# The Future of Green IT

Graduation Project,
MSc Strategic Product Design,

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Chapter 00

# EXECUTIVE SUMMARY

Increasing energy usage and environmental concerns force us to look into green innovation. In today's world improving Corporate Social Responsibility (CSR) is becoming the main point on every business agenda. Organizations need to become more sustainable in every aspect to stay relevant. To minimize a company's carbon footprint, IT should also be included in the strategy. Therefore, greening IT is and will continue to be a necessity, not an option (Murugesan, 2008).

This project is done in collaboration with the department Technology Strategy & Operating Model within Deloitte Consulting. This team helps various types of companies with their Information Technology challenges. In the last months, the technology strategy department has noticed a serious increase in questions relating to incorporating sustainability in their IT. Thus, this project is relevant for Deloitte TSOM as it can future-proof the strategies of their clients.

**Therefore, this thesis aims to investigate the question; how can Deloitte TSOM help consumer goods companies shift to Green IT?**

Within the research phase of the project, desk research was conducted which existed of literature review and trend research, which was followed by ten expert interviews. The outcome detected an opportunity gap for Deloitte TSOM which resulted in a necessary refocus for the solution. From the initial focus of helping consumer goods clients of Deloitte TSOM to creating a tool for TSOM consultants that makes sustainability in IT implementable.

**Thus, the modified aim of this thesis is to develop a tool for TSOM that makes sustainability in IT implementable using their own frameworks.**

To make sure the solution would be suited for the upcoming years, a future vision was developed in which the role of IT plays is central.

The next phase further explores the proposed future vision and researches how Deloitte can help its client become sustainable. By using a collaborative design process, TSOM team members were engaged and encouraged to express their needs in various co-creation sessions throughout the design process.

The end result consists of a modified framework, implementation strategy, and adoptation AIDA model for employees. In the Tech TOM framework capabilities are added to include sustainability in IT assessments. Additionally, an implementation roadmap was created using the AIDA model to ensure a straightforward adaption process.

The new framework and implementation strategy were validated in several validation sessions with employees. New insights resulted in several iterations on the AIDA model and a new implementation strategy of the new capabilities. Finally, the new framework combined with the implementation strategy was assessed on feasibility, viability, and desirability. Based on the validation and assessment, it can be stated that the outcome adds to the current offerings. However, this outcome combined with limitations of the research resulted in several concrete recommendations for Deloitte to implement and further develop the proposed strategy.

Reflecting back on the initial assignment, the focus area of this research was on TSOM The Netherlands, feedback shows that the final capabilities have the potential to be implemented globally. Additionally, this thesis can be seen as an example for other departments within Deloitte researching how to implement sustainability in their frameworks.



EXECUTIVE SUMMARY

Chapter 00

# PREFACE

Dear reader,
in front of you, is the final deliverable of my graduation project of the masters' program Strategic Product Design at the Delft University of Technology. Looking back at the past six months, I am proud to present to you my final work, which I could not have completed without the support of a number of people.

First and foremost, I would like to thank Deloitte for trusting me with this opportunity. Thank you, Bob and Rendel, for your guidance and support over the past few months. Our weekly check-ins were not only a moment for me to talk about the progress of my report, but also to talk about life. I would like to thank you for taking the time to emerge yourself in the world of strategic design and help me stay on track to deliver the best version of my thesis possible. I would also like to thank the other TSOM team members who were willing to spend time listening to my ideas, providing me with expert insights, and participating in the interviews or validation session. I want to thank you for making my first experience with Deloitte unforgettable by creating an open atmosphere, inviting me for lunch and walk outside, coffee chats, or the Friday afternoon 'borrel'.

I would also like to say thank you to my TU Delft supervisors. Although we only met once in real life, I still felt your support and involvement throughout my project. Giulia, thank you for continuously sharing your academic perspective and encouraging me to reach my full potential by providing frameworks, or other interesting documentation. Mathijs, thank you for always challenging my thoughts, and for being so engaged in my process. I enjoyed our coaching sessions, you were always open to scheduling a meeting when I struggled with something, and your constructive feedback improved my thesis greatly.

