.
- Business integration - Sustainability is integrated as a natural part of the business operation.

Figure 3.14: Brainstorming in workshop two

The identified goals during the second workshop is stated below:

- Understanding
  - CPAC should have an understanding of why customers select their products over other companies.
- Responsibility to challenge
  - CPAC should have requirements regarding sustainability in project processes.
  - CPAC should have a target on the impact of sustainability.
- Business integration
  - CPAC should marketing sustainability towards clients.
  - CPAC should make demands on suppliers regarding sustainability.

3.9.3 Summary of future state

Finally it can be concluded that the two workshops shifted slightly in their content, though remained similar in the core. A returning subject was common understanding of sustainability and that it is important to see the impact of the organisation on a societal perspective. In the future state the organisation and its employees should have the knowledge about their products impact. The organisation should share a common view on what sustainability is and understand how it can be integrate into their daily work.
What differentiated the two workshops was the focus. In the first workshop focus was shed on the human, relations and that the organisations should be climate

positive. That the organisation should be climate positive was confirmed during the second workshop where the subject once again was raised. It was again confirmed that CPAC should strive to always increase the positive impact on the environment for each year. Hence over time their environmental impact should always decline and the relation between emissions during production and the savings from functionality should be increased. Again linking back to what previously was stated, that there needs to be some kind of measurement to confirm the environmental impact with decent accuracy.

The focus that differentiated the second workshop was the ability to use sustainability in marketing and communication of the organisations value. In the future state of the organisation it was regarded important that sustainability was completely integrated and that the organisation was associated to sustainability to the same extent as innovation is today. Sustainability should be integrated into the core of the organisation and used in marketing and sales operations to affect customers and suppliers in offers. A vision is that sustainability can be used to the extent as financial means currently do. Moreover it was also thought to be integrated in project evaluation and follow-ups.

Concluding, the core for the future state is summarized with the topics bellow:

- Understanding - The organisation understands the effect of their products and services and how they affect the society in a large perspective.
- Climate positive - CPAC should be climate positive. Meaning that their inventions should save more energy than whats needed in production and usage.
- Sustainable relations - CPACs employees should have sustainable relations individually, with family, colleagues and society. The organisation should nurture a safe environment, where personnel can develop internal growth as well as relationships.
- Responsibility to challenge - CPAC takes responsibility to foster sustainability and acts as an moderator.
- Business integration - Sustainability is integrated as a natural part of the business operation.

The goals presented from the workshops above is used for determining if the later progress is heading in the right direction. If the goals can be fulfilled then the organisation is approaching the future state. Hence the next time the goals are mentioned is in relation to the plan of action, to confirm that the plan is accurate and positions the organisation in the direction that is desired.

3.10 Gaps and challenges

At this point of the project the future state had been identified through workshops with the management. Earlier in the process the current state had been identified through dialogues with coworkers from different segments and levels within the organisation. It was now time to identify the gaps between these two states and determine what the organisation is missing to reach the stated future.

3.10.1 Understanding

Throughout the organisation there is a big understanding of their products and their effects regarding performance. Nevertheless, there is a lack of knowledge for the product's impact on the environment and their effects during its whole life. Knowledge about suppliers impact on the products and clients usage and post-usage phase. Most important is that the knowledge around what sustainability actually is differentiates between individuals within the organisation which was identified during the dialogues. When thinking about sustainability the thoughts often steers towards the environmental aspect, though there is a need for paying attention to all four aspects 2.3. Therefore, there is a gap of communication of how the work around sustainability should be performed. When creating a clarity around sustainability it eases the process of how to perform the work and at the same time it increases the obscurity of what to do to enhance innovation. Resulting in a wider range of inventions, and new marketing opportunities. To close the knowledge gap, it was perceived that some type of measurement of the environmental impact must be introduced. Currently there are no generic model for calculation of a products impact on the environment. To achieve a reasonable understanding of the products impact, a life cycle analysis needs to be performed. A solution which is both time consuming and costly. What makes the situation more difficult to manage is that CPACs products is sold as third party solutions and often affects an entire system, rather than an individual product. meaning that the efficiency can change from case to case for a system. To increase the difficulty even further, each solution affects different aspects of sustainability and many systems acts as enablers for other solutions provided by their customers. Resulting in the dilemma of how much of the savings that can be accounted for as CPACs contribution.

3.10.2 Climate positive

One subject that came up during the workshops was to not be climate neutral, CPAC wants to perform better and be climate positive. It can be argued that CPAC already is climate positive due to the savings in carbon dioxide emissions from their systems 3.3. Nevertheless, this is a continuous process that needs to be revisited to ensure that the emission progress in the desired direction and not deviates. A goal that emphasizes that vision is the increase in the relation between carbon release during production and the savings from functionality. Which also is related to the need of measuring stated above.

3.10.3 Relations

Regarding relations within the organisation, it has not been possible to identify a gap between the current state and the future. However it is important to follow up to make sure that the current situation is sustained. Hence the challenge is in maintaining the same values and communicating the same feeling that there is today. Hence, promoting the relations with family, colleagues and society and how it relates to sustainability.

3.10.4 Responsibility to challenge

CPAC wants to be trendsetters and be on the leading edge of sustainability in the industry. CPAC has a responsibility to create innovative solutions that aids with decreasing the negative impact on the environment. It was identified that responsibility was a core principle for sustainability and a key for implementation. CPAC is already a trendsetter to some extent within the Volvo Cooperation, though aim to act as an moderator for how to deal with sustainability. The organisation envisioned CPAC to be related to sustainability to the same extent as innovation is today. Exploiting the gap between the current situation and the future and at the same time approaching the challenge how to reach it. Though emphasizing the importance of the responsibility as an indicator for how to proceed.

3.10.5 Business integration

In the desired future state, sustainability should be a natural part of the business operation. Sustainability should be managed in offers towards clients as well as in negotiations with suppliers to handle the impact on the environment of the products. In the current situation at CPAC, sustainability is not managed in these situations. Sustainability as a subject is not managed within the organisation, which introduces the gap. The challenge is to change the business model to suit the future scenario. It does not only require a personal change in behavior from the employees, though also a strategical approach to be able to adopt the new thought process. The challenge also includes the financial issue that raises if the environmental approach interferes with the financial one. Hence, there is a need for evaluating ecological perspective with the economical issue in mind.

3.11 Sustainability policy

Connected with the stages recently performed was the formulation of the new sustainability policy. The new policy was constructed based on the the desired future state that the personal stated. The policy was first formulated in a number of different appearances and statements. Thereafter examined by the organisation in many iterations to confirm the content, improve the language and the format. The policy that was formulated follows.
"CPAC is an organisation that manages a business with direct ties to sustainability and large impact on the community. Hence, we take a large responsibility to push the industries in a positive direction and make it visual by becoming more climate positive for each year. CPAC creates prerequisites that can deliver more sustainable solutions to all the companies stakeholders. Further, CPAC acts as precursor for sustainability and enlightens with transparency, the systems effects on different levels. The business model is developed to foster sustainability and permeate the organisation, to the degree where each individual understands their contribution, feel safe and healthy."
The policy is accompanied with commitments related to the current core values of the company. The commitments are the following:

- Value creation
  - CPAC should be climate positive in the designation that the savings are larger than the emissions.
  - The relation between savings and emissions should increase over time.
  - Sustainability is naturally integrated in the business.
- Human
  - Pervading understanding of what sustainability is.
  - Understanding the community impact that the products and services contributes to.
  - CPAC employees have healthy relations individually, with family, colleagues and towards society.
- Responsibility
  - Enlightens stakeholders with the impact of the provided products and services.
  - CPAC leads the development of systems with sustainability in focus.
  - Takes responsibility for integrating sustainability in all developed solutions.

These commitments are accompanied with the challenges former mentioned in the chapter 3.10. Concluded with what sustainability means for CPAC. Which is the foundation presented in the Lighthouse, with the economical, social and ecological aspects 2.9.

3.12 Workshop - Filling the gaps

With the gaps and challenges identified and the sustainability policy determined it was time to approach the final workshop. The purpose of the final workshop is to identify a wide variety of solutions for how to approach and implement the sustainability policy. The goal is to accumulate as many ideas possible linked to the gaps and challenges. The ideas can be presented by anyone at the company since the aim of the workshop is to include the entire organisation. The argument being that with the ideas coming from within, which makes it easier to motivate a change and adopt. It makes it visual that the information comes from within, hence creating a strategy that is internally constructed. Which foster internal motivation, as mentioned in 2.1.

3.12.1 Workshop - Preliminary setup

The workshop has been constructed accordingly to suit the purpose of filling the gaps and to ensure a large quantity of ideas. Bröckling states the following in his book On Creativity: A brainstorming session - *"creativity is meant to be mobilized and set free; on the other hand, it is meant to be controlled and reined in"* (Bröckling, 2006). Hence it was important to establish an environment free from judgement and criticism. The purpose was to design an open environment, that was able to tap the well of creativity from the employees. According to Floyd Hurt there is no perfect method, though there are a few things that helps fostering a useful outcome. Starting with a clear statement of the purpose of the workshop and the outcome. The

second being that there is no perfect way to construct a workshop, hence making it possible to construct a workshop combined of different methods as well as adjusting them to better suit the need for the particular situation (Hurt, 1994). Hence the workshop was performed with the walking brainstorm format developed by Hadnes, with some slight adjustments. The reasons for using this method is that it requires no prerequisite brainstorming experience, hence a low difficulty. Further it fosters an environment without disagreement and judgment (Hadnes, 2020).
The figure 3.15 indicates with a graphical representation how the workshop was constructed. Each blue square represents an area for placing of a post-it note. Each idea is placed under a suitable sub categories as well as an approximation for the time needed to implement the solution. After a participator has placed the ideas he or she tries to identified the difficulty of the ideas with color coded stickers. If the idea is considered exceptional, it is marked with a star to highlight important findings.
This approach was regarded beneficial since it enables identification of important and necessary ideas. At the same time it introduced a number of different measurements that could be used in the elimination and selection processes.

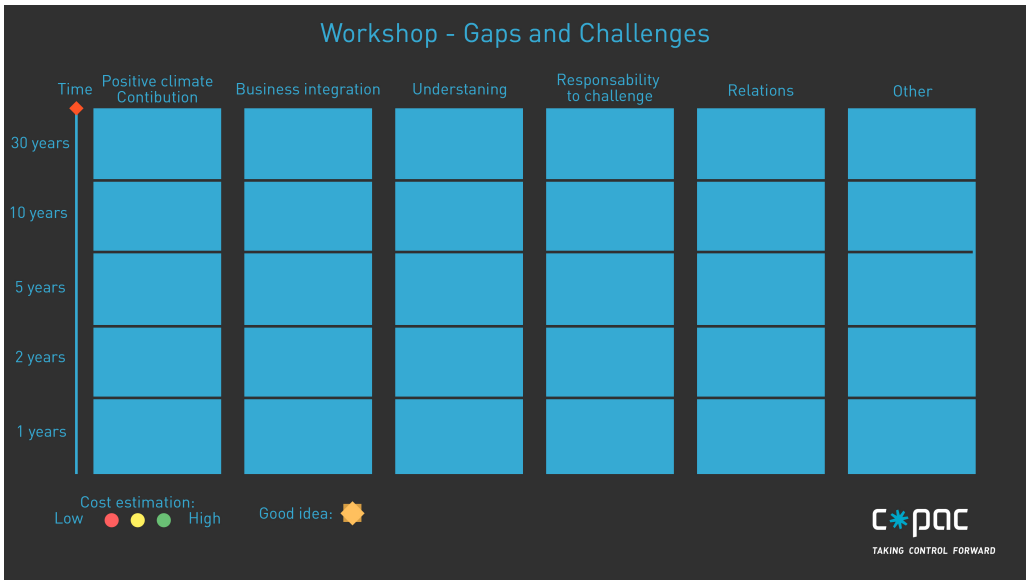


Figure 3.15: The graphical format of the workshop

3.12.2 Workshop - Secondary setup

Because of the circumstances related the Covid-19 decease, the format of the primary workshop needed to be changed to suite the current situation. A situation where no one was allowed in the office, and the meetings reduced to minimal. Hence a secondary solution became the construction of a website where the employees of the organisation could take part of the information regarding the sustainability policy, gaps and challenges. Instead of performing a survey, a website was regarded more efficient and the employees were able to leave feedback and solutions in a way similar to the former method. The website can be viewed in appendix E. The major need from the website remained the same, which was to bridge the gaps and identify

solutions to the challenges. The information still contained an approximation of the implementation time and difficulty. Measures that was regarded vital in the determination of the plan of action. This method was not regarded the most suitable method, though with the current circumstances it was regarded acceptable. The down side of the method was that the employees could not interact with each other to share ideas and insights. Neither could employees indicate which idea they thought was exemplary.

Returning to the SDT, a workshop would have been preferable since it fosters communication and cooperation, that can not be achieved through a website without the face to face interaction. Risking that the employees can not see their contribution, receive confirmation on their ideas and finally risk of loosing internal motivation. With this stated the work progressed as before, though the end result might have differed slightly.

3.12.3 Workshop - Third setup

With regards to the development of the Virus Covid-19 further precautions was implicated in the organisation, which obstructed the secondary workshop. Hence, the method for identification of a plan for action was shifted once more. This time it was in union with the supervisor from CPAC decided to progress without feedback from the entire organisation. This was decided since large parts of the organisation was put on permutation and was not regarded to sufficient time free to aid in the brainstorming activity. Therefore the third setup was performed by summarizing solutions and ideas that were identified during the former dialogues and workshops, in addition complementary ideas from David Andersson and Jakob Eriksson. Even though this approach was not regarded as the most accurate method that would be easiest to implement it would still work. The procedure of the third workshop followed accordingly. The layout in figure 3.16 was used to place ideas on colour coded post-it notes. The ideas included both challenges and potential positive outcome. Most of the identified ideas had during some former part been discussed and received an approximation of time and cost for implementation. Hence the ideas could quite easily be placed. However these placings were regarded as approximations, though relative to each other accurate enough to be used for determination of difficulty and time. The identified ideas for the plan for action is present in appendix F.

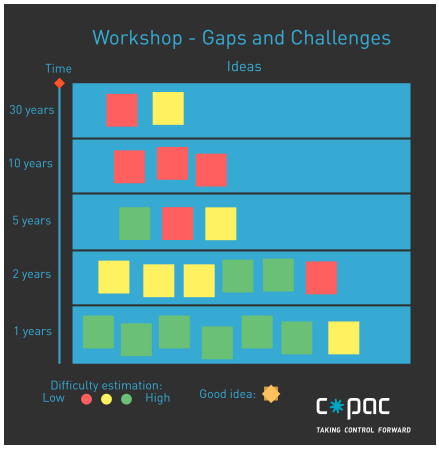


Figure 3.16: Third workshop setup for brainstorming ideas for an action plan

The promising and unique ideas was marked with a star. Thereafter an elimination of solutions that was presumed to have low impact on the organisation was removed, these have a red border in appendix F.

3.13 Elimination of solutions

After the third workshop setup had been performed, a process of elimination started. The aim was to eliminate the solutions that were perceived to have a lower impact relative to another to find the solutions that resulted in a greater outcome. This process was intended to be performed within the workshop together with the personnel though due to the circumstances this was not possible. As mentioned before, this would increase the intrinsic motivation of the employees for being a part of the process as well as provide information from the source of knowledge within the organisation. Nevertheless, this process was continued without the expertise from the employees though the information that was gathered in the earlier workshops and dialogues was taken into consideration when evaluating the solutions. The eliminated solutions can be identified with a red border in the appendix F.
Further, this leads to the plan of action that is presented in the results.

4
Results

What should the organisation do to create a sustainable mindset? What should the organisation do to become sustainable? How could CPAC reach the stated future? These questions will be answered in the following section. The results from the execution and the theory that has been presented earlier in this report will be presented as an suggestion for what the organisation need to execute to become sustainable. The mapping of the organisation and the sustainability policy are results of its own that are associated with what the organisation are doing right now and where they want to be in the future, though there are steps in a path for finding out what to do to reach the future state. This leads to the plan for action that brings the gap between these states together.

4.1 Plan for Action

The plan for action is the last step of this process and closes the gap between the state of where CPAC currently is positioned and where they want to be in the future. This plan is divided into several steps that will be presented more profoundly in this section. These steps are graded in difficulty and how long time it would take to implement in the organisation. The procedures are presented in a chronological order, meaning that the projects are thought to be implemented in the order they are presented below. Each sub chapter represent the estimated time frame needed for completion.

4.2 Now - Picking the low hanging fruit

The steps that are presented in this section are what is called the "low hanging fruit". These steps can be performed right away with reference to that they are least difficult to execute regarding the time it take to perform and the means that are needed. These steps are also necessary to perform before other more advanced steps can be performed in the future.

4.2.1 Basic knowledge - Low level of difficulty

To initiate a transformation towards a sustainable commitment, the first and most vital procedure is to enlighten and communicate what sustainability is. It is important to ensure that there is a common understanding of what sustainability entitles for CPAC. To ensure the validity and implementation it is deemed necessary that

the messages comes from top management, preferably the CEO. This because of the identified respect the employees have for the top management and their decisions. With communication from the top the employees will more likely embrace sustainability as an important feature within the organisation.
Furthermore, the basic knowledge and sustainability policy needs to be communicated repeatedly over time to permeate the mindset of each individual. During the communication of the sustainability policy it is important to emphasize that it is constructed internally and developed within the organisation. That each member can contribute to foster a more sustainable organisation.
The basic knowledge that is regarded as vital is the information presented in the chapter 3.11. This information is necessary to communicate, thereafter additional information related to the lighthouse approach and the core formulation of what sustainability is can be used to further spark in depth learning. Returning to the SDT in chapter 2.1, the basic knowledge acts as an bridge to close the knowledge gap. It enlightens and unites people across segments in the company, hence increasing communication and collaboration across borders. Which in term fosters a healthy social life and affects the intrinsic motivation in a positive manner.
Finally the basic knowledge acts as the foundation for building a sustainable organisation where numerous other plans are implemented based on the basic knowledge. Without the understanding, it might in some cases be difficult to see the reason for why the organisation adopts the sustainable thinking processes.

4.2.2 Team activities and sustainability evaluation - Low level of difficulty

Once there is clarity in what sustainability is, the second step can be approached. Which is implementation of activities and evaluation linked to sustainability. Each team will in weekly stand up meeting discuss the projects from a sustainable angle, what impact the project has on the surrounding and the stakeholders. How the different projects affects and changes the society in a larger picture. The need is not for establishing a different setup of the meeting, where the focus shifts from the preliminary setup. Rather sustainability should be integrated as a natural part, where positive effects on the environment can be highlighted to increase the intrinsic motivation of the personnel. The motivation is increased since it insert a new type of incentive that is not monetary. Instead it focuses on providing a good feeling through visualising what the positive effects are on the society and how each member have contributed to a more sustainable society.
The responsibility to insert this communication is positioned in the hands of the Key Account Managers and the project owners. Since in the majority of the cases, they are leading the meetings. However, the communication should hopefully transcribe into the team to foster further development in the sustainable thinking process. With time it will feel like a natural part of the meeting and communication related to sustainability feels as natural as budget and resource planning.
With the sustainable thinking process implemented in the mindset of the employees it will become more evident what can be done to increase sustainability, though it will increase the uncertainty in what to do. Hence, it will create a wider spectrum

of reasoning, leading to possible development of new products, functionality and services.

4.2.3 Weekly/monthly project updates - Medium level of difficulty

Each week or month one project will be communicated to the entire organisation. Information that will be communicated will include a project description, interesting findings together with a difficulty and sustainability evaluation. This will enlighten the employees of the organisations projects and their contribution. If difficulties arises within a project and are presented in the newsletter, another employee may have an idea how to fix the problem which in turn leads to collaboration across segments within the organisation. The sustainability evaluation will support in the process of integrating sustainability in the normal working processes. By providing information in a sustainable point of view it will remind employees to think about it and they will also see their contribution within the area. Positive results that are presented will increase the personal motivation for people involved in the project. Though negative results that are presented may not always increase motivation, rather decrease the motivation it may lead to collaboration across segments to fix the problems that may arise.
This requires a standardised template that each project owner needs to fill in once required. The standardised template will also make it easier for the readers to know where to look to get certain information. The material and knowledge to perform this is already available and will increase the information flow and knowledge of the organisations projects.

4.3 1 year - What projects can be started

What projects can be initiated during the first year after the basics are implemented to further foster a sustainable working procedure? In the following chapter these steps will be presented, though some projects are initiated during the first year it does not mean that they will be completed during that year, rather carried out during numerous years after the implementation.

4.3.1 Product portfolio - Medium level of difficulty

To further foster and encourage personnel to learn about other products and services that the organisation offer, a Product portfolio could be constructed. The portfolio should include all projects that has been developed by the organisation, though excluding subsystems. The portfolio could be constructed in many different appearances. However it is the content that is key, which bring us back to sustainability and enlightenment of CPAC organisational impact on society. Not only will the employees and stakeholders be able to read about functionality of the projects, but also about the projects impacts on society and on an individual level.
Information could range from carbon releases, to material savings and efficiency. Though with the key take away that the product or service provides positive effects

on society.
The portfolio have further usage internally in the company since it can also be used for communicating project to students and to potential customers. For customers it acts as references to other projects, where it can indicate that the entire organisation has adopted to sustainable thinking and not only one project.
The resources that are required to create a product portfolio and especially one that give fair indications on sustainability effects, requires adequate data to be able to state persuading facts. Though a product portfolio could be constructed without a sustainability chapter focused on sustainability with numbers that indicates the differences in savings. It is presumed to not give equal amount of positive impact as the product portfolio with sustainability statements. Hence, it requires resources for further investigation, as well as the project owners time to formulate and write about each product.
Furthermore a design for the product portfolio needs to be constructed, which is considered to have a low level of difficulty.

4.3.2 Student Projects - Low level of difficulty

When the base knowledge of sustainability is achieved throughout the organisation, a good strategy is to continuously introduce new student projects related to sustainability. Students have an open mindset and an image representing sustainability that is not obscured by the reality of the industry. A position which is unique for them and put them in a position that can be desired for problem solving. By introducing new student projects on all levels, bachelor and master theses and other projects as well, the organisation will achieve new perspectives on problems. Though it will require supervisors with insight in the organisation to take working hours to focus on student projects, it is a low cost for the return of investment. Additionally the students can aid in time consuming activities, that can be necessary for providing exceptional data used in marketing and decision making process. Referring to that students can perform LCA analysis and activities deemed appropriate for nurturing of sustainability.
This is also an opportunity to find new employees that are connected to the company. When a student project is performed, the students will have a good connection with the employees that is already employed by the organisation and they will gain an insight in the organisation to some extent. During the student project the students will also have supervisors that can support in the work that is performed, hence they will not be thrown in to a project without any advise or previous experience.
Finally it sends the message to students that CPAC is a company that values sustainability and the future highly. Marketing CPAC in a positive manner and communicating the message to both students and internally within the organisation.

4.3.3 Marketing - Medium level of difficulty

To make people more aware of what is going on regarding sustainability within the organisation, sustainability could be used as a factor in marketing. This could be used both internally to increase employees internal motivation by presenting

employees contribution. It could also be used externally for increasing sales by using basic facts. In today's society, sustainability is growing as a subject that is becoming necessary for the development of businesses (Akademien, 2020). Though it still has not come to that level, it is an advantage to consider due to that a sustainable business will not fail in the long term.
To market sustainability it is necessary to have facts to rely on. These facts needs to be accurate for people to trust them, it needs to be backed up by a trustworthy source as for example the United Nations sustainable development department (Nations, 2020). Without any trustworthy source it would be difficult to stand for the facts that are presented.
Connected to the sustainability policy in 3.11 where it is stated that the organisation wants to be a moderator on the market regarding sustainability, it is necessary to present this to others. It could also benefit CPAC through stakeholders adaption to the market and takes on sustainability to a greater extent than in the past.

4.3.4 Raise awareness - Low level of difficulty

With raising awareness, it insinuates to inspire a sustainability further then within the organisation. How CPAC as an organisation affect individuals to act within the sustainable boundaries outside the office and how CPAC can affect other industries to invest in sustainable options and services. This is performed by leading with example and communicating how sustainability is approached. This can be performed by the entire organisation in many different approaches and variations. One step in the right direction is the initiation of integrating sustainability in to the core of the organisation and letting it speak for itself. Other than that it will become visual in the communication between the stakeholders and the organisation, by reading in the website, communicated at fairs and to students. The possibilities are endless, though it is the initiation and the action towards communicating the subject that is important to become the precursor of sustainability.
This is a step that is regarded to have a low level of difficulty, since it is regarded the initiation effect of sustainability adaptation. However the effects will not transcribe immediately, rather it will surface over time as the result of a long lasting adaptation.

4.3.5 Sustainability department - High level of difficulty

A step that would ensure that the organisation continues to develop in the right direction, would be the initiation of a sustainability department. A department dedicated to follow this or another action plan through. The department would be responsible for fulfillment of the action plan, identify new possibilities and continuously improving the organisation. Sustainable development will always need to be updated due to the change of business and individual behaviours to be relevant over time (Holmberg & Larsson, 2018). The department would initially not be directly linked to any specific department rather as stand alone department, acting to aid the others. The department would act as an moderator for sustainability within the company together with top management and key account managers. The reason for not implementing a sustainability department within each segment Marine, Con-

struction and Industries is due to the importance of collaboration across borders and the strive for a united company where knowledge can easily be shared across segments.

A sustainability department could be used for more than following the plans through, it could also be used to foster further inspiration in development of new systems, where it can provide new perspectives different from efficiency. The sustainability department than act as a part of the initial phases of the product development to provide further insight.

The reason why this is regarded a case of high difficulty is since it requires an opening of a new department within the company, with a dedicated budget and resources. Moreover it needs to be communicated from top management that it in the beginning will need a lot of attention from the organisation. Without the dedication from the employees the department will have difficulties to operate and start the procedures in the action plan. Resulting in a risk of being under valued, ignored and substituted by task perceived to be of higher importance.

4.4 2 years - What projects can be started

At this point the organisation will have a basic understanding for sustainability and started to form an infrastructure. What projects can be started to further develop the sustainability mindset and working processes? The following projects are suggestions of how to proceed with sustainable development.

4.4.1 Generic model - High level of difficulty

Calculations are necessary for presenting the impact that the organisation have on the environment. To be trustworthy with the information that is presented, the information needs to be backed up by accurate calculations. The calculations will also need to be calculated in a certain sense that is similar for all cases. Hence, there is a need for creating a generic model for calculations of the impact that the organisations projects have on the environment. This will support project owners in their process of determine products and services impact. Though it will need support by expertise knowledge within the area. National and international standards for calculations must be taken into consideration. This will take time to develop due to all standards that needs to be considered and to create a standardised model that includes all of these aspects.

The reason behind why this can not be performed earlier is that there will not be enough information available for development of a generic model. This model will also act as a foundation for a lot of other projects that are proposed in this chapter. It will act as a base that backs up other information. When a generic model is developed it can bring confidence to project owners and employees and boost their internal motivation of doing the right thing. It can be perceived as evidence for their contribution.

4.4.2 Environmental case - High level of difficulty

Business cases plays a big role in whether or not a project is going to be performed. It captures the essential information about a project and from that information a decision is going to be made for the projects future. It is possible to do the same thing for the environment. By introducing environmental cases it is possible to determine a projects existence from a sustainable point of view. This can further on be used in the marketing strategy 4.3.3 for sale purposes. Environmental cases can be applied on ongoing projects as well to see if a project needs to improve certain features from a sustainable perspective.

Environmental cases would depend on a generic model 4.4.1 for the calculations in the presented information. To be able to compare different cases there have to be a reference available. It would also be beneficial to have a similar layout for the different cases for future comparison of the impact that is made from the projects. This would also make it less difficult for stakeholders to determine the grade of impact and create a selling point for future business.

4.4.3 The Carbon Clock - Medium/high level of difficulty

The Carbon Clock is a new concept that is constructed to make it visible for the entire organisation the effects of the organisation. The idea is that in a public space that many people visit or see each day there should be a digital clock that visualizes the saving in carbon dioxide that the company contributes to. Once a project start to be shipped to customers, the saving can be displayed. Creating a visual representation of the daily effect that the organisation contributes to. Though not only will the clock account for the savings, but also the the releases from production, logistics and transportation from and to work.

The idea is to design a user friendly interface for smaller input that can be inserted by the employees. The larger inputs are sent to the sustainability department as a change request. Which then after inspection and evaluation inserts the savings or releases.

There are several difficulties with the project ranging from technical, analytical to human problems. Starting with the technical, a digital interface needs to be developed and it would require both time and resources. Secondly the analytical part must be sufficient, meaning that there would be a need for a generic model for calculation of the carbon dioxide releases and savings to make accurate inserts. Furthermore it is dependent on that teams and individuals send in both releases and savings to ensure a reliable model that could be useful in fostering intrinsic motivation even further.

Hence, to implement this project the ideal situation would be to start up a new project with either students as a master thesis or as a project within the organisation. However, before initiating the project it is vital that there is a generic model for calculation of carbon dioxide and that there is resources dedicated for management of the clock once constructed.

If the project is constructed properly there is also a business opportunity to sell the interface and the clock to other organisations that are in similar position as CPAC.

4.5 5 years - What projects can be started

After five years the organisation will have a clear infrastructure regarding sustainability and more profound projects can be initiated. This section will present the projects that are preferred to begin with after approximate a five years period.

4.5.1 LCA - High level of difficulty

The product portfolio that was mentioned earlier makes it possible for all stakeholders to gain more insight in every product on a holistic level, for basic understanding. By performing LCA-analyses on products it is possible to gain a more profound insight in products and services impact on the environment during its life. Though this is a time-consuming activity that is also expensive to perform, it will justify the choices made in the development process. Furthermore it will act as accurate data that truly indicates that CPAC is climate positive.

LCA-analyses could be performed by students to reduce the time and cost that is needed. Though that arguably could be deemed insufficient it is still an option rather than the costly alternative to consultant recruitment, or internal performance of LCA. The benefits with the internal evaluation is that the trace ability of each step will be easier since it is a person that has been a part of the development that is performing the evaluation.

Since it is a time consuming and costly activity it is considered appropriate to first decide if it is necessary, to perform a full scale analysis or if smaller lighter versions could be acceptable. What is the final purpose of data from the analyses?

4.5.2 Process Implementation - High level of difficulty

Implementation of a sustainability process within all projects where aspects regarding sustainability will be taken into consideration will strengthen the mindset that the organisation is trying to create. For that to happen, this process will be treated as natural as all other processes within a project. However, this will need trustworthy and accurate data as well as basic knowledge within sustainability. Nevertheless, it will contribute to making products and services more sustainable and act as guidelines for how to think when developing products and services.

This is regarded as a high level of difficulty. To implement a process that includes a new way of thinking and using another perspective will take time. There are also several other parts that needs to be introduced within the organisation before this can be performed. The basic knowledge is a crucial part that needs to be implemented first. Secondly the trustworthy data, which takes time itself needs to be implemented as well. When everything is in place and a sustainability process could be implemented, the organisation has come a long way. This process implementation could be performed by the sustainability department if that would have been created at this time. In that case the expertise for creating the guidelines for the process will be available in-house.

4.5.3 Green list (Material)- medium level of difficulty

The Green list is an initiative to determine a list of material that is the opposite to the black list from Volvo Group which is a list of all the materials that are not allowed to use in the manufacturing of a product. The Green lists purpose is instead to provide materials that are thought more appropriate to use. A list for suggested materials, where possible partnerships or collaborations are established. The list's purpose is to aid in the process to find sustainable materials, especially for situations where the properties of the material is not the front matter.

The difficulty is that it requires expertise to develop the list. Though if it can be performed internally without the need to hire an external expertise that is not a major issue. Whats important for CPAC is however to develop a list that fulfills the environmental requirements of corrosion, strain, vibrations and more. Hence the development for a complete list requires a well developed list that is adequate for each segment of CPACs industries. Furthermore to function properly, partnerships with the suppliers can further aid in reduction of the prices as well as increased performance and fostering of sustainability.

The reason for why the suppliers would want to enter a partnership or an arrangement, is because of the mutual effect. The suppliers ensures a returning costumer, positive marketing and aids in the sustainability issue. For CPAC it aids in simplifying the process since, frameworks are established and negotiations might not be required more then initially. It eases the development process and material selection process and finally improves the economy and fosters sustainability. Though this is a longer process it is not perceived to be established on a five years basis, rather during a longer time. On the other hand the list of material are approximated to be able to have developed during a five years period.

4.5.4 Green list (Machining) - medium level of difficulty

Similar to the Green list of materials a coexisting list could be established for manufacturing methods. What methods thought to be prioritized and how they could be implemented. The content and the arguments for implementation remains the same as for the material section above. Though what differentiates the two sections is that the materials have properties that can be easier to categorise by and to use for justification of a material. Whereas the machining is bound to be determined with regards to the material selection and the geometry design. Hence if any of the two lists should be prioritized over the other, it is the material selection.

4.6 10 years - What projects are insinuated

After 10 years the organisation will know what they are doing regarding sustainability. The organisation will hopefully have an important role in the market as well as within Volvo Group. What activities and projects are implemented at this time? When the organisation plays a bigger role?

4.6.1 Business Model - High level of difficulty

Already the first step towards the integration of a business model has been implemented and from this point forward it will continue to grow into the heart of the organisation. To develop a fully functional business model takes time and adaptations. Overtime it will no longer feel external and foreign, rather adapted and integrated. To achieve a functional business model that is developed to suit the wide range that sustainability encapsulates, it takes long time, with many iterations and constant revision and changes.
However, the initial step is to approach the complications and the challenges and start to bridge them. After time it will yield a business model with sustainability naturally integrated and supported by the sub functions. The subject sustainability will after time be interpreted as a natural part of the organisation, though initially it might be interpreted as en external factor.
With regards to the long lasting process that needs to be revisited and evaluated regularly it is presumed to be a difficult task. Though also one of the topics of highest importance, since it includes to some extent all the other projects as well.

4.6.2 Recycle - High level of difficulty

When different processes already are implemented in the organisation, a new process could start with taking responsibility over the products and services entire life. What happens with a product after it is taken out of service? Could it still be used as a spare part? Can the parts be melted down and used in new manufacturing processes? Questions like these could be answered through this new process. By this time the organisation will have a bigger understanding of products and their impact on the environment and know where to look for answers. The reason why this is mentioned first in the ten year category is not that the organisation will start to look at it after ten years. It is after ten years that this will become a stable part of the development. This process is dependant on knowledge and calculation guidelines that will have been implemented at this point in time.
This process also connects to the three core values of CPAC, more specifically to take responsibility and to do what is right. Then the organisation have to look at the whole life-cycle of a product and ensure that they do whatever they can to improve their contribution in the aspects of sustainability.

4.6.3 Sustainable Collaboration - High level of difficulty

To increase the positive contribution that CPAC has with regards to sustainability, they can create sustainable collaborations with stakeholders on the market. Stakeholders that corresponds with CPACs view of sustainability and are willing to take the extra step for a positive future. Creating sustainable collaborations will take a long time and will be established continuously. It is difficult to find mutual interests in all cases that all stakeholders can benefit from. However, when collaborations has been introduced it will improve and ease the processes with and between stakeholders.

Sustainable collaborations is a part of the bigger picture. This will create a network where the stakeholders can benefit from each other. Take recycling as an example, end users can not use the parts of a product anymore, the manufacturers can use the material for production of new parts. This and many other benefits can grow out of a sustainable collaboration. This will also contribute to CPACs impact of the products life, and it all started from CPACs initiative of taking responsibility over their products whole life.
Looking back to the Green list and another example of where collaboration can be identified for mutual benefits. Even further back in the plan a collaboration between CPAC and students are mentioned, which also is an indication channel for collaboration. Collaboration through student projects is a great way for integrating students into the industry and showcase how sustainability can be adapted. An agreement where all parties can benefit from the situation.
Concluding, there are many different levels where collaboration can be insinuated. Though it in many cases requires a lot of dedication and energy, it fosters more ideal scenarios in the future. Where new relations can grow together with improved finance and ecology aspects.

4.7 30 years - What is CPAC doing in the future

How is the organisation operating in the future, what are the company focusing during these times? This relates back to the future state of the organisation, and how they would like to be identified then and what actions have been implemented.

4.7.1 CPAC is a precursor of sustainability - High level of difficulty

After numerous years of implementing sustainability, in everything from personal motivation, to development of projects and evaluations of the business. CPAC is now communication and acting as precursor for sustainability. Inspiring the industries to follow, visualising with transparency the effects of the organisation and their contribution. CPAC is identified with sustainable innovation prior to only innovation. This is an ongoing process that does not happen overnight, rather as a result of implementing the action plan and adopting a true path towards sustainability. Hence it is presumed that after integrating sustainability in its various stages CPAC truly exhales their commitment and that other industries recognizes it.