I would also like to thank my parents and brother for their unconditional support throughout my studies. Thank you, papa, for always being open to help me with any course I struggled with. I value the many hours you have helped me with physics or math since high school. Thank you, mama, for being the great role model you are. You have shown me what it is like to be a successful woman, and where hard work can bring me. The interest and encouragement of both of you were a tremendous help and truly appreciated, thank you for believing in me. Thank you, Erik, I enjoyed living in the same city during the beginning of my master's. Our coffee breaks or competitive squash games were a great distraction from my studies.

Thank you, Shelley and Claudia, I am grateful for our friendship and the support you give me. I value our inspiring conversations about life after university, and you make me motivated to pursue my dreams and ambitions. Thank you, Femke, for convincing me that "ondernemen is risico nemen" and for your enthusiastic take on life. I could not wish for a better business partner. Thank you, Fien, you never fail to make me laugh, and you always ask me how I am doing, it is truly appreciated.

Marije, Lilly, Titi, and Nuria, I would like to thank you for your support and help throughout the whole master's program. Thank you Bolbewoners, you were willing to listen to my struggles, cheer me up, and celebrated successes together. You have made my time in Delft unforgettable.

Finally, thank you Flip, for constantly checking in on me. Asking me what my goals for the day are, and distracting me with a skiing holiday. I truly appreciate your support since day one of my thesis.

Eline Maatje



# ACKNOLEDGMENTS

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# Introducing the project

This chapter provides an introduction to this thesis. It describes the project, explains the project assignment, provides information about deloitte, and explains the project approach.

# Chapter 01
# INTRODUCING THE PROJECT

## 1.1. Introduction

In less than a century, our world has transitioned from an industrial to a digital era, largely due to tremendous advances in information and communication technologies (Calabretta & Kleinsmann, 2017). Businesses rely heavily on Information Technology to run their everyday operations (Green, 2007). In today's world improving Corporate Social Responsibility is becoming a main point on every business agenda. Consumer goods organizations need to become more sustainable in every aspect to stay relevant. A relatively new trend is companies wanting to become more sustainable in terms of their Information Technology usage (Green IT). Energy and emissions from data centers are a major concern in green IT analysis (Ruth, 2009). To minimize a company's carbon footprint, IT should also be included in the strategy. Therefore, greening IT is and will continue to be a necessity, not an option (Murugesan, 2008).

### 1.1.2 Deloitte

This Project is executed in collaboration with Deloitte. Deloitte is a multinational professional service network that provides audit & assurance, consulting, risk and financial advisory, risk management, tax, and related services to select clients. Deloitte has over 345.000 professionals employed to deliver tailor made results to help or reinforce their clients with what they need. Committed to driving societal change and focusing on environmental sustainability Deloitte is in constant growth and guided by purpose to "make an impact that matters."

This thesis is written within the Technology Strategy & Operating Model (TSOM) team, which is part of Technology Strategy & Transformation (TS&T) within the consultancy side of Deloitte. TSOM helps organizations reset or restructure their IT strategy and implement the systems that build business value and drive performance.

Not only the TSOM team within the company will be involved in this research, but also the sustainability department. Deloitte aims to guide organizations towards a more sustainable future. The current climate crisis urges us to rethink, and reinvent our economy. Business needs to change to meet higher expectations of sustainability. Sustainability in Information Technology is still a relatively undiscovered topic, but it might also be the beginning of something big (Buith, 2021).

Another department within Deloitte that is involved is Consumer Products. Deloitte's Consumer Products team serves companies in a range of specialties, including apparel, beverage and food manufacturing, agriculture, and consumer electronics. They help companies solve their challenges from strategy and assessment to execution. The adoption of disruptive technologies in the consumer product industry has increased tremendously in the past decade (Renner, 2019).