4.8 Concluding the action plan

The action plan presented above is a suggestion for action towards a more sustainable organisation. It requires dedication of resources, time and a strive to pursue integration of sustainability. The action plan that is developed above is regarded a preliminary plan and an adequate first indication of what to do and what can be expected from the company during the upcoming years. However, since the issue of sustainability is a continuously changing topic, the plan need to be revisited on

a yearly basis to ensure the development is going in the right direction. Hence, it requires dedication and evaluation according to the most recent information. Most importantly, the plan must not deviate from where an effect can contribute to the greatest change. The question, What can be done to perform a change that actually contributes to enforcing of sustainability? needs to be frequently asked. The smaller projects needs to receive a lower priority, though not be neglected. Finally the first step has already been initiated, which is the construction of the action plan. Now the need is to fully commit to the plan and adapt it into CPAC.

5
Conclusion

This thesis aimed to increase CPACs awareness related to sustainability and to establish a plan for action, in collaboration with the employees. Already from the initiation of the project the employees were highly involved and integrated in the process, starting with mapping of the organisation. Through dialogues the current situation was established, how they operated and interpreted sustainability in development, communication, marketing and more. The common interpretation was that sustainability was camouflaged by efficiency or could be directly translated into it. That is in many cases true, though if efficiency is changed to a sustainability perspective it could foster a wider thinking pattern, leading to more improvements and ideas. The dialogues also yielded insight in that a lot of things regarding sustainability already is performed at CPAC and works exceptionally. To clarify on the subject of sustainable operations functioning properly, one example is the social aspect that truly is interpreted as inviting and rewarding. Rewarding in the sense that your contribution is valued and not neglected or dismissed into the mass. Though the studies indicated two areas were a change could contribute to a positive change. That areas was the ecology and social aspects of sustainability. One of the most important areas was how sustainability was interpret by the employees, not all employees had the same understanding of what sustainability really is. Another area was the communication of sustainability, which is difficult to realize if the understanding differentiates between employees of CPAC 3.1.

It was also identified that CPACs products functionality have an greater impact on the environment rather than their emissions for manufacturing, transportation and logistics. By focusing on their products functionality, introducing knowledge related to sustainability and foster channels for communication regarding sustainability would yield a positive outcome 3.1.

An opposing statement acting against CPAC and their products are if they denounce the responsibility of the product after it has been installed in a bigger system. Then, why does this count as a positive impact for CPAC? During this thesis the calculations for carbon dioxide measured how a product performed standalone versus with CPACS developed systems. The effects of integrating a system and determining the difference in emissions were considered as positive or negative depending on the results.

Initially during the development of the sustainability policy and the identification of where CPAC wants to be in the future, the employees were participating in the development and justification. Unfortunately the situation related to Covid-19 made it difficult to proceed the interactions with employees. This resulted in a new plan to try to interact with employees over the internet. When that was not possible either

due to the circumstances, a third plan was developed. This plan did not include any further interactions with the employees. The ideas for the action plan therefore had its foundation in the dialogues and the discussion during the iterating process from the development of the sustainability policy. This is not the optimal solution for dealing with the initial problem. Nevertheless, there were material available to create an action plan that was to some extent a collaboration with the organisation, even though it would be preferred to have more interaction with the employees.
The sustainability policy resulted in an accepted policy for how the organisation applies, values and position themselves in the sustainability matter. Moreover, how they are interpreted and positioned on the market, to become moderators for sustainability. They want to lead the market and set an example for those who comes after. More important, how the organisation will continue to contribute with positive impact on carbon dioxide reduction 3.11.
Finally the action plan fulfills the initial goal of the project, by increasing CPACs awareness of sustainability and doing it by conducting the action plan. Fostering internal motivation through a wider range of understanding of their effect on society. Co-developing this action plan to feel integrated, valued and appreciated. The collaboration and communication that been present throughout the development of the action plan, has insinuated the first steps of raising the awareness and establishing a common understanding of what sustainability is and how it is approached by CPAC. Hence to move forward in the area to tap the well of new knowledge, implementation of the action plan is key.

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Appendices

Appendix A: Environmental plan 2018

TAKING CONTROL FORWARD

CPAC SYSTEMS AB
Falkenbergsgatan 3
SE-412 85 Göteborg
Phone: +46 (0)31 352 16 00
Fax: +46 (0)31 352 16 99
www.cpacsystems.se

VAT#: SE556566281001

Miljöplan 2018

Description	Miljöplan för 2018 på CPAC Systems		
Issued by	Marcus Brorsson	**Classification**	Public
Approved by	Marcus Brorsson	**Date**	2018-03-02
Project	Miljöplan 2018	**Revision**	A
Reg. No.	-	**Page**	1 (16)
File	QMS ADM ETC Miljöplan 2018.Docx		

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Title:	Revision:	Classification:	Page:
Miljöplan 2018	A	Public	2(16)

Revision history

Rev	Date	Name	Description
PA1	2018-02-02	Marcus Brorsson	Första utgåva
PA2	2018-03-02	Marcus Brorsson	Mindre uppdateringar
PA3	2018-03-09	Marcus Brorsson	Uppdateringar efter review av ledningsgrupp samt R&D-ledning
A	2018-03-09	Marcus Brorsson	Godkänt

Title:	Revision:	Classification:	Page:
Miljöplan 2018	A	Public	3(16)

TAKING CONTROL FORWARD

Title:	Revision:	Classification:	Page:
Miljöplan 2018	A	Public	4(16)

1. Sammanfattning

Detta är CPACs miljöplan för 2018.

1.1 Syfte

Detta dokument är tänkt som en del i miljöledningssystemet för att beskriva relevanta intressenter, risker & möjligheter samt miljöaspekter för CPAC och visa hur dessa kopplas till CPACs verksamhet, mål och strategi.

1.2 Status

Godkänt.

1.3 References

Ref	Document Name
1	QMS ADM Miljöpolicy Quality Manual Sect(1).pdf
2	QMS ADM Instruction Handling of waste and recycling.doc
3	QMS ADM Policy för resor och utlägg.docx

1.4 Sekretess

Publikt. Tillgängligt för listade intressenter av CPACs miljöarbete.

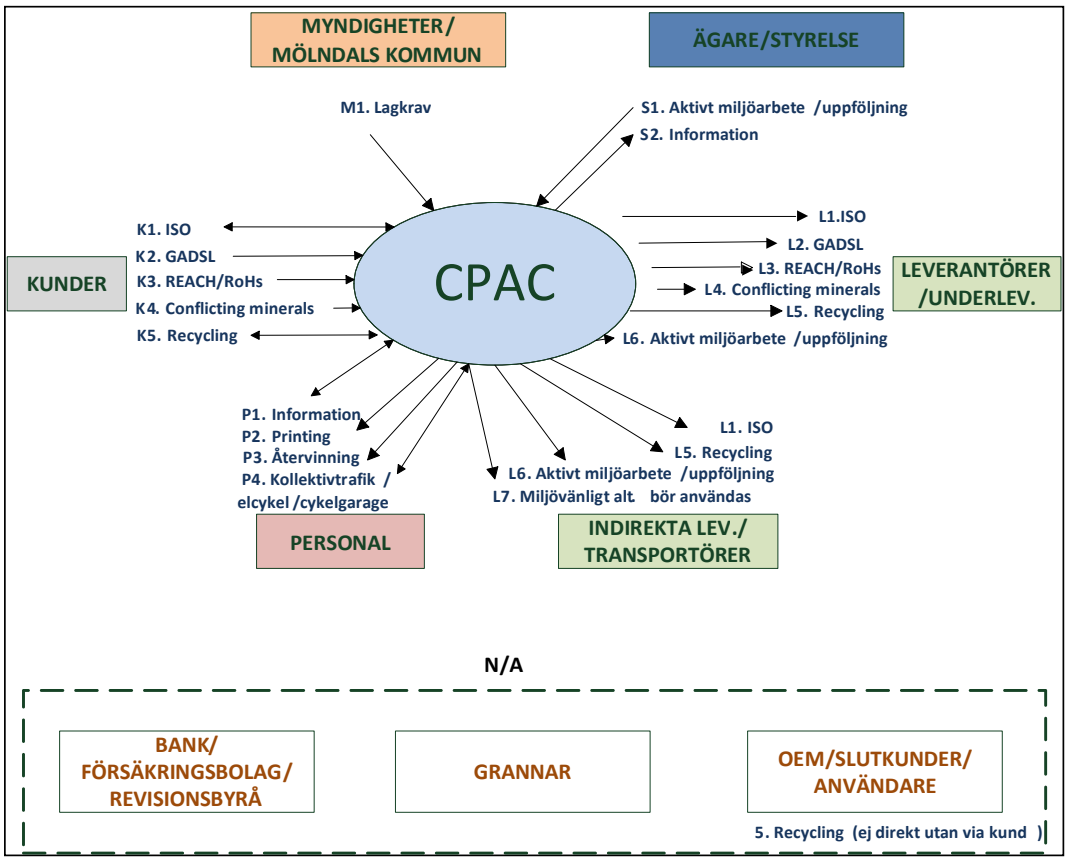
2. Miljöpolicy

Allt miljöarbete på CPAC skall följa de mer generella riktlinjerna listade i CPACs miljöpolicy [1].

Title:	Revision:	Classification:	Page:
Miljöplan 2018	A	Public	6(16)

3. Intressenter, risker & möjligheter

Miljöarbetet på CPAC påverkas av flera olika intressenter. Alla intressenter har olika krav, behov och förväntningar. Relevanta intressenter för CPAC och våra produkter är beskrivna nedan.



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CPAC SYSTEMS AB
Falkenbergsgatan 3
SE-412 85 Göteborg
Phone: +46 (0)31 352 16 00
Fax: +46 (0)31 352 16 99
www.cpacsystems.se

VAT#: SE556566281001

3.1 Intressentanalys

Intressent	Krav/förväntning	Status	Styrning	Detaljerad styrning	Ansvarig
Myndigheter/ Mölndals kommun	M1. Lagkrav dvs. efterlevnad av tillstånd och miljöförfattningar	M1. Årlig återkommande kontroll och uppföljning av lagkrav samt miljökrav.	Via askengrens lagbevakning	M1. Miljörutiner	Marcus Brorsson
Kunder	K1. ISO 14001 K2. GADSL (tidigare svarta/gråa listan) K3. REACH/RoHs K4. Conflicting minerals K5. Recycling	K1. CPAC skall uppfylla och uppfyller krav på ISO14001, motsvarande krav finns på våra kunder även om CPAC specifikt inte ställer detta krav. K2. CPAC uppfyller krav på GADSL. K3. CPAC uppfyller nuvarande krav för REACH/RoHs. Arbetet pågår också för att säkerställa att framtida krav också möts. K4. Efterfrågas enbart idag endast av en kund, status är OK. K5. Inga krav idag på återvinning av produkter från kund då CPAC som leverantör ej säljer till OEM eller slutkund. Kan ev. komma att ändras i takt med nya affärer där CPAC kan komma att sälja direkt till slutkund och därmed få ett större ansvar/åtagande.	Via rutiner och check-listor	K1. Via miljöledningssytem/ miljöplan samt årlig revision. K2. Se produktutvecklingsprocessen där kundkrav och lagkrav följs upp via olika verktyg och gater/checklistor. K3. Se ovan. K4. Se ovan. K5. -	Marcus Brorsson/ Marcus Wingolf
Indirekta leverantörer/ transportörer (t.ex. kontorsmtrl., konsulttjänster)	L1. ISO 14001 L4. Recycling L6. Aktivt miljöarbete/uppföljning L7. Miljövänligt alt. bör användas	L1. För närvarande ställs inte dessa krav på indirekta leverantörer. L4. För närvarande ställs inte dessa krav på indirekta leverantörer. L6. För närvarande ställs inte dessa krav på indirekta leverantörer. L7. Krav på leverantörer av kontors- och städmtrl. att använda miljövänliga alternativ.	Via rutiner	L1. – L4. – L6. – L7. Information vid nyupphandling.	Anders Renstedt

Personal	P1. Återvinning P2. Printing P3. Information/uppföljning ang. internt miljöarbete P4. Kollektivtrafik/ elcykel/cykelgarage	P1. Återvinning sker idag. Regelbundna större städdagar sker där all typ av avfall tas om hand och körs till Renova för återvinning. Även medlem i FTI. P2. Nya skrivare installerade sedan flytt till Krokslätts-fabriker vilket kräver att användare aktivt loggar in på skrivaren och och skriver ut sina dokument vilket leder till färre utskrifter samt högre säkerhet. P3. Information ang. miljöarbete sker i samband med nyanställning då processer och arbetssätt gås igenom samt i viss mån vid frukostmöten men då främst i form av ny funktionalitet som är mer miljösmart. P4. Val av lokaler har skett så att kollektivtrafik är möjlig att nyttja. Elcykelar finns tillgänglig för användning under arbetstid. Cykling till/från jobbet uppmuntras och speciellt cykelgarage finns tillgängligt. CPAC har vunnit västra sveriges bästa cykelarbetsplats två år i rad.	Via rutiner och krav/ förfrågningar från personal som fångas upp av HR alt. teamledare (PU-samtal)	P1. Rutin i QMS. P2. – P3. PU-samtal. P4. Stor del i CPACs värderingar som sätter människan i centrum och att denna ska må bra vilket även bidrar positivt till miljöarbetet	Anders Pihl/Claes Segerfelt
Leverantörer/ underleverantörer	L1. ISO 14001 L2. GADSL (tidigare svarta/gråa listan) L3. REACH/RoHs L4. Conflicting minerals L5. Recycling L6. Aktivt miljöarbete/uppföljning	L1. Samtliga våra större leverantörer och underleverantörer är ISO 14001-certifierade. L2. Samtliga CPACs produkter från lev. och underlev. uppfyller GADSL. L3. Samtliga CPACs produkter från lev. och underlev. uppfyller nuvarande krav för REACH/RoHs. Arbetet pågår också för att säkerställa att framtida krav också möts. L4. – L5. – L6. CPAC kräver och efterfrågar/följer kontinuerligt upp ett aktivt miljöarbete hos samtliga större lev.	Via rutiner och check-listor	L1. Krav i RFQ. L2. Self-assessments. L3. Self-assessments. L4. – L5. – L6. QBR.	Henrik Lindbäck/ Susanna Kinnander

Ägare/Styrelse	S1. Aktivt miljöarbete/uppföljning S2. Information	S1. Med Volvo som ägare krävs ISO 14001 samt ett aktivt miljöarbete. Volvo genomför dock inga egna revisioner på detta utan för CPACs del handlar det om egenkontroll. S2. VD informerar vid styrelsemöten relevant och efterfrågad information ang. miljöarbetet på CPAC.	Via rutiner	S1. QMS. S2. Regelbundna styrelsemöten.	Richard Berkling
OEM/slutkund/ användare	Recycling-krav?	Krav ställs på/från CPACs kunder och ej direkt på/från CPAC.	N/A	-	-
Bank/ försäkringsbolag/ revisionsbyrå	-	Krav ställs på/från Volvo och ej direkt på/från CPAC.	N/A	-	-
Grannar	Inga krav/förväntningar från aktuella grannar		N/A	-	-

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CPAC SYSTEMS AB
Falkenbergsgatan 3
SE-412 85 Göteborg
Phone: +46 (0)31 352 16 00
Fax: +46 (0)31 352 16 99
www.cpacsystems.se

VAT#: SE556566281001

3.2 Djupanalys/identifierande av risker & möjligheter

3.2.1 Myndigheter/Mölndals kommun

Krav från myndigheter och från ”hemkommun” är en självklar del som behöver uppfyllas och regelbundet kontrolleras.

Här finns en uppenbar risk att nya lagar och förordningar missas men för att undvika det används Askengrens lagtjänst där ev. nya krav kommuniceras regelubndet till miljöansvarig samt vid årlig revision i tjänsten.

3.2.2 Kunder

Den intressent, förutom myndigheter, som ställer flest krav på CPAC och våra produkter när det kommer till miljöarbetet. Generellt kan sägas att det nästan uteslutande handlar om ”normala” branschkrav och därmed inte skiljer speciellt mycket mellan olika kunder.

Dessa krav är just krav och måste uppfyllas för att CPAC skall komma i fråga som leverantör och därför också en självklar del som behöver uppfyllas och följas upp regelbundet.

Då CPAC i många fall agerar ”innovatör” åt våra kunder och kommer med förslag på produkter/funktioner som kan göra deras totala erbjudande mer attraktivt och användningen av kundernas produkter mer effektivt och miljövänligt är detta ett av de områden vi ser störst möjligheter att skapa goda affärer parallellt med god miljönytta. Att öka effektiviteten och utnyttjandegraden av våra kunder produkter ligger också väl i linje med CPACs strategi och med vårt stora applikationskunnande är det också i detta område vi har vår styrka.

För att ta till vara på och följa upp denna möjlighet har vi nu även med utvecklandet av mer miljöeffektiva produkter/features som del i ett miljömål inom produktutvecklingsprocessen.

3.2.3 Indirekta leverantörer

Idag ställer CPAC inga direkta krav på indirekta leverantörer med undantag för leverantörer av kontors- och städmaterial där miljövänliga alternativ alltid skall användas.

Transport och våra produkter har en stor miljöpåverkan men då transportören i de flesta fall är kravställd från kund har CPAC inte den påverkansmöjlighet som gör detta område prioriterat.
För paketleveranser används stora, kända företag som har ett aktivt miljöarbete.

I och med att detta område ännu inte prioriterats finns här vissa möjligheter att förbättra och öka relevansen av CPACs miljöarbete.

3.2.4 Personal

Idag finns inget strukturerat sätt för att fånga upp krav och/eller förväntningar från personalen. Inom ramen för CPACs värderingar och kultur finns dock stora möjligheter och befogenheter för personalen att föreslå och genomdriva egna förändringar/förbättringar. Trots detta ser vi här flera till viss del oytnyttjade möjligheter dels till att föda nya tankar/ideér kring hur företagets miljöarbete kan förbättras men även till att skapa en attraktiv arbetsplats då miljö och miljöarbete värdesätts av allt fler när man väljer arbetsplats.

Även om vi inte uttryckligen profilerar CPAC som en miljövänlig arbetsplats finns miljöaspekten konstant i vårt medvetande som en hygienfaktor och företaget gör också mycket som ligger i linje med detta som tex att våra lokaler sedan ett antal år är belägna i ett miljöklassat hus, vår utmärkelse för andra året i rad till västra sveriges cykelvänligaste arbetsplats samt våra regelbundet anordnande städdagar där vi omhändertar och kör iväg vårt avfall till Renova för återvinning.
För oss är detta en självklarhet då det inte bara bidrar till miljön utan också skapar en trivsam och sund arbetsplats.
Ett steg i att omhänderta möjligheten våra anställda besitter är att först och främst bli bättre på att informera om vad vi faktiskt gör för miljön och hur miljöarbete ser ut på CPAC då det tidigare inte alltid varit väl kommunicerat. Därför finns detta nu även upptaget som ett av våra miljömål i produktutvecklingsprocessen.