# Chapter 01
# INTRODUCING THE PROJECT

## 1.2 The project

### 1.2.1 What is Green IT?

Increasing energy usage and environmental concerns forces governments to look into green innovation. Green innovation, compared to traditional innovation, can not only accelerate industrialization but also mitigate many of the negative consequences on sustainability (Rennings, 2000).

To start, an understanding of what green IT is needed. Even though this topic is becoming widely known, a commonly accepted and universal definition is lacking in the existing literature. The most basic meaning would be: “Green IT refers to the usage of IT resources in an energy-efficient and cost effective manner.” (Bose, 2011). A more elaborate definition would be: “Green IT aims to minimize the negative impact of IT operations on the environment by designing, manufacturing, operating, and disposing of computers and computer-related products in an environmentally-friendly manner” (McLaughlin, 2013).

Even though there are many slightly different definitions developed in existing literature, they all essentially cover two goals. The first and most wanted goal is to reduce the number of emissions released by IT systems and infrastructure. The second goal is to reduce emissions from business and production processes with the aid of IT. These two different goals can be described as the greening of IT and greening by IT (Hemalatha, 2017).

A strong and often used definition is developed by Patricia Ordóñez de Pablos, written in “Green Technologies and Business Practices” (Jenkin, 2011): “Green IT is the systematic application of practices that enable the minimization of the environmental impact of IT and allow for company-wide emission reductions based on technological innovations.”

### 1.2.2 Initial problem definition

With the increasing urgency to become more sustainable, all businesses are currently faced with it, it is necessary to build a future-proof strategy on how to incorporate green IT into consumer goods companies. The consumer goods sector is chosen to focus on for this research due to the trend in which consumers care about how a product is made, and how it affected the earth. Consumers are demanding companies to make the shift towards green development, which should also include Green IT. However, despite the increase in awareness due to global warming, companies are not yet prioritizing green IT 4 in their net-zero strategies.

Research shows that shifting to green IT is not only better for the environment, but is also cost-efficient over a longer period. However, implementing this idea into your business without a solid strategy is unadvisable. Therefore, this research asks for an understanding of what the future of green IT looks like, and what is needed to achieve the desired future.

### 1.2.3 Initial project assignment

Develop a future vision of what Green IT will look like in 3-5 years, a roadmap providing a step·wise approach that guides consumer good companies to reach this plausible future with the support of Deloitte.

However, after the research phase, the goal of the initial project needed to be modified. It was found that Deloitte TSOM benefited more of a fitted tool which would help employeses implement sustaianbility in their everyday projects. Thus, in chapter 6 the design vision and design goals were focussed on providing a solution for Deloitte TSOM, instead of consumer good clients of Deloitte.

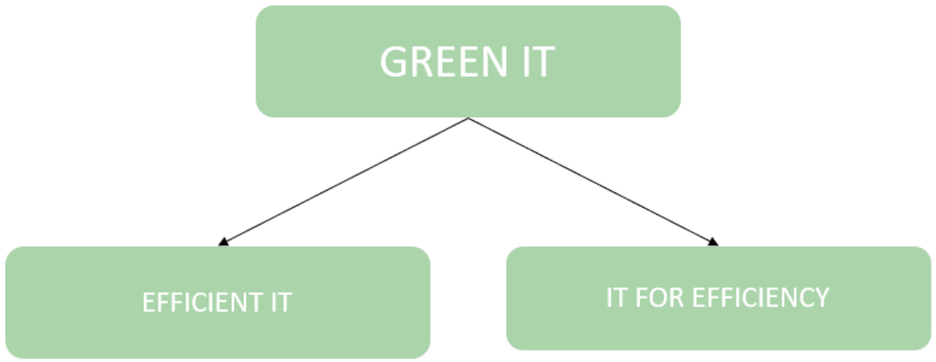



*Figure 1 - Green IT explained*

# Chapter 01
# INTRODUCING THE PROJECT

## 1.3. Project approach

### 1.3.1 Report and project structure

In this section, the project approach will be explained. However, the work will be presented chronologically, the actual process is iterative in which multiple diverging and converging phases took place. To structure the process, the four phases of the double diamond (British Design Counsel, 2019) method are used.