3.2.5 Leverantörer/underleverantörer

Leverantörer/underlev. upplever oss sedan ett antal år tillbaka som mer kravställande samt informationsefterfrågande när det kommer till deras miljöarbete och deras påverkan på miljön. Detta då vi ser ett förbättrat miljöarbete hos våra leverantörer som en av de absolut största möjligheterna vi har för att minimera miljöpåverkan.

Via CPAC och våra kunder har samtliga våra större leverantörer och underleverantörer kraven på sig om ISO 14001-certifiering och vi följer med regelbundenhet upp detta samt säkerställer att man har ett aktivt och väl fungerande miljöarbete. Vi ser gärna att detta går utöver kraven inom ramen för ISO 14001 och pushar alltid våra leverantörer till att göra mer.

Ett effektivt utnyttjande av våra leverantörers produktion hjälper inte bara miljön i form av minskat råvaruspill och råvaruttag utan ger även CPAC minskade kostnader och ökad kvalitet. För att ta till vara på dessa möjligheter har vi därför flera olika mål inom våra olika processer som skall bidra till just ökad effektivitet och uttnyttjandegrad av produktionen hos våra leverantörer.

3.2.6 Ägare/styrelse

Inga direkta risker eller möjligheter identifierade.

3.2.7 OEM/slutkund/användare

Då CPAC för närvarande inte säljer sina produkter direkt till slutkund och därmed inte heller har ansvaret för produkten i fält har denna intressent begränsat påverkan när det kommer till risker och möjligheter. Givetvis finns möjligheter i att utforma miljöeffektiva produkter/tjänster för att på detta sätt tilltala våra kunders kunder men denna möjligheter har vi i mångt och mycket redan identifierat inom intressenten kunder.

3.2.8 Bank/försäkringsbolag/revisionsbyrå

Inga direkta risker eller möjligheter identifierade.

3.2.9 Grannar

Inga direkta risker eller möjligheter identifierade.

3.3 Sammanfattning risker & möjligheter

Risker	Hantering	Uppföljning	Ansvarig
Nya lagar/förordningar från myndigheter	Askengrens lagbevakning	Reglbundna uppdatering från verktyget samt årlig genomgång	Marcus Brorsson
Nya krav från kunder eller i form av branschkrav	Kontinuerlig övervakning av GADSL och liknande förordningar som reglerar användandet av olika material och substanser En väl fungerande ändringshantering för att snabbt agera på nya krav/regler (CPCN-proceduren)	IMDS Regelbundna CPCN-genomgångar Svarta rummet	Göran Åberg/ Stefan Lundgren
Uppfattas som en oattraktiv arbetsplats utifrån ett miljöperspektiv	Ökad kommunikation internt om CPACs miljöarbete CPACs kultur och värderingar Mål i produktutvecklingsprocessen	PU-samtal	Marcus Brorsson/ Anders Pihl/ Marcus Wingolf

Möjligheter	Hantering	Uppföljning	Ansvarig
Skapa produkter/features som ökar användningsgraden och produktiviteten hos våra kunders produkter/maskiner	Del i CPACs övergripande strategier Mål i utvecklingsprocessen	Regelbundna genomgångar av ledningen, stå-upp dagligen och ledningsmöten varannan vecka Svarta rummet	KAM
Effektiv produktion	Se utvecklingsprocessen samt customer support processen	KPIer Svarta rummet QBR Mål inom utvecklingsprocessen samt customer support processen	Marcus Brorsson/ Marcus Wingolf
Uppfattas som en attraktiv arbetsplats från ett miljöperspektiv	Ökad kommunikation internt om CPACs miljöarbete CPACs kultur och värderingar Mål i produktutvecklingsprocessen	PU-samtal Frukostmöten Kulturdagar	Marcus Brorsson/ Anders Pihl/ Marcus Wingolf

4. Miljöaspekter

Nedan följer de miljöaspekter bedömda att CPAC har möjlighet att styra och påverka.

4.1 Energianvändning

CPAC som enskilt bolag bedriver sin verksamhet i öppna kontorslandskap och har i och med valet av kontor i en miljöklassad byggnad och närvarosensor vid flertalet arbetsplatser väldigt liten energianvändning.
Energianvändingen i kontorslokaler var i snitt 2017 110 kWh/m2 (källa: www.energimyndigheten.se).
För CPACs lokaler som är certifierade enligt miljöbyggnad nivå guld är kravet max 65 kWh/m2 men husvärden har ett mål om max 50 kWh/m2 (källa: www.krokslattsfabriker.se/miljobyggnad-niva-guld).
CPAC har alltså omkring 50% lägre energiförbrukning relativt liknande verksamheter.

CPACs olika produkter produceras runt om i världen i olika fabriker hos partners och underleverantörer som har desto större energianvändning vilket gör deras energianvänding till en mer relevant miljöaspekt.

4.2 Utsläpp

CPAC som enskilt bolag har inga eller väldigt små direkta utsläpp till luft eller vatten vilket även gäller partners och underleverantörers fabriker då maskiner och utrustning som behövs för elektronikproduktion nästan uteslutande handlar om elektriskt driven utrustning.
Därmed är energianvädning en desto mer relevant miljöaspekt.

4.3 Råvaruuttag

CPACs råvaruttag är direkt kopplat till antalet produkter som produceras. Då affärsverksamheten bygger på försäljning av produkter är den relevanta faktorn kring denna miljöaspekt att minska waste och annat onödigt råvaruuttag.

CPAC, som leverantör till fordonsindustrin, har flera lagkrav och standarder kopplade till användandet av olika substanser och ämnen. Det kan handla om ämnen som är helt förbjudna eller ämnen där det tillåtna användandet är begränsat. För att underlätta säkerställandet att detta åtfölja används IMDS vilket är fordonsindustrin databas där samtliga använda ämnen skall rapporteras in. På detta sätt är det även enkelt att identifiera ifall det längre fram kommer nya ämnen och substanser som förbjuds.

4.4 Transporter

4.4.1 Personal till och från jobbet

CPACs lokaler ligger i ett område med goda möjligheter att ta sig till och från jobbet genom att åka kollektivt. CPAC arbetar också väldigt aktivt för att underlätta och uppmuntra till att ta cykeln till jobbet då detta både är bra för miljön och hälsan. CPAC har via detta arbete vunnit priset som västsveriges cyeklvänligaste arbetsplats två år i rad (www.cykelvanligarbetsplats.se).

4.4.2 Tjänsteresor

Då CPAC har partners och leverantörer över hela världen är tjänsteresor inte helt ovanliga. I takt med ny teknik sker dock även många möten med kunder och leverantörer via video- och tele-konferenser.

För resor inom Göteborg uppmuntras att låna cykel och CPAC har bland annat ett par elcyklar för personalen att låna. För lite längre resor i Göteborgsområdet och i dess närhet finns ett antal poolbilar att låna varav flera är elbilar.
Längre resor sker vanligtvis med flyg. CPAC jobbar alltid aktivt med att planera dessa resor på ett så smart sätt som möjligt och hitta synergier mellan olika projekt och aktiviteter för att på så sätt minimera behovet av resandet.
Se även CPAC policy for tjänsteresor för mer information [3]:
https://subversion.cpac.loc/SVN/CPAC_SW/MainTrack/Products/QMS/ADM/QMS%20ADM%20Policy%20f%c3%b6r%20resor%20och%20utl%c3%a4gg.docx

På marknader långt borta med hög närvaro av CPACs kunder och/eller leverantörer finns även egen personal stationerad, detta gäller bland annat USA, Kina och Australien.

4.4.3 Produkt/komponent-transporter

CPAC ansvarar generellt inte för val av transportör eller transportsätt av komponenter till produktion eller producerade produkter. Givetvis kan dock CPAC påverka och förenkla för kunder och leverantörer att välja miljösmarta transporter.

För transporter av paket till och från kontoret används alltid stora leverantörer som aktivt arbetar med miljöfrågor.

4.4.4 Hantering av kemiska produkter

CPAC använder endast en väldigt liten mängd kemiska produkter och hanterar alltid dessa enligt medföljande säkerhetsdatablad för att skydda personal och miljö.

Samtliga säkerhetsdatablad finns även lagrade på en av CPACs servrar för enkel åtkomst:
file://cfil01/gemensam/Säkerhetsdatablad

4.4.5 Avfallsshantering

Allt miljöskadligt avfall återvinns på CPAC i enlighet med instruktion i QMS [2]:
https://subversion.cpac.loc/SVN/CPAC_SW/MainTrack/Products/QMS/ADM/QMS%20ADM%20Instruction%20Handling%20of%20waste%20and%20recycling.doc

5. Betydande miljöaspekter

De miljöaspekter från föregående kapitel som CPAC bedömmer som betydande är:

- Energianvändning:
  Primärt hos våra kunder och leverantörer då CPAC som enskilt bolag har en väldigt låg energianvändning.

- Råvaruuttag:
  Fokus på att minimera waste och onödigt användande.

Kriteriet för denna bedömning är att dessa miljöaspekter bedöms vara de som ger CPACs största miljöpåverkan.

Det finns även en, i kapitel 4 ej nämnd, miljöaspekt CPAC trots allt bedömer vara av betydande karaktär. Att den inte är nämnd är för att det inte är en miljöaspekt CPAC har direkt påverkan på men som trots allt är vad mycket av CPACs affär handlar om, nämligen att öka produktiviteten hos våra kunders produkter.
CPACs kunder tillverkar primärt lastbilar, anläggningsmaskiner, bussar samt drivlinor för marint. CPACs mission säger:

CPAC create products and features that differentiate our clients from their competitors (differentiating technology) and turn these into high-value products (industrialized innovation).

En stor del i att skapa differentierad teknik för våra kunder handlar om att öka produktiviteten hos våra kunders maskiner vilket givetvis också är till stor fördel för milljön. En maskin som ger tex 30% ökad produktivitet är också 30% mer effektiv för miljön. Därmed måste även detta räknas som en betydande miljöaspekt.

5.1 Hantering av betydande miljöaspekter

Nedan följer en summering kring CPACs betydande miljöaspekter samt dessa hantering/uppföljning:

Betydande miljöaspekt	Hantering	Uppföljning	Ansvarig
Energianvändning	Säkerställa aktivt miljöarbete för att minska energianvändningen hos våra leverantörer.	QBR	Susanna Kinnander/ Henrik Lindbäck
Råvaruttag	Se effektiv produktion i kap 3.3. Minska antalet claims och öka hastighet i lösandet av kvalitetscase (mål i customer support processen)	KPIer Svarta rummet QBR Mål inom utvecklingsprocessen samt customer support processen	Marcus Brorsson/ Marcus Wingolf
Differentierad teknik	CPAC mission, del av CPACs strategi	Regelbundna genomgångar av ledningen, stå-upp dagligen och ledningsmöten varannan vecka	Richard Berkling

5.2 Exempel differentierad teknik

För att ge en tydligare bild kring miljönyttan kring den betydande miljöaspekt vi kallar differentierad teknik följer här några exempel på nyligen lanserade features/produkter samt förstudier/projekt som arbetas med för närvarande.

Co-Pilot assist-funktioner:
En rad assist-funktioner för olika typer av anläggninsmaskiner som i snitt ökar produktivitetet med 30% för resp. maskin vilket i sin tur kan översättas till motsvarande miljönytta.

CICU/CICU2
CICU var en av möjliggörarna för Volvos el- och elhybrid-bussar som den enhet som ansvarar för kommunikationen mellan bussen och ladd-stationen.
Nu jobbar CPAC aktivt med att utöka CICU-affären till andra buss-tillverkare för att på så sätt vara en del i att arbeta in en standard och därmed öka användandet av elbussar runt om i världen.

Easy Boating 2.0
Under konceptet easy boating 2.0 tittar CPAC och Volvo Penta bland annat på en helelektrisk drivlina samt en rad olika features/produkter för att förenkla båtanvändandet.

Appendix B: Environmental plan 2019

CPAC SYSTEMS AB
Falkenbergsgatan 3
SE-412 85 Göteborg
Phone: +46 (0)31 352 16 00
Fax: +46 (0)31 352 16 99
www.cpacsystems.se

VAT#: SE556566281001

Miljöplan 2019

Description	Miljöplan för 2019 på CPAC Systems		
Issued by	Marcus Brorsson	**Classification**	Public
Approved by	Marcus Brorsson	**Date**	2019-03-29
Project	Miljöplan 2019	**Revision**	A
Reg. No.	-	**Page**	1 (20)
File	QMS ADM ETC Miljöplan 2019.Docx		

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Title:	Revision:	Classification:	Page:
Miljöplan 2019	A	Public	2(20)

Revision history

Rev	Date	Name	Description
PA1	2019-03-25	Erik Roos	Första utgåva, reviderad variant från 2018
PA2	2019-03-27	Anders Gunne	Uppdaterad med räkneexempel för miljöaspekter
A	2019-03-29	Marcus Brorsson	Granskad och godkänd

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Title:	Revision:	Classification:	Page:
Miljöplan 2019	A	Public	3(20)

Title:	Revision:	Classification:	Page:
Miljöplan 2019	A	Public	4(20)

1. Sammanfattning

Detta är CPACs miljöplan för 2019.

1.1 Syfte

Detta dokument är tänkt som en del i miljöledningssystemet för att beskriva relevanta intressenter, risker & möjligheter samt miljöaspekter för CPAC och visa hur dessa kopplas till CPACs verksamhet, mål och strategi.

1.2 Status

Godkänd.

1.3 References

Ref	Document Name
1	QMS ADM Miljöpolicy Quality Manual Sect(1).pdf
2	QMS ADM Instruction Handling of waste and recycling.doc
3	QMS ADM Policy för resor och utlägg.docx

1.4 Sekretess

Publikt. Tillgängligt för listade intressenter av CPACs miljöarbete.

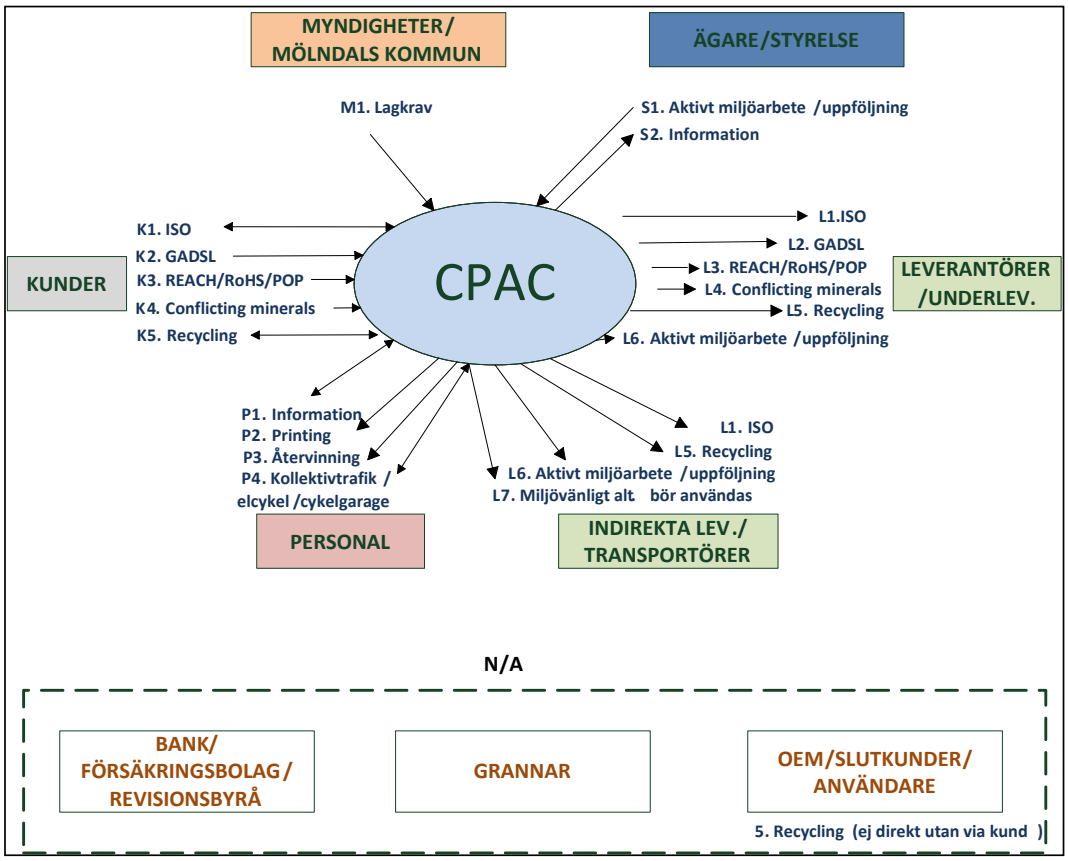
2. Miljöpolicy

Allt miljöarbete på CPAC skall följa de mer generella riktlinjerna listade i CPACs miljöpolicy [1].

Title:	Revision:	Classification:	Page:
Miljöplan 2019	A	Public	6(20)

3. Intressenter, risker & möjligheter

Miljöarbetet på CPAC påverkas av flera olika intressenter. Alla intressenter har olika krav, behov och förväntningar. Relevanta intressenter för CPAC och våra produkter är beskrivna nedan.



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Falkenbergsgatan 3
SE-412 85 Göteborg
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Fax: +46 (0)31 352 16 99
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VAT#: SE556566281001

3.1 Intressentanalys

Intressent	Krav/förväntning	Status	Styrning	Detaljerad styrning	Ansvarig
Myndigheter/ Mölndals kommun	M1. Lagkrav dvs. efterlevnad av tillstånd och miljöförfattningar	M1. Årlig återkommande kontroll och uppföljning av lagkrav samt miljökrav.	Via askengrens lagbevakning	M1. Miljörutiner	Marcus Brorsson
Kunder	K1. ISO 14001 K2. GADSL (tidigare svarta/gråa listan) K3. REACH/RoHS/POP K4. Conflict minerals K5. Recycling	K1. CPAC skall uppfylla och uppfyller krav på ISO14001, motsvarande krav finns på våra kunder även om CPAC specifikt inte ställer detta krav. K2. CPAC uppfyller krav på GADSL. K3. CPAC uppfyller nuvarande krav för REACH/RoHS/POP. Ny lagstiftning och krav övervakas kontinuerligt och implementeras om nödvändigt. K4. Efterfrågas enbart idag endast av en kund, status är OK. K5. I de fall våra kunder ställer det som krav tillhandahålls en återvinningsinstruktion. Detta varierar dock från fall till fall då CPAC som leverantör ej säljer direkt till slutkund samt att fordonsindustrin ej innefattas av WEEE och inte heller ELV (max 3,5 ton).	Via rutiner och check-listor	K1. Via miljöledningssytem/ miljöplan samt årlig revision. K2. Se produktutvecklingsprocessen där kundkrav och lagkrav följs upp via olika verktyg och gater/checklistor. K3. Se ovan. K4. Se ovan. K5. -	Marcus Brorsson/ Marcus Wingolf
Indirekta leverantörer/ transportörer (t.ex. kontorsmtrl., konsulttjänster)	L1. ISO 14001 L4. Recycling L6. Aktivt miljöarbete/uppföljning L7. Miljövänligt alt. bör användas	L1. För närvarande ställs inte dessa krav på indirekta leverantörer. L4. För närvarande ställs inte dessa krav på indirekta leverantörer. L6. För närvarande ställs inte dessa krav på indirekta leverantörer. L7. Krav på leverantörer av kontors- och städmtrl. att använda miljövänliga alternativ.	Via rutiner	L1. – L4. – L6. – L7. Information vid nyupphandling.	Anders Renstedt

Personal	P1. Återvinning P2. Printing P3. Information/uppföljning ang. internt miljöarbete P4. Kollektivtrafik/ elcykel/cykelgarage	P1. Återvinning sker idag. Regelbundna större städdagar sker där all typ av avfall tas om hand och körs till Renova för återvinning. Även medlem i FTI. P2. Nya skrivare installerade sedan flytt till Krokslätts-fabriker vilket kräver att användare aktivt loggar in på skrivaren och och skriver ut sina dokument vilket leder till färre utskrifter samt högre säkerhet. P3. Information ang. miljöarbete sker i samband med nyanställning då processer och arbetssätt gås igenom samt i viss mån vid frukostmöten men då främst i form av ny funktionalitet som är mer miljösmart. P4. Val av lokaler har skett så att kollektivtrafik är möjlig att nyttja. Elcykelar finns tillgänglig för användning under arbetstid. Cykling till/från jobbet uppmuntras och speciellt cykelgarage finns tillgängligt. CPAC har vunnit västra sveriges bästa cykelarbetsplats två år i rad.	Via rutiner och krav/ förfrågningar från personal som fångas upp av HR alt. teamledare (PU-samtal)	P1. Rutin i QMS. P2. – P3. PU-samtal. P4. Stor del i CPACs värderingar som sätter människan i centrum och att denna ska må bra vilket även bidrar positivt till miljöarbetet	Anders Pihl/Claes Segerfelt
Leverantörer/ underleverantörer	L1. ISO 14001 L2. GADSL (tidigare svarta/gråa listan) L3. REACH/RoHS/POP L4. Conflict minerals L5. Recycling/Yield L6. Aktivt miljöarbete/uppföljning	L1. Samtliga våra större (Scanfil, Enics, Wong's, Thorsells) leverantörer och underleverantörer (Hemisphere, Garmin) är ISO 14001-certifierade. L2. Samtliga CPACs produkter från lev. och underlev. uppfyller GADSL. L3. Samtliga CPACs produkter från lev. och underlev. uppfyller nuvarande krav för REACH/RoHs. Arbetet pågår också för att säkerställa att framtida krav också möts. L4. – L5. CPAC har kontinuerlig uppföljning på samtliga produkters yield. Detta förebygger uppkomsten av avfall. Vidare tillhandahålls en Rework Policy som	Via rutiner och check-listor	L1. Krav i RFQ. L2. Self-assessments. L3. Self-assessments. L4. – L5. Uppföljning med leverantörer L6. QBR.	Henrik Lindbäck/ Susanna Kinnander

		främjar återanvändning av delkomponenter vid ev. fel i produktion. L6. CPAC kräver och efterfrågar/följer kontinuerligt upp ett aktivt miljöarbete hos samtliga större lev.			
Ägare/Styrelse	S1. Aktivt miljöarbete/uppföljning S2. Information	S1. Med Volvo som ägare krävs ISO 14001 samt ett aktivt miljöarbete. Volvo genomför dock inga egna revisioner på detta utan för CPACs del handlar det om egenkontroll. S2. VD informerar vid styrelsemöten relevant och efterfrågad information ang. miljöarbetet på CPAC.	Via rutiner	S1. QMS. S2. Regelbundna styrelsemöten.	Richard Berkling
OEM/slutkund/ användare	Recycling-krav?	Krav ställs på/från CPACs kunder och ej direkt på/från CPAC.	N/A	-	-
Bank/ försäkringsbolag/ revisionsbyrå	-	Krav ställs på/från Volvo och ej direkt på/från CPAC.	N/A	-	-
Grannar	Inga krav/förväntningar från aktuella grannar		N/A	-	-

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Falkenbergsgatan 3
SE-412 85 Göteborg
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Fax: +46 (0)31 352 16 99
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VAT#: SE556566281001

3.2 Analys av risker & möjligheter

3.2.1 Myndigheter/Mölndals kommun

Krav från myndigheter och från ”hemkommun” är en självklar del som behöver uppfyllas och regelbundet kontrolleras.

Här finns en uppenbar risk att nya lagar och förordningar missas men för att undvika det används Askengrens lagtjänst där ev. nya krav kommuniceras regelbundet till miljöansvarig samt vid årlig revision i tjänsten.

3.2.2 Kunder

CPACs kunder ställer alla konventionella branschkrav som finns inom fordonsbranschen. Dessa kontrolleras av våra kunder genom exempelvis krav på dokumentation, tester på våra produkter samt revision i produktion.

Till detta tillkommer förväntan och krav på prestanda i våra produkter som bland annat har en påverkan på slutkundens bränsleförbrukning, nyttjandegrad och effektivitet.

CPAC levererar för närvarande cirka 500.000 artiklar per år och totalt finns våra komponenter i storleksordningen miljontals fordon. Alla dessa har mer eller mindre påverkan på fordonens funktionalitet och därmed också en miljömässig verkningsgrad. Förutom nyproduktion kan pågående utveckling också komma befintlig fordonspark tillgodo genom uppdateringar av mjukvara.

Genom innovation av ny funktionalitet och system, inkluderandes både hårdvara och mjukvara, kan CPAC trots sin ringa storlek som företag vara en betydande kraft i samhället för att åstadkomma hållbara och miljömässigt kloka lösningar. Denna innovation är vanligtvis initierad internt av CPAC. Vi skall förstå våra kunders behov och erbjuda värdeskapande produkter inte minst inom ramen för effektivare resursutnyttjande.

Slutsatsen är att här finns stora möjligheter vad gäller CPACs förmåga att positivt påverka miljön.

3.2.3 Indirekta leverantörer

Idag ställer CPAC inga krav på indirekta leverantörer med undantag för leverantörer av kontors- och städmaterial där miljövänliga alternativ alltid skall användas.

Transport av våra produkter till kund har givetvis en miljöpåverkan men då transportören i de flesta fall är kravställd från kunden har CPAC i dessa fall inte någon större möjlighet att påverka detta.

Där CPAC däremot har en möjlighet att påverka är vid transport till vårt centrallager i centrala Europa och då främst genom att välja mer miljövänliga alternativ såsom båt, tåg och lastbil framför flyg.

För mindre paketleveranser används stora, kända företag som har ett aktivt miljöarbete.

3.2.4 Personal

Idag finns inget strukturerat sätt att fånga upp krav och/eller förväntningar från personalen. Inom ramen för CPACs värderingar och kultur finns dock stora möjligheter och befogenheter för personalen att föreslå och genomdriva egna förändringar/förbättringar. Som ett led i detta har det under våren startas ett miljöinitiativ av ett antal medarbetare där man diskuterar CPACs miljöpåverkan och inom vilka områden bolaget kan göra skillnad.

Även om vi inte uttryckligen profilerar CPAC som en miljövänlig arbetsplats finns miljöaspekten konstant i vårt medvetande som en hygienfaktor och företaget gör också mycket som ligger i linje med detta som tex att våra lokaler sedan ett antal år är belägna i ett miljöklassat hus, vår utmärkelse för andra året i rad till västra sveriges cykelvänligaste arbetsplats samt våra regelbundet anordnande städdagar där vi omhändertar och kör iväg vårt avfall till Renova för återvinning.
För oss är detta en självklarhet då det inte bara bidrar till miljön utan också skapar en trivsam och sund arbetsplats.

3.2.5 Leverantörer/underleverantörer

Leverantörer/underlev. upplever oss sedan ett antal år tillbaka som mer kravställande samt informationsefterfrågande när det kommer till deras miljöarbete och deras påverkan på miljön. Detta då vi ser ett förbättrat miljöarbete hos våra leverantörer som en av de absolut största möjligheterna vi har för att minimera miljöpåverkan.

Via CPAC och våra kunder har samtliga våra större leverantörer och underleverantörer kraven på sig om ISO 14001-certifiering och vi följer med regelbundenhet upp detta samt säkerställer att man har ett aktivt och väl fungerande miljöarbete. Vi ser gärna att detta går utöver kraven inom ramen för ISO 14001 och pushar alltid våra leverantörer till att göra mer.

Ett effektivt nyttjande av våra leverantörers produktion hjälper inte bara miljön i form av minskat råvaruspill och råvaruttag utan ger även CPAC minskade kostnader och ökad kvalitet. För att ta till vara på dessa möjligheter har vi därför flera olika mål inom våra olika processer som skall bidra till just ökad effektivitet och nyttjandegrad av produktionen hos våra leverantörer. Exempelvis hålls regelbundet uppföljning på yield för alla produkter nedbrutet på olika produktionssteg.

3.2.6 Ägare/styrelse

Inga direkta risker eller möjligheter identifierade.

3.2.7 OEM/slutkund/användare

Då CPAC för närvarande inte säljer sina produkter direkt till slutkund och därmed inte heller har ansvaret för produkten i fält har denna intressent begränsat påverkan när det kommer till risker och möjligheter. Givetvis finns möjligheter i att utforma miljöeffektiva produkter/tjänster för att på detta sätt tilltala våra kunders kunder men denna möjligheter har vi i mångt och mycket redan identifierat inom intressenten kunder (se ovan).

3.2.8 Bank/försäkringsbolag/revisionsbyrå

Inga direkta risker eller möjligheter identifierade.

3.2.9 Grannar

Inga direkta risker eller möjligheter identifierade.

3.3 Sammanfattning risker & möjligheter

Risker	Hantering	Uppföljning	Ansvarig
Nya lagar/förordningar från myndigheter	Askengrens lagbevakning	Regelbundna uppdatering från verktyget samt årlig genomgång	Marcus Brorsson
Nya krav från kunder eller i form av branschkrav	Kontinuerlig övervakning av GADSL och liknande förordningar som reglerar användandet av olika material och substanser En väl fungerande ändringshantering för att snabbt agera på nya krav/regler (CPCN-proceduren)	IMDS Regelbundna CPCN-genomgångar Svarta rummet	Göran Åberg/ Stefan Lundgren
Uppfattas som en oattraktiv arbetsplats utifrån ett miljöperspektiv	Ökad kommunikation internt om CPACs miljöarbete CPACs kultur och värderingar Mål i produktutvecklingsprocessen	PU-samtal	Marcus Brorsson/ Anders Pihl/ Marcus Wingolf

Möjligheter	Hantering	Uppföljning	Ansvarig
Skapa produkter/features som ökar användningsgraden och produktiviteten hos våra kunders produkter/maskiner	Del i CPACs övergripande strategier Miljöinitiativ	Regelbundna genomgångar av ledningen, stå-upp dagligen och ledningsmöten varannan vecka Svarta rummet	KAM Marcus Brorsson
Effektiv produktion	Se utvecklingsprocessen samt customer support processen	KPIer Svarta rummet QBR Mål inom utvecklingsprocessen samt customer support processen	Marcus Brorsson/ Marcus Wingolf
Produkttransporter (från leverantör)	Välja båt/tåg/lastbil framför flyg	Stå-upp möten (logistik)	Marcus Brorsson
Uppfattas som en attraktiv arbetsplats	Ökad kommunikation internt om CPACs miljöarbete	PU-samtal Frukostmöten	Marcus Brorsson/ Anders

Title:	Revision:	Classification:	Page:
Miljöplan 2019	A	Public	13(20)

från ett miljöperspektiv	CPACs kultur och värderingar Mål i produktutvecklingsprocessen	Kulturdagar	Pihl/ Marcus Wingolf

4. Miljöaspekter

Nedan följer en genomgång av de miljöaspekter som bedömts relevanta för CPAC och dess aktiviteter. För att avgöra en aktivitets miljöpåverkan har fyra olika kriterier tagits i beaktande.

1. Energianvändning
2. Utsläpp (i form av C02)[1]
3. Råvaruuttag
4. Avfall (inkl. farligt avfall)

Värt att notera är att energianvändning i sig inte är ett miljöproblem så länge energin kommer för förnyelsebara energikällor som t.ex. solenergi. Dock leder nästan all energianvändning idag till någon grad av utsläpp (kriterium 2) men varierar kraftigt i olika delar av världen. T.ex. så har Sverige relativt ”grön” el där 1 kWh ger ca 37g C02 medan motsvarande siffra i t.ex. Slovakien är 203g C02 och i Polen 676g C02 (https://www.electricitymap.org/?page=map&solar=false&remote=true&wind=false). I denna genomgång hanteras dock energianvändning som ett eget kriterium och ev. omräkning sker endast för jämförelse.

Vidare har analysen delats upp i två delar där den första fokuserar på den miljöpåverkan som CPACs personal har genom sitt arbete, och den andra fokuserar på den miljöpåverkan de produkter bolaget tar fram har genom sin livscykel.

4.1 Miljöaspekter för CPACs personal

4.1.1 Transporter till och från jobbet

CPACs lokaler ligger i ett område med goda möjligheter att ta sig till och från jobbet genom att åka kollektivt. CPAC arbetar också väldigt aktivt för att underlätta och uppmuntra till att ta cykeln till jobbet då detta både är bra för miljön och hälsan. CPAC har via detta arbete vunnit priset som västsveriges cykelvänligaste arbetsplats två år i rad (www.cykelvanligarbetsplats.se).

Vad gäller transporter anses aktiviteten påverka miljön i form av utsläpp och bedömningen är att:

- 1/3 cyklar (inget utsläpp per person)
- 1/3 åker kollektivt (försumbart utsläpp per person)
- 1/3 kör bil, d.v.s. ca 50 personer, och ca 3 mil om dagen vilket ger ca 50*3*226*0,5[2] = 17.000l * 2,5[3] = **42.000 kg C02 / år**

4.1.2 Tjänsteresor

Då CPAC har partners och leverantörer över hela världen är tjänsteresor inte helt ovanliga. I takt med ny teknik sker dock även många möten med kunder och leverantörer via video- och tele-konferenser.

För resor inom Göteborg uppmuntras att låna cykel och CPAC har bland annat ett par elcyklar för personalen att låna. För lite längre resor i Göteborgsområdet och i dess närhet finns ett antal poolbilar att låna varav flera är elbilar.

[1] Även andra utsläpp som t.ex. marknära partiklar och kväveoxider uppstår vid förbränning men i dessa beräkningar tas enbart C02 i beaktande
[2] Ungefärlig bränsleförbrukning för en förbränningsmotor i en bil/lastbil
[3] Ungefärligt C02-utsläpp per liter bensin/diesel

Längre resor sker vanligtvis med flyg. CPAC jobbar alltid aktivt med att planera dessa resor på ett så smart sätt som möjligt och hitta synergier mellan olika projekt och aktiviteter för att på så sätt minimera behovet av resandet.
Se även CPAC policy for tjänsteresor för mer information [3]:
https://subversion.cpac.loc/SVN/CPAC_SW/MainTrack/Products/QMS/ADM/QMS%20ADM%20Policy%20f%c3%b6r%20resor%20och%20utl%c3%a4gg.docx

På marknader långt borta med hög närvaro av CPACs kunder och/eller leverantörer finns även egen personal stationerad, detta gäller bland annat USA, Kina och Australien.

Även denna aktivitet anses påverka miljön genom utsläpp och här har bedömningen gjorts att det är framförallt flygresor som står för utsläppen. Antagandet är att:

- Ca 1/4 CPACs personal flyger 1-2 gånger per år = 37 * 1.5 = 55 flygresor
- Genomsnittsresan bedöms vara ca 250 mil och genom att använda sig av kalkylatorn på https://www.icao.int/environmental-protection/CarbonOffset/Pages/default.aspx resulterar en sådan T&R resa i ca 200kg C02 per person
- Detta ger 55 * 200 = **11.000 kg C02 / år**

4.1.3 Kontor

CPAC som enskilt bolag bedriver sin verksamhet i öppna kontorslandskap och har i och med valet av kontor i en miljöklassad byggnad och närvarosensor vid flertalet arbetsplatser väldigt liten energianvändning.
Energianvändningen i kontorslokaler var i snitt 2017 110 kWh/m2 (källa: www.energimyndigheten.se).
För CPACs lokaler som är certifierade enligt miljöbyggnad nivå guld är kravet max 65 kWh/m2 men husvärden har ett mål om max 50 kWh/m2 (källa: www.krokslattsfabriker.se/miljobyggnad-niva-guld).
CPAC har alltså omkring 50% lägre energiförbrukning relativt liknande verksamheter.

- Energianvändningen för CPACs kontor, som är ca 2000 m2 är således 50 * 2000 = **100.000 kWh / år** (detta motsvarar ca **3.700 kg C02** i Sverige och får anses som lite)

4.1.4 Hantering av kemiska produkter

CPAC använder endast en väldigt liten mängd kemiska produkter och hanterar alltid dessa enligt medföljande säkerhetsdatablad för att skydda personal och miljö.

Samtliga säkerhetsdatablad finns även lagrade på en av CPACs servrar för enkel åtkomst:
file://cfil01/gemensam/Säkerhetsdatablad

- Bedömningen är att CPACs hantering av kemiska produkter resulterar i en försumbar mängd farligt avfall.

4.1.5 Avfallsshantering

Allt miljöskadligt avfall återvinns på CPAC i enlighet med instruktion i QMS [2]:
https://subversion.cpac.loc/SVN/CPAC_SW/MainTrack/Products/QMS/ADM/QMS%20ADM%20Instruction%20Handling%20of%20waste%20and%20recycling.doc

- Bedömningen är att CPACs hantering av miljöskadligt avfall resulterar i en försumbar mängd farligt avfall.

4.2 Miljöaspekter för CPACs produkter (under sin livscykel)

En typisk produkt som CPAC levererar har en (något förenklad) livscykel enligt:

Råvaruuttag -> Produktion -> Transport -> Användning -> Återvinning

4.2.1 Råvaruuttag

CPACs råvaruttag är direkt kopplat till antalet produkter som produceras. Då affärsverksamheten bygger på försäljning av produkter är den relevanta faktorn kring denna miljöaspekt att minska avfallet och annat onödigt råvaruuttag samt se till att produkterna är effektiva i sin konstruktion och håller hög kvalité. Genom smarta och effektiva konstruktioner kan mängden komponenter hållas nere och hög kvalité borgar för att produkterna inte behöver bytas ut i onödan.