Discovery

In the first phase (discovery) after the kick-off, the initial assignment was further explored to create a deeper understanding of the context (chapter 1.2) and challenges consumer goods companies face when trying to become more sustainable in IT. This initial analysis resulted in further research opportunities for the literature research (chapter 2), to create a strong theoretical foundation. Based on these findings, opportunities for Deloitte were defined.

Define

In the second phase (define) the aim was to analyze, synthesize, and focus. By identifying the research opportinities at the end of the literature research, it was possible to scope and create goals for expert interviews. During the Define phase, internal interviews were conducted to create an understanding of how experts see the future of IT, and how sustainability can be incorporated in this future (chapter 3 and 4). The insights were clustered and translated to form the future vision of IT, and are the basis of the foundation of the solution space (chapter 5 and 6). This phase marks the end of the first diamond and creates a clear starting point for the second.

Develop

In the third phase (develop), the road to the solution (chapter 7) will be explored. Next, I will develop a roadmap to implement the future vision (chapter 8). To create this roadmap, further analysis is needed into the then-defined end solution. I will facilitate internal and external brainstorm sessions and map/ conceptualize the ideas.

Deliver

And lastly, in phase 4 (deliver) I will define and validate my final strategy. Write the last part of my thesis and work on the deliverables.

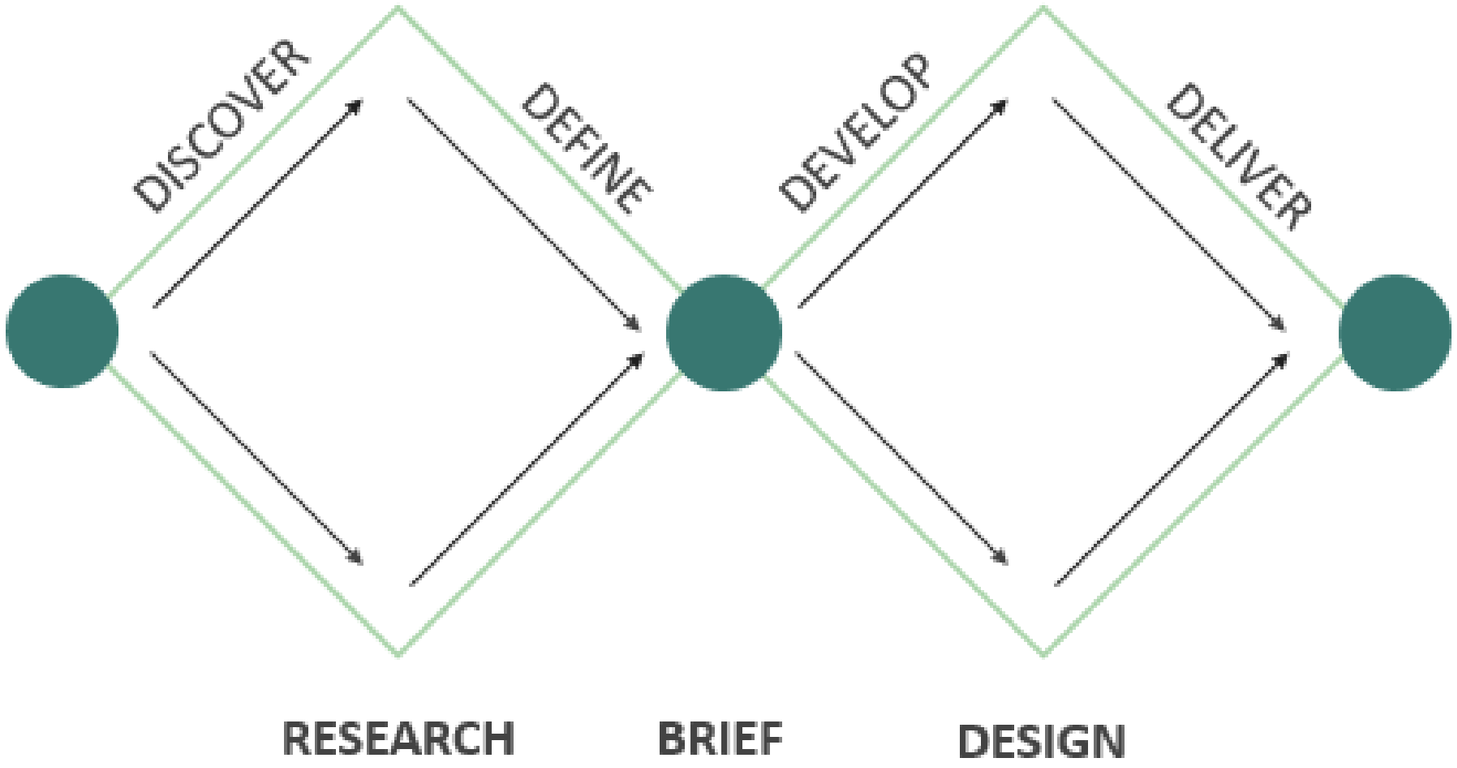



*Figure 2 - Structure of the report according to the Double Diamond*

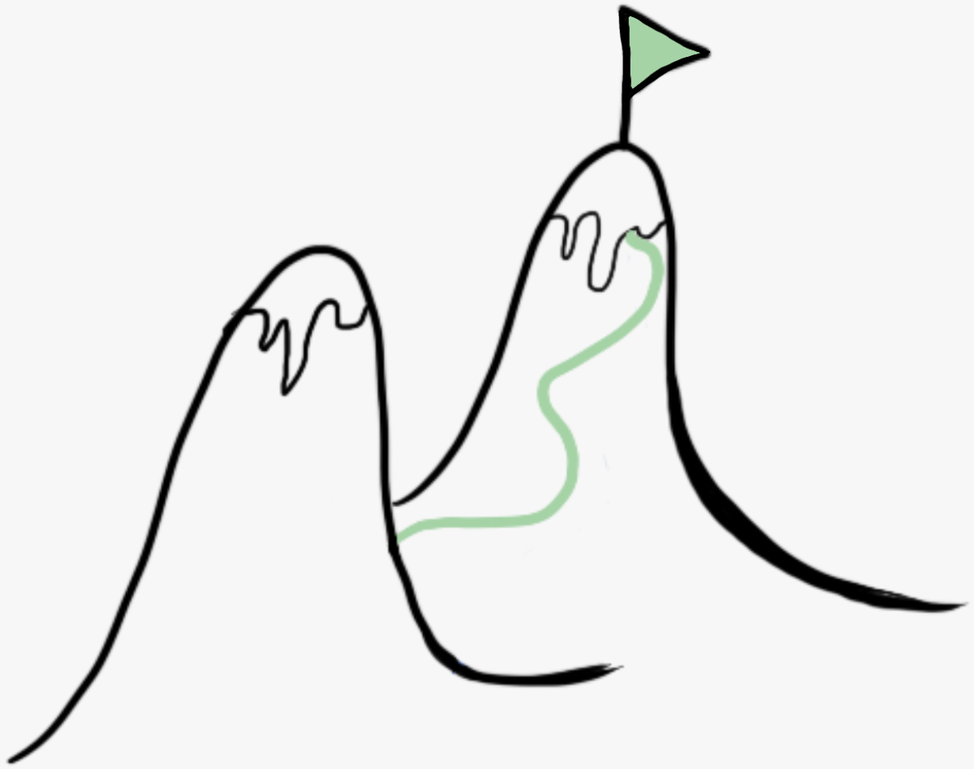
Chapter 01

# INTRODUCING THE PROJECT

### 1.3.2. personal ambitions

Next to the initial assignment, I look forward to implementing my academic skills into a real business environment. Being able to effectively manage the different stakeholders involved in my project and find new business opportunities is what I hope to fulfill during my graduation process. I hope to apply the various skills I obtained during my bachelor Product Ontwikkeling at the