CPAC, som leverantör till fordonsindustrin, har flera lagkrav och standarder kopplade till användandet av olika substanser och ämnen. Det kan handla om ämnen som är helt förbjudna eller ämnen där det tillåtna användandet är begränsat. För att underlätta säkerställandet att detta åtfölja används IMDS vilket är fordonsindustrin databas där samtliga använda ämnen skall rapporteras in. På detta sätt är det även enkelt att identifiera ifall det längre fram kommer nya ämnen och substanser som förbjuds.

- Denna aktivitet har en ganska uppenbar påverkan på råvaruuttag och som tidigare nämnts producerar CPAC ca 500.000 artiklar / år.
- Artiklarna väger från 0,1kg till ca 10 kg och medelartikeln bedöms väga ca 0.5kg vilket ger ett totalt råvaruuttag på: **250.000 kg**

Då råvaruuttaget är i storleksordningen 250 ton och många av de ämnen som ingår i elektronikproduktion är sällsynta ämnen anses råvaruuttaget högt. Värt att notera är också att det indirekta råvaruuttaget är avsevärt större än denna siffra (om än svårare att räkna på) då det t.ex. går åt stora mängder vatten att producera elektronik.

4.2.2 Produktion

CPACs produkter produceras runt om i världen i olika fabriker hos partners och underleverantörer som framförallt har stor energianvändning i form produktionsutrustning. Vidare kan det vid elektronikproduktion förekomma användning av miljöfarliga ämning vid t.ex. lackning och tvätt av mönsterkort. Som ett Volvobolag har dock CPAC högt ställda krav (t.ex. genom REACH och RoHS) på vilka ämnen som får användas och därför görs bedömningen att den största miljöpåverkan kommer från tidigare nämnda energianvändning.

- I detta fall har antagandets gjort att en typisk CPAC-komponent motsvarar ca 1/2 laptop i form av komplexitet och storlek.
- Enligt en studie (https://www.networkworld.com/article/2229029/computer-factories-eat-way-more-energy-than-running-the-devices-they-build.html) gick det åt ca 1000 kWh att producera en laptop är 2011 vilket antas ha halverats till 2019 till 500 kWh.
- Det skulle betyda ca 500 * 0,5 = **250 kWh / produkt**
- CPACs största producenter ligger i Slovakien och Polen och i dessa länder motsvarar denna siffra **50kg resp. 170 kg C02 / produkt**

Eftersom CPAC producerar i storleksordningen 500.000 produkter / år är slutsatsen att energianvändning vid produktion är hög (och påverkar miljön i ytterligare utsträckning när tillverkningen sker i Polen).

4.2.3 Transporter

CPAC ansvarar generellt inte för val av transportör eller transportsätt av komponenter till produktion eller producerade produkter. Givetvis kan dock CPAC påverka och förenkla för kunder och leverantörer att välja miljösmarta transporter och då främst båt, tåg och lastbil framför flyg.

För transporter av paket till och från kontoret används alltid stora leverantörer som aktivt arbetar med miljöfrågor.

- Transporter genererar framförallt utsläpp i form av C02 och ungefärliga värden är (https://en.wikipedia.org/wiki/Environmental_impact_of_transport):

Typ	kg CO2 / kgkm
Flyg	0,000504
Lastbil	0,0001058
Tåg	0,0000655
Båt	2,51875E-05

- Antag att genomsnittsprodukten transporteras totalt ca 200 mil från produktion till kund och att transporten sker med lastbil. Detta ger 250.000 kg (från ovan) * 2000 * 0,0001058 = **53.900 kg C02 / år**
- Detta är i storleksordningen lika mycket utsläpp som transporter för CPACs personal (42.000 + 11.000 = 53.000kg) per år.

4.2.4 Användning

Användningen av CPACs produkter får anses ha en stor miljöpåverkan (och då i form av utsläpp) då de nästan uteslutande sitter i fordon med en förbränningsmotor. Man skulle kunna argumentera för att produkterna i sig, som är elektriskt styrda, inte själva leder till någon förbränning av fossila bränslen (det är bara motorn som gör det) men i denna analys anses elektroniken ha så pass stor påverkan på framdriften och nyttjandet av fordonet att det inte går att särskilja.

Samtidigt, just eftersom CPACs produkter har så pass stor påverkan på fordonet, har bolaget en stor möjlighet att påverkan energianvändning hos våra slutkunder. Smarta lösningar som kan reducera bränsleförbrukningen eller öka effektiviteten hos fordonen får direkt en stor positiv nettoeffekt för miljön.

I detta exempel har tre typiska fordon valts, ett från varje segment, där CPACs elektronik används:

1. Marine – 2 x Volvo Penta D4 fritidsbåt
   - En fritidsbåt antas användas ca 60h per år
   - En D4 förbrukar ca 31l/h vid 2000rpm
   - 31 * 60 * 2 = 3720 l/år = **9.300 kg C02 / år**
2. Industri – Volvo FH 460 lastbil
   - En lastbil antas köra ca 6.000mil/år
   - En duktig chaufför kan köra på ca 2,6l/mil (https://www.volvotrucks.com/en-ig/trucks/volvo-fh-series/performance/jastim.html)
   - 6000 * 2,6 = 15.600l/år = **39.000 kg C02 / år**
3. Construction – L180G hjullastare
   - En hjullastare antas användas ca 8h dag, 5 dagar i veckan, 40 veckor om året
   - En L180G förbrukar ca 19l/h

- 19 * 8 * 5 * 40 = 30.400l/år = **76.000 kg C02 / år**

Då dessa räkneexempel endast tar i beaktande användningen av ETT fordon är slutsatsen att utsläppen vid användningen av CPACs produkter är höga. T.ex. släpper en FH 460 lastbil och en L180G hjullastare ut mer C02 än vad alla transporter av personal och produkter genererar tillsammans.

4.2.5 Återvinning

Som tidigare nämnts har säljer CPAC inte sina produkter till slutkund och har därför heller ingen direkt påverkan på vad som händer med produkterna i slutet på livscykeln. Det bolaget däremot gör är att tillhandahålla en återvinningsinstruktion i de fall kunden kräver det för att underlätta vid återvinning.

- Bedömningen är att CPACs har en begränsad möjlighet att påverka återvinningen av de produkter som levereras utom att välja miljövänliga och återvinningsbara alternativ i konstruktionen.

5. Betydande miljöaspekter

Nedan följer en sammanfattning av de miljöaspekter som anses vara relevanta för CPAC baserat på de fyra urvalskriterierna:

	Energianvändning	Utsläpp	Råvaruuttag	Avfall
CPACs personal				
Transporter	-	Låg	-	-
Tjänsteresor	-	Låg	-	-
Kontor	Låg	-	-	Låg
Kemiska produkter	-	-	-	Låg
Avfall	-	-	-	Låg
CPACs produkter				
Råvaruuttag	-	-	**Hög**	-
Produktion	**Hög**	Låg	-	Låg
Transporter	-	Låg	-	-
Användning	-	**Hög**	-	-
Återvinning	-	-	-	Låg

5.1 Mappning

För att avgöra vilka av de ovanstående miljöaspekter som bedöms som betydande för CPAC har en kartläggning av dessa gjorts mot FNs 17 mål för hållbar utveckling. Viktning har tagits till omfattning på CPACs miljöpåverkan.

Följande av FNs mål anses vara av relevans för CPAC:

- Hållbar industri, innovationer och infrastruktur (Nr 9)
- Hållbara städer och samhällen (Nr 11)
- Hållbar konsumtion och produktion (Nr 12)
- Bekämpa klimatförändringarna (Nr 13)

Med bakgrund av detta och tidigare analys av CPACs miljöaspekter är följande kategorier att anse som betydande:

1. Råvaruuttag för tillverkning
2. Energianvändning i produktion
3. Utsläpp vid användning av produkter

5.2 Hantering av betydande miljöaspekter

Nedan följer en summering kring CPACs betydande miljöaspekter samt hantering/uppföljning av dessa:

Betydande miljöaspekt	Hantering	Uppföljning	Ansvarig
Råvaruuttag	Säkerställa effektiv produktion med minimalt avfall och miljömässigt bra materialval Minska antalet claims och öka hastighet i lösandet av kvalitetscase (mål i customer support processen)	KPIer (yield etc) Svarta rummet QBR Mål inom utvecklingsprocessen samt customer support processen	Marcus Brorsson/ Marcus Wingolf
Energianvändning	Säkerställa aktivt miljöarbete för att minska energianvändningen hos våra leverantörer.	QBR	Susanna Kinnander/ Henrik Lindbäck
Utsläpp vid användning av produkter	Nya innovationer och teknik som bidrar till miljömässigt positiva effekter (se fördjupning nedan).	Regelbundna genomgångar av ledningen, stå-upp dagligen och ledningsmöten varannan vecka	Richard Berkling

5.3 Positiva effekter av innovation

Det är tydligt att CPAC genom sina produkter har en relativt stor påverkan på miljön men det är också därför bolaget har möjlighet att påverka miljön genom förbättringar av dessa. Nedan följer några positiva exempel på funktionalitet där CPAC genom sin innovation bidrar positivt till miljön.

- Marine - IPS-drev
  - Bränslebesparing på 30% jämfört med konventionella marina propellersystem.
  - CPAC säljer ca 2.000 IPS-system per år vilket ger en total besparing på 9.300 (se räkneexempel ovan) * 2.000 * 0,3 = **5.580 ton C02 / år!**
- Industri - CICU
  - En del av en systemlösning för att möjliggöra elektrisk framdrift av bussar
  - Bränsleförbrukningen för en dieselbuss är ungefär densamma som för en lastbil (2,6l / mil) och energiförbrukningen för en elbuss ligger på ca 10 kWh / mil
  - Om bussen kör i Sverige blir besparingen då ungefär 2,6 * 2,5 (C02 per mil för en diesel) – 10 * 0,037 (C02 per kWh i Sverige) = 6,13 kg CO2 / mil
  - Om bussen kör ca 6000 mil / år och CPAC säljer 100 CICU-system per år ger det en besparing på 6000 * 100 * 6,4 = **3.680 ton C02 / år**
- Construction - Co-Pilot Load-assist
  - Ca 1500 hjullastare beräknas öka sin effektivitet med ca 25 % med denna funktionalitet
  - Detta motsvarar 76.000 * 1500 * 0,25 = **28.500 ton C02 / år!**

Appendix C: Meeting Agendas

Meeting Agendas

KAM

1. How do you look at sustainability?
2. Where do you want to be in the future?
3. Market potential
    a. Selling point (carbon dioxide)
    b. Possibly the 17 sustainable development goals
4. Trends on the market
5. Competitors? -> market leading
6. Active implementation of sustainability approach in R&D, what do you do? What do you see that others should do?
7. Priority sustainability vs economy, what are you willing to choose vs clients
8. Where is potential? (functions)
9. What is the client's needs/expectations?
10. How does the customer receive the sustainability approach?
11. Motivation internally (communication)
12. How is the environmental policy handled today?
13. What do you see as your responsibility?
14. Introduction of new functions, whose responsibility?
15. Integration and not an add-on
16. Fundamental values, human, responsibility, value creation
17. Calculations, computations
18. Marketing materials to us

Use Case

1. Possible scenarios, current uses
2. What is the goal?
    a. Improvement?
    b. Positive/negative effects?
3. Potential improvements directly connected to sustainability
    a. Where do you see the best potential for improvement?
    b. Future improvements and updates?
4. Usage as stand-alone vs connected/site equal potential?
5. Is sustainability actively coomunicated?
6. CPAC values
    a. Human, responsibility, value creation
7. Numbers
    a. Market potential %
    b. Current position %
    c. Volume
    d. Effectivity studies, business case

Management

Vision

1. Where do you see CPAC in the future?

Human

2. How is sustainability communicated today, what does it look like?
3. Who should you impact? Internally and externally?
4. Is there consciousness in-house?

Responsibility

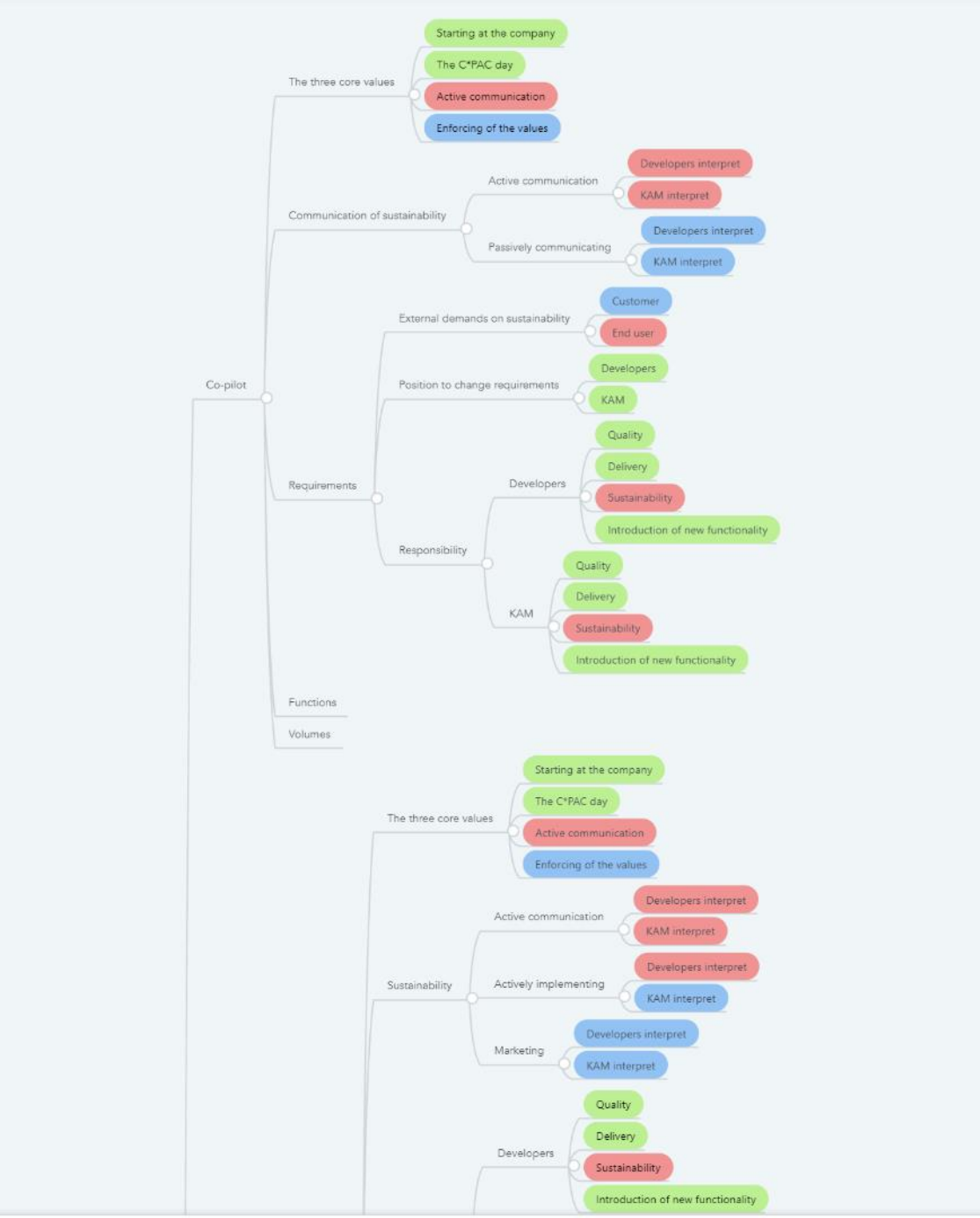
5. What is CPACs responsibility?
    a. Towards the community?
    b. Volvo
    c. Internally
6. What is your responsibility