University of Antwerp and my master Strategic Product Design at the TU Delft. The competencies I want to apply in particular are stakeholder management, creative problem solving, and conducting trend research. I hope to gain experience with synthesizing large volumes of data into meaningful insights. Additionally, I hope to gain experience with interviewing and co-creation sessions.

After completing my graduation project, I hope to not only be proud of my work, but also look back at a great time with inspiring colleagues, a healthy work-life balance, and a positive learning journey.





# 01

# Introducing the project

## KEY TAKEWAYS

**1.1 What is green IT**
Green Information Technology is the usage of IT resources in an energy-efficient and cost-effective manner.

**1.2 Problem definition**
It will become a necessity for consumer goods companies to build a sustainable IT strategy. However, despite the increase in awareness, businesses are not yet prioritizing Green IT.

**1.2 Assignment**
Develop a future vision of what Green IT will look like in 3 years, a roadmap providing a stepwise approach that guides consumer good companies to reach this plausible future with the support of Deloitte.

**1.3 approach**
The double diamond method is used to structure the process of the thesis and findings in the report.

# 02

# Understanding the context

This section will describe the context in which Green IT is located by providing an overview of the initial exploration of the context. The context in which Green IT is located is based on three pillars in this reserach: Information Technology, sustainability, and consumer goods companies.

Chapter 02

# UNDERSTANDING THE CONTEXT

*This initial context exploration aims to discover and identify the perceived challenges and unanswered questions Deloitte might have about the future of Green IT. It will cover an initial analysis of the three main pillars in this research: Information Technology, Sustainability, and the Consumer Goods industry. Furthermore, it will examine the relationship between the topics. The results of this section will be used as a starting point for further research.*

## 2.1 Information Technology

*"The development, study, or use of electronic equipment, especially computers, for storing and analyzing information"*