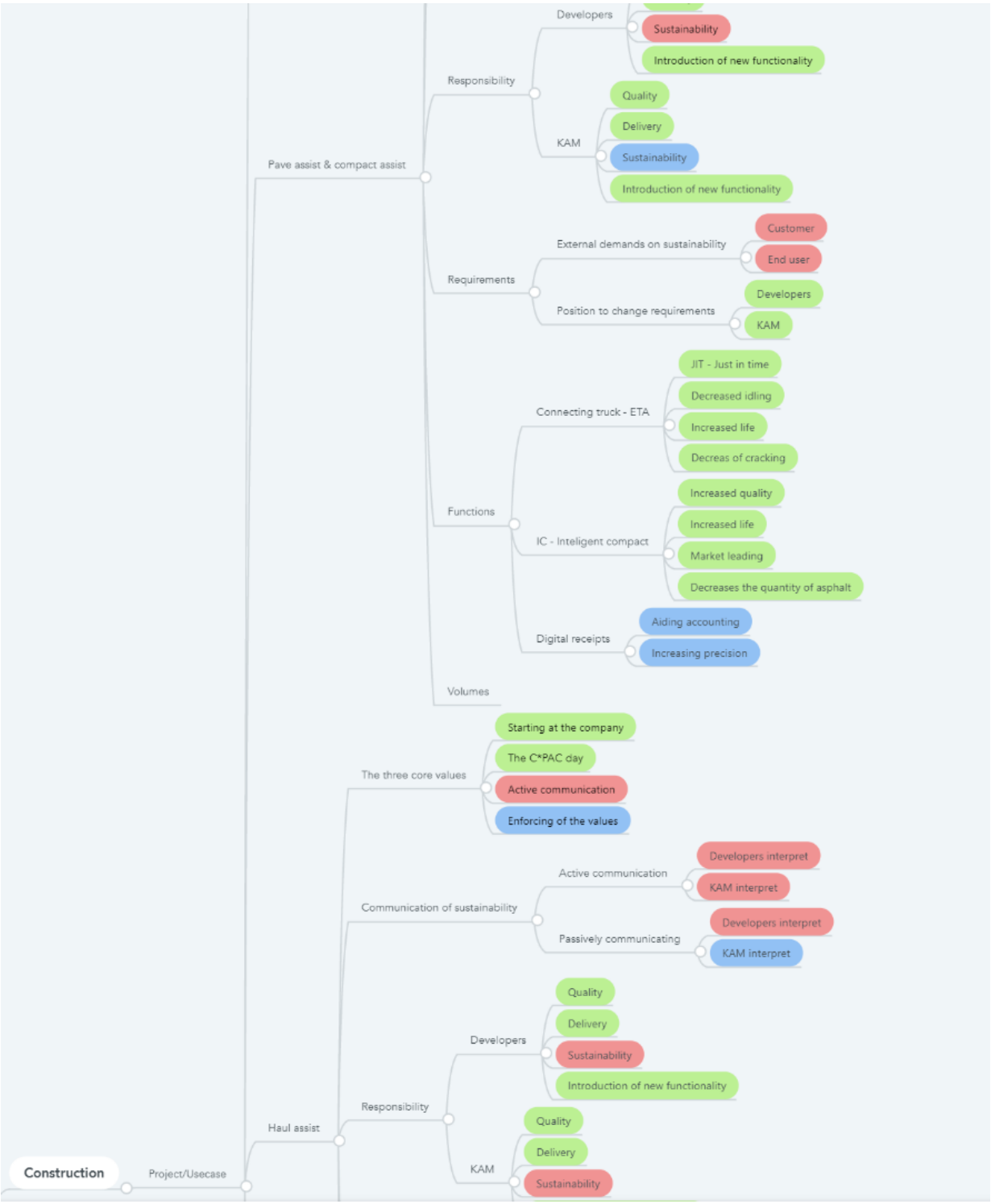
Value Creation

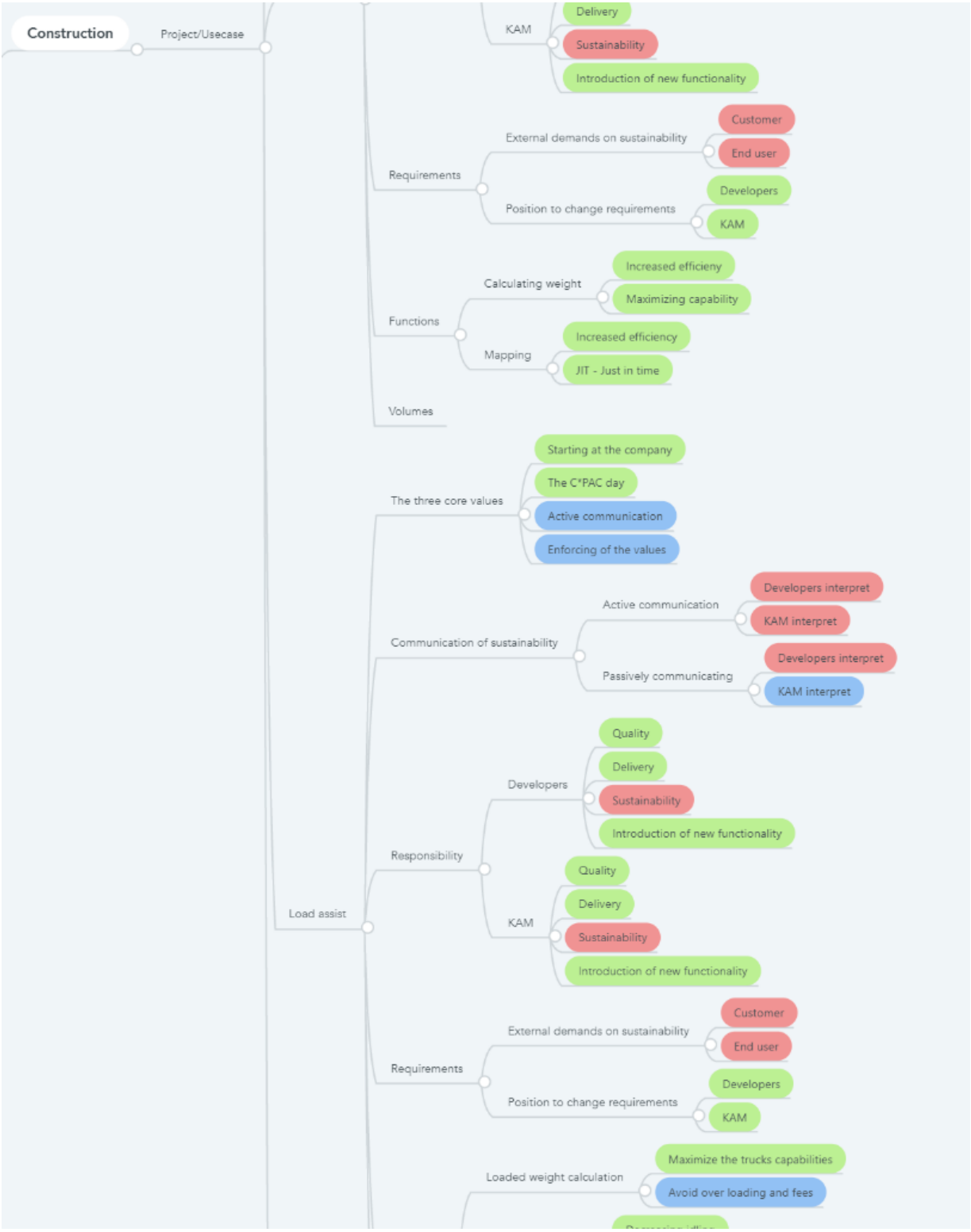
What is Value Creation?

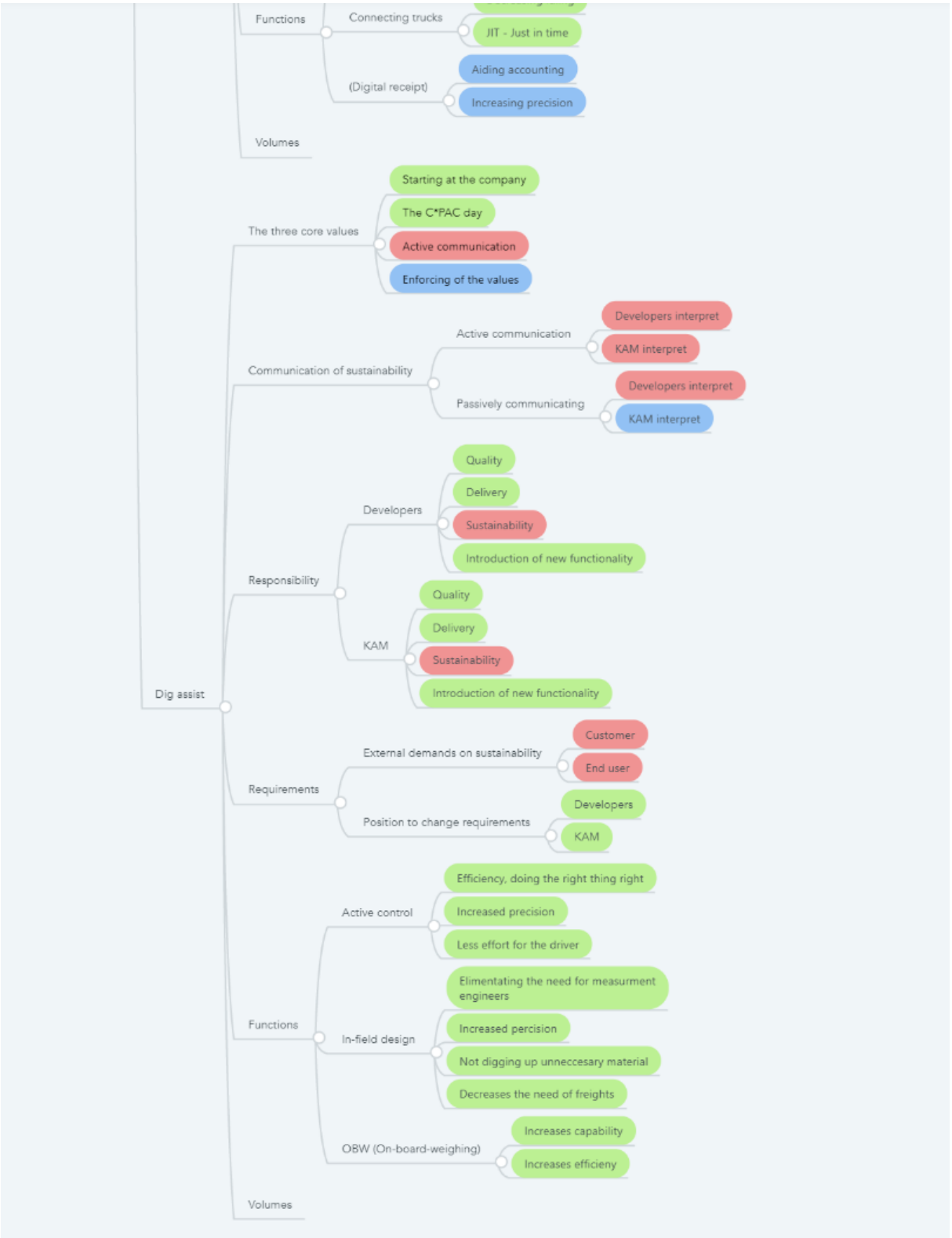
Who are the customers primarily?

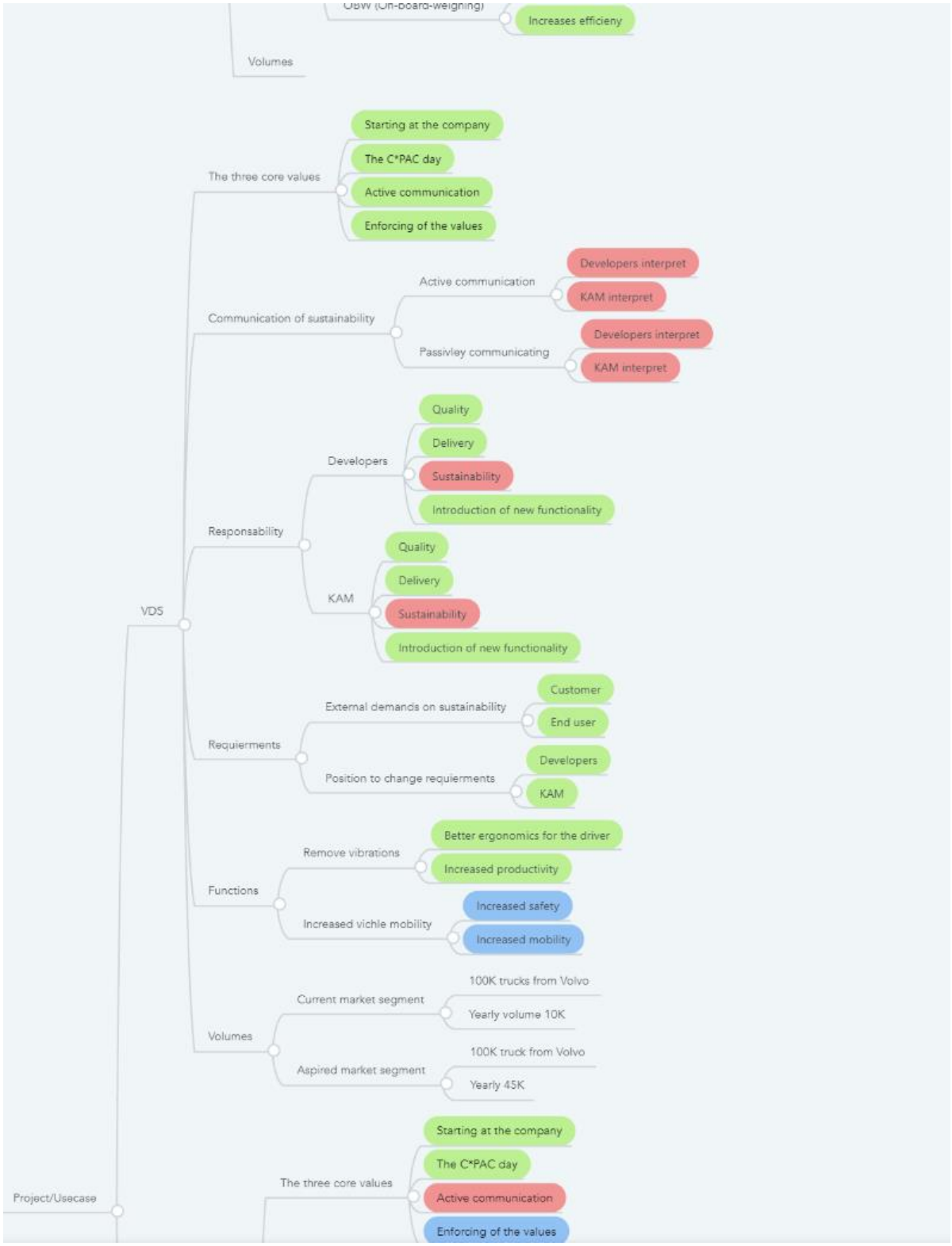
Appendix D: The map




Construction
Project/Usecase
Pave assist & compact assist
Responsibility
Developers
Sustainability
Introduction of new functionality
KAM
Quality
Delivery
Sustainability
Introduction of new functionality
Requirements
External demands on sustainability
Customer
End user
Position to change requirements
Developers
KAM
Functions
Connecting truck - ETA
JIT - Just in time
Decreased idling
Increased life
Decreas of cracking
IC - Inteligent compact
Increased quality
Increased life
Market leading
Decreases the quantity of asphalt
Digital receipts
Aiding accounting
Increasing precision
Volumes
Haul assist
The three core values
Starting at the company
The C*PAC day
Active communication
Enforcing of the values
Communication of sustainability
Active communication
Developers interpret
KAM interpret
Passively communicating
Developers interpret
KAM interpret
Responsibility
Developers
Quality
Delivery
Sustainability
Introduction of new functionality
KAM
Quality
Delivery
Sustainability


Construction
Project/Usecase
KAM
Delivery
Sustainability
Introduction of new functionality
Requirements
External demands on sustainability
Customer
End user
Position to change requirements
Developers
KAM
Functions
Calculating weight
Increased efficieny
Maximizing capability
Mapping
Increased efficiency
JIT - Just in time
Volumes
Load assist
The three core values
Starting at the company
The C*PAC day
Active communication
Enforcing of the values
Communication of sustainability
Active communication
Developers interpret
KAM interpret
Passively communicating
Developers interpret
KAM interpret
Responsibility
Developers
Quality
Delivery
Sustainability
Introduction of new functionality
KAM
Quality
Delivery
Sustainability
Introduction of new functionality
Requirements
External demands on sustainability
Customer
End user
Position to change requirements
Developers
KAM
Loaded weight calculation
Maximize the trucks capabilities
Avoid over loading and fees


Functions
Connecting trucks
JIT - Just in time
(Digital receipt)
Aiding accounting
Increasing precision
Volumes
The three core values
Starting at the company
The C*PAC day
Active communication
Enforcing of the values
Communication of sustainability
Active communication
Developers interpret
KAM interpret
Passively communicating
Developers interpret
KAM interpret
Responsibility
Developers
Quality
Delivery
Sustainability
Introduction of new functionality
KAM
Quality
Delivery
Sustainability
Introduction of new functionality
Dig assist
Requirements
External demands on sustainability
Customer
End user
Position to change requirements
Developers
KAM
Functions
Active control
Efficiency, doing the right thing right
Increased precision
Less effort for the driver
In-field design
Elimentating the need for measurment engineers
Increased percision
Not digging up unneccesary material
Decreases the need of freights
OBW (On-board-weighing)
Increases capability
Increases efficieny
Volumes


OBW (On-board-weighing)
Increases efficieny
Volumes
Starting at the company
The C*PAC day
The three core values
Active communication
Enforcing of the values
Developers interpret
Active communication
KAM interpret
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Developers interpret
Passivley communicating
KAM interpret
Quality
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Sustainability
Introduction of new functionality
Responsability
Quality
Delivery
KAM
Sustainability
VDS
Introduction of new functionality
Customer
External demands on sustainability
End user
Requierments
Developers
Position to change requierments
KAM
Better ergonomics for the driver
Remove vibrations
Increased productivity
Functions
Increased safety
Increased vichle mobility
Increased mobility
100K trucks from Volvo
Current market segment
Yearly volume 10K
Volumes
100K truck from Volvo
Aspired market segment
Yearly 45K
Starting at the company
The C*PAC day
The three core values
Active communication
Project/Usecase
Enforcing of the values


ndustrie
Project/Usecase
Connecting trucks
The three core values
Starting at the company
The C*PAC day
Active communication
Enforcing of the values
Sustainability
Active communication
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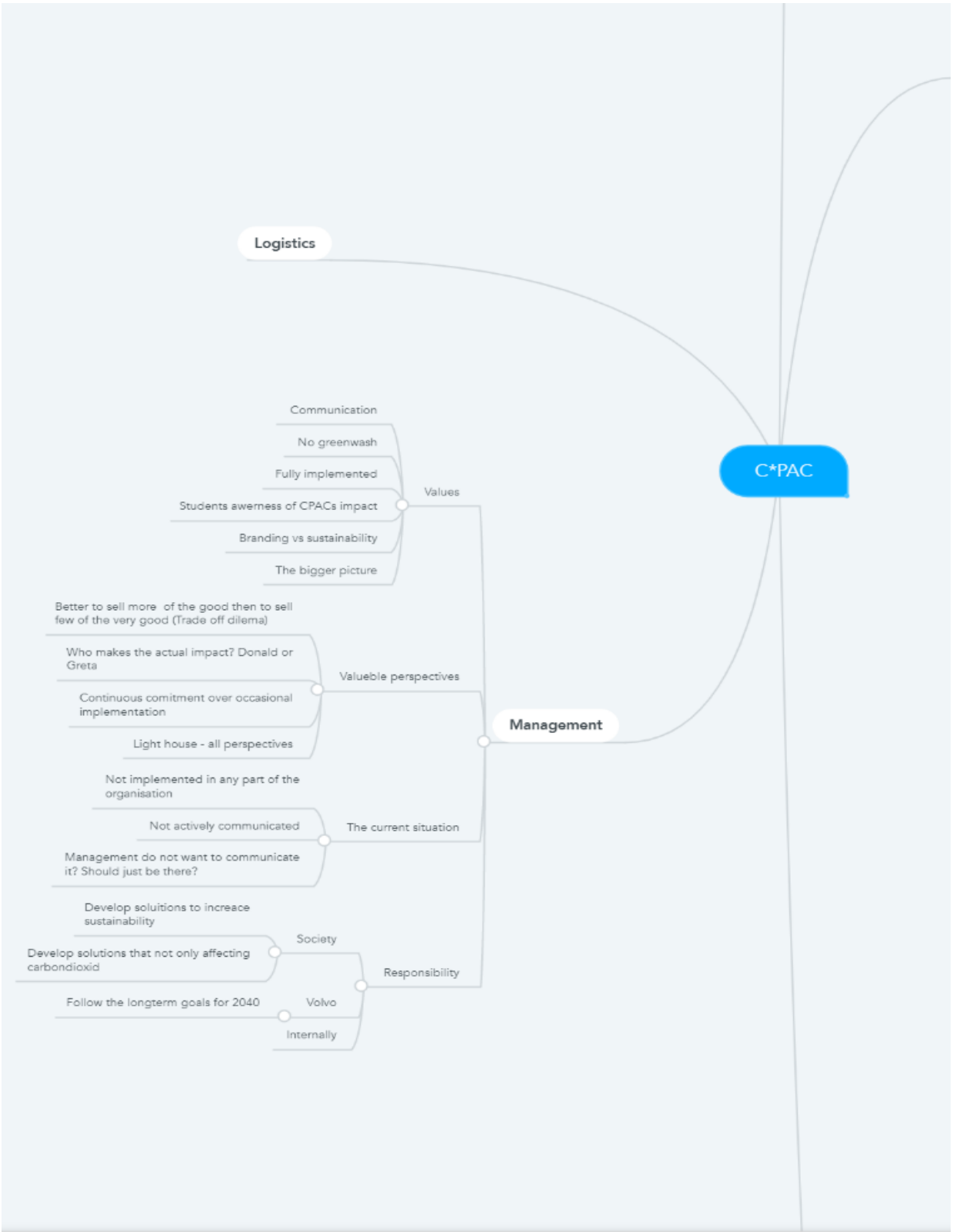
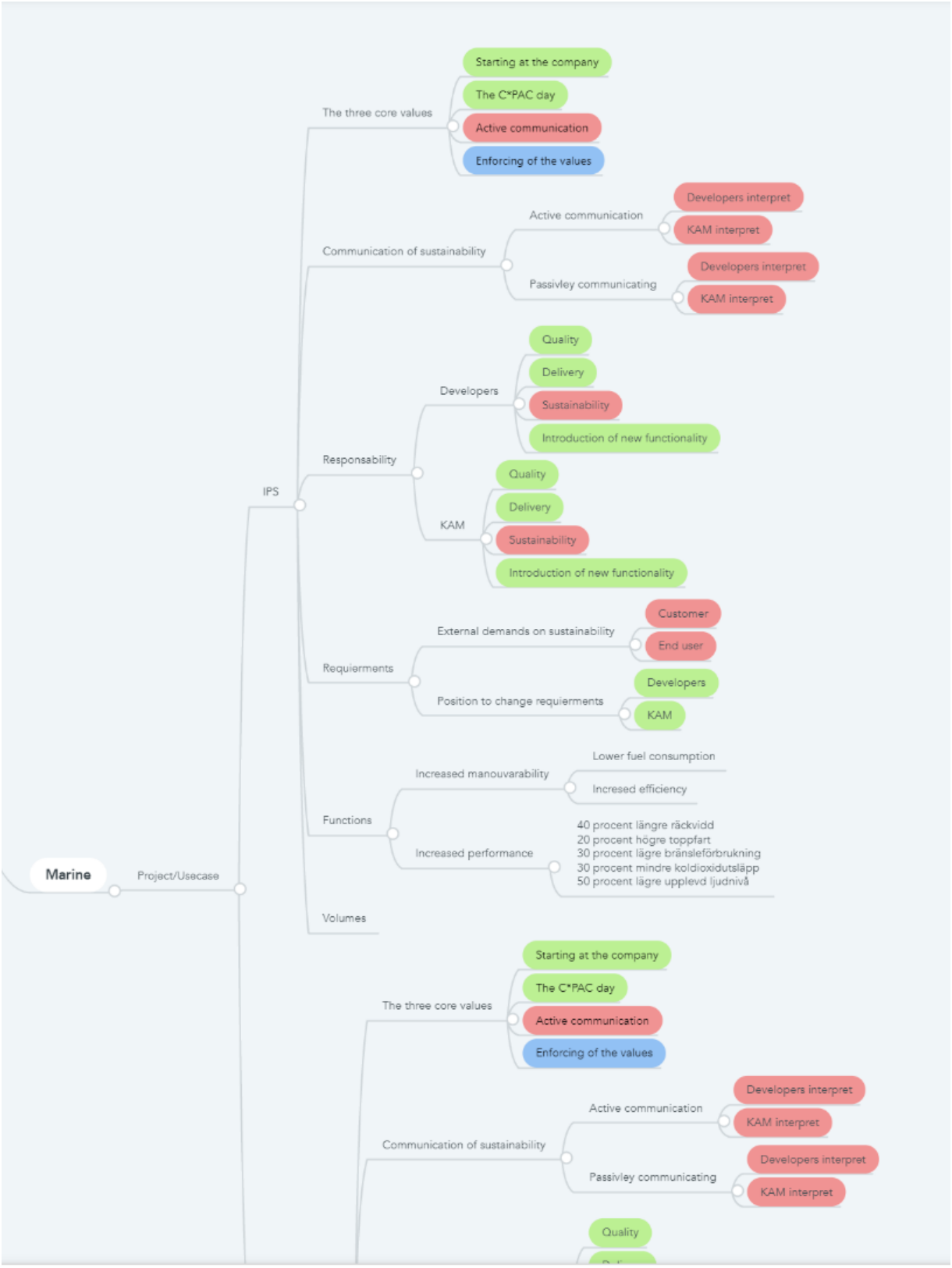
KAM interpret
Activley implementing
Developers interpret
KAM interpret
Marketing
Developers interpret
KAM interprit
Responsability
Developers
Quality
Delivery
Sustainability
Introduction of new functionality
KAM
Quality
Delivery
Sustainability
Introduction of new functionality
Requierments
External demands on sustainability
Customer
End user
Position to change requierments
Developers
KAM
Functions
Connecting truck - ETA
JIT - Just in time
Decreased idling
Increased life
Decreas of cracking
IC - Inteligent compact
Increased quality
Increased life
Market leading
Decreases the quantity of asphalt
Digital receipts
Aiding accounting
Increasing precision
Volumes


C*PAC
Logistics
Management
Values
Communication
No greenwash
Fully implemented
Students awerness of CPACs impact
Branding vs sustainability
The bigger picture
Valueble perspectives
Better to sell more of the good then to sell few of the very good (Trade off dilema)
Who makes the actual impact? Donald or Greta
Continuous comitment over occasional implementation
Light house - all perspectives
The current situation
Not implemented in any part of the organisation
Not actively communicated
Management do not want to communicate it? Should just be there?
Responsibility
Develop soluitions to increase sustainability
Society
Develop solutions that not only affecting carbondioxid
Volvo
Follow the longterm goals for 2040
Internally


Marine
Project/Usecase
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Starting at the company
The C*PAC day
Active communication
Enforcing of the values
Communication of sustainability
Active communication
Developers interpret
KAM interpret
Passivley communicating
Developers interpret
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Responsability
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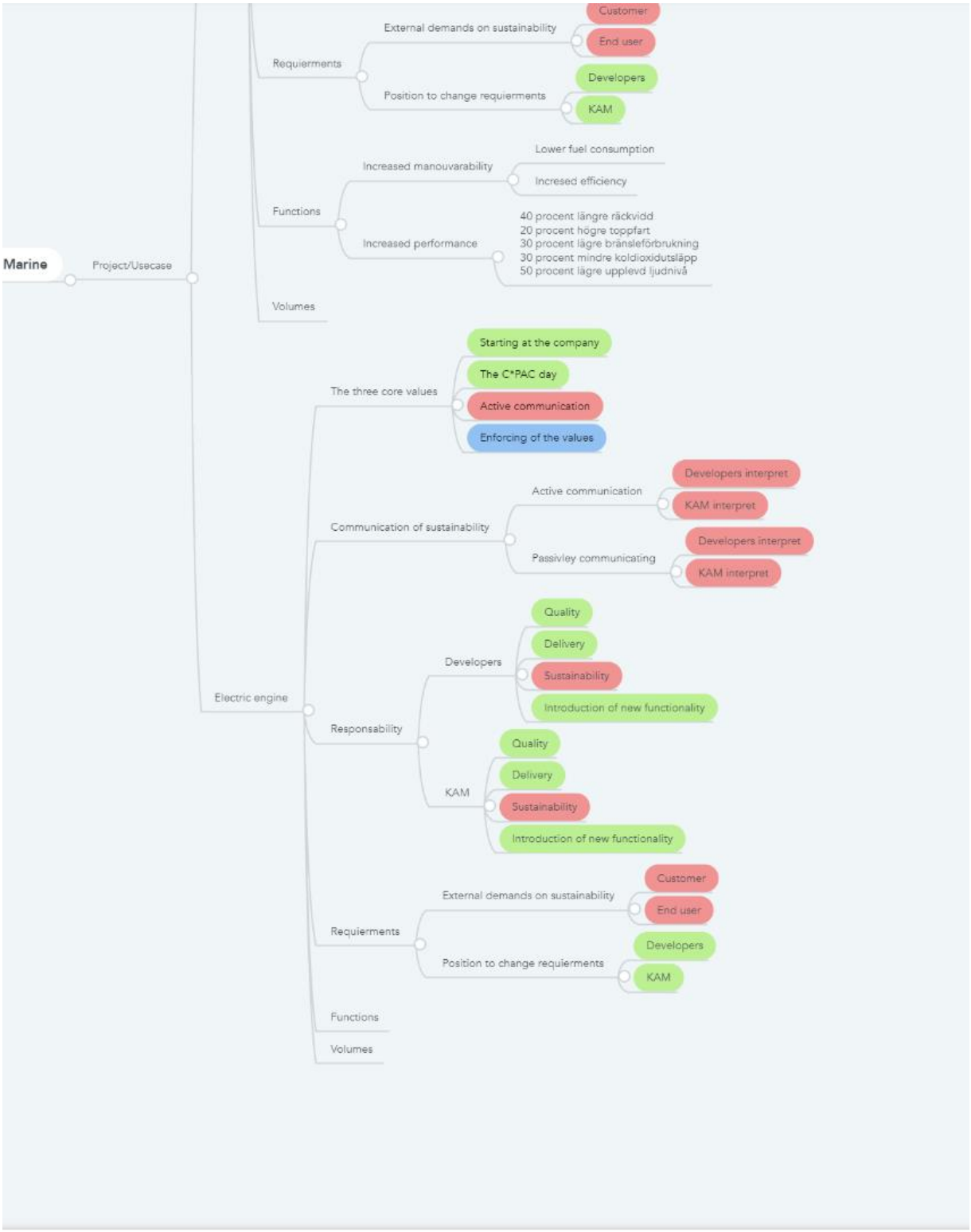
Introduction of new functionality
KAM
Quality
Delivery
Sustainability
Introduction of new functionality
Requierments
External demands on sustainability
Customer
End user
Position to change requierments
Developers
KAM
Functions
Increased manouvarability
Lower fuel consumption
Incresed efficiency
Increased performance
40 procent längre räckvidd
20 procent högre toppfart
30 procent lägre bränsleförbrukning
30 procent mindre koldioxidutsläpp
50 procent lägre upplevd ljudnivå
Volumes
The three core values
Starting at the company
The C*PAC day
Active communication
Enforcing of the values
Communication of sustainability
Active communication
Developers interpret
KAM interpret
Passivley communicating
Developers interpret
KAM interpret
Quality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30 procent mindre koldioxidutsläpp
50 procent lägre upplevd ljudnivå
Volumes
Electric engine
The three core values
Starting at the company
The C*PAC day
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KAM
Functions
Volumes

Appendix E: Sustainability website

SeaPACK

Hållbarhetspolicy

Bearbetning av SeaPACKs policy

Vad gör vi?

Hållbarhetspolicy

SeaPACK är en organisation som bedriver en verksamhet med direkt koppling till hållbarhet och stor samhällspåverkan. Därför tar vi ett stort ansvar för att driva industrin i en positiv riktning och gör det visuellt genom att bli mer klimatpositiva för varje år. SeaPACK skapar förutsättningar för att leverera mer hållbara lösningar till alla företagets intressenter. Vidare agerar SeaPACK som föregångare för hållbarhet och upplyser med transparens systemens effekter på olika nivåer. Affärsstrategin är utvecklad för att uppmana hållbarhet och genomsyra organisation, till den grad att varje enskild individ har förståelse av sitt bidrag, känner trygghet och välbefinnande.

Åtaganden

Värdeskapande

- SeaPACK ska vara klimatpositiva i benämningen att besparingarna är större än utsläppen.
- Relationen mellan besparingar och utsläpp skall öka över tid.
- Hållbarhet är naturligt integrerat i affärsverksamheten.

Människan

- Genomgående förståelse om vad hållbarhet är.
- Förståelse för vad produkter och tjänster har för inverkan på samhället.
- SeaPACK s anställda har hållbara relationer individuellt, med familjen, kollegor och gentemot samhället.

Ansvarstagande

- Upplyser intressenter om produkter och tjänsters påverkan på samhället.
- SeaPACK leder utvecklingen av system med hållbarhet i fokus.
- Tar ansvarar för att integrera hållbarhet i alla utvecklade lösningar.

Utmaningar

Värdeskapande

- Kontinuerlig uppföljning och mätningar för att kontrollera att

Människan

- Behov av genomgående förståelse för hela organisationen.

Ansvarstagande

- Transparensen inom organisationen för att skapa förändring som syns

organisationen fortsätter arbetet i rätt riktning.

- Användning av en generisk modell för beräkningar av ekonomisk och ekologisk hållbarhet.
- Allokera trovärdig data till försäljning och inköp, som möjliggör strategiska beslut.
- Utveckla affärsmodellen för att integrera hållbarhet i form av ekologi.
- Hantering av konflikten som uppstår när man marknadsför med ekologi parallellt med ekonomi.
- Kontinuerlig kommunikation av produkter och tjänster effekter på samhället.
- Bibehålla en arbetsplats som fostrar en hälsosam arbetsmiljö.
- Arbetsplatsen ger fortsatt möjlighet för individuell utveckling, likväl som för arbetsrelationer, då företaget växer.

mot kund.

- Visualisering av effekter och förändring som SeaPACK bidrar till.
- Utvärdering av verksamheten och erbjudanden med en hållbarhetsbedömning.

Vad innebär hållbarhet för SeaPACK ?

Ekonomiska aspekter

Ekonomisk hållbarhet innebär för SeaPACK , hur kapital förvaltas över tid.

Kapital anses bestå av finansiellt kapital, resurser som arbetskraft, naturresurser och råmaterial.

SeaPACK förvaltar kapital för att bibehålla och utveckla ekonomisk hållbarhet.

Ekologiska aspekter

Ekologisk hållbarhet innebär för SeaPACK , hur jordens resurser kan nyttjas för att fostra ett hållbarare samhälle.

Ett hållbart samhälles aktiviteter extraherar resurser från jorden i samma takt som de returneras.

SeaPACK s produkter och tjänster skapar förutsättningar för ekologisk hållbarhet.

Sociala aspekter

Social hållbarhet innebär för SeaPACK , hur organisationen samverkar vertikalt och horisontellt samt gentemot intressenter.

SeaPACK främjar en jämställd, jämlik och hälsosam arbetsplats där alla trivs och kan utvecklas för att driva social hållbarhet.

Vad tänker DU?

Vad har du för lösning?

För att vi skall kunna skapa en handlingsplan för att integrera hållbarhet i SeaPACK , behöver vi er hjälp. Vi skulle vara otroligt tacksamma om ni kunde komma på åtminstone en idé per kategori för att vi ska kunna börja arbete mot visionen. Till lösningen ser vi gärna att ni lägger in en kommentar till hur lång tid det tar för att få lösningen integrerad samt svårighetsgraden/kostnaden med estimation (Lätt, medel eller svår).

Att genomföra undersökningen på detta viset var såklart inte önskvärt, men med rådande förutsättningar gällande Corona, hoppas vi detta kan vara en alternativ lösning för att kommunicera ut informationen.

Värdeskapande

Värdeskapande - lösningsförslag:

Svårighetsgrad
- ○ Lätt
- ○ Medel
- ○ Svår

Människan

Människan - lösningsförslag

Svårighetsgrad
- ○ Lätt
- ○ Medel
- ○ Svår

Ansvarstagande

Ansvarstagande - lösningsförslag

Svårighetsgrad
- ○ Lätt
- ○ Medel
- ○ Svår

Uppskattad tid för implementering (Nu - 30år)

Beskrivning

Uppskattad tid för implementering (Nu - 30år)

Beskrivning

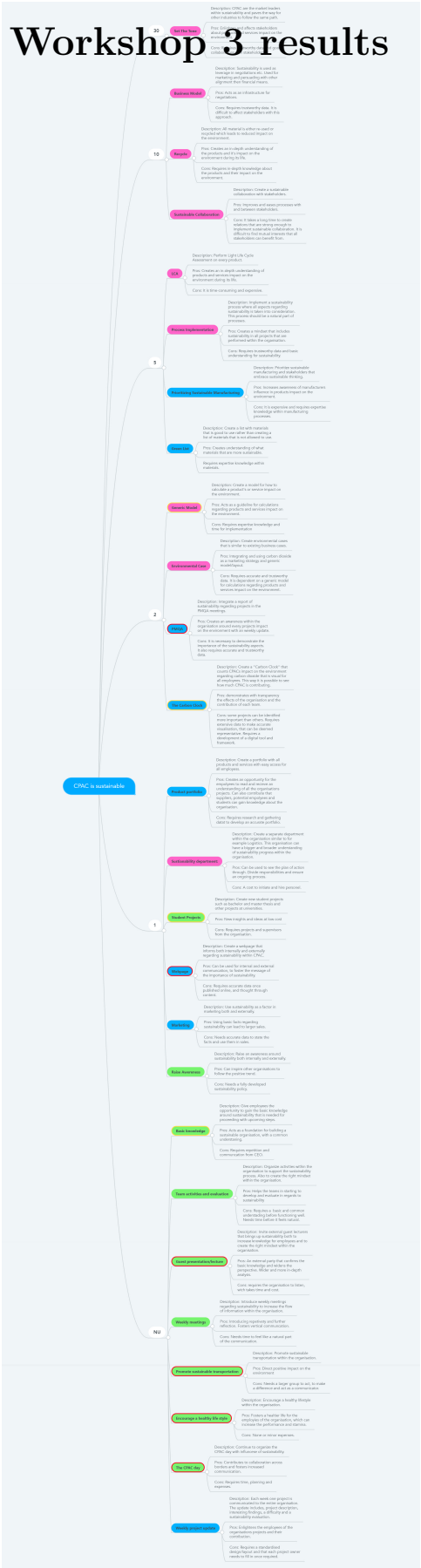
Uppskattad tid för implementering (Nu - 30år)

Beskrivning

Tack för era bidrag!

Nu har vi ett härligt sorteringsjobb framför oss med alla era ideér. Ni hör snart mer från oss med en handlingsplan och en fullständig hållbarhets policy.

Appendix F: Workshop 3 results



DEPARTMENT OF INDUSTRIAL AND
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Gothenburg, Sweden
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