*– Oxford Dictionary*

Information technology (IT) is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data (Castagna, 2021). Everyone uses IT, both in private and in business settings. For this research the business aspect matters due to the focus on IT in consumer goods companies. Whether it contains a small or larger consumer goods company, IT plays a large role in everyday work. Businesses tend to use IT in three main ways: to support basic information processing tasks, to help with decision-making, and to support innovation (Jorgenson, 1999).

IT has been part of our lives since 1958 and is evolving each year. Recent advances in IT have led to important changes in the operation of offices. IT enables consumer goods companies to operate efficiently, truly customer-driven, optimize the supply chain, and much more. Reasons why consumer goods companies use IT systems are endless, but the common reasons are communi
cation, Management Information Systems (MIS), inventory management, data management, and customer relationship management.

Currently, emerging new technologies are expected to demand innovation in this IT even further. Trends such as AI and Edge computing are becoming more pervasive, and the world is demanding brands to deliver with a higher accuracy and real-time efficiency.

***IT and Sustainability***

Unfortunately, everything we do on our computers or other devices costs energy. If the IT industry would be a country, it would be the third largest electricity consumer in the world, and as a sector, IT is responsible for 3% of all carbon emissions (Capgemini, 2021). So, IT already has a sustainability issue, but it is likely to get a lot worse as data volumes snowball in the coming decade. Today, global IT accounts for about 10% of global electricity demand, but that is expected to rise to 20% (UN, 2020). Additionally, the number of connected devices is expected to reach 55.7 billion by 2025. Over half of these devices will be connected to IoT platforms, which will lead to a large growth in data usage(IDC, 2020). If these predictions hold ground, and nothing is done to reduce data usage, IT processes could contribute to 20% of the global CO2 emissions within the next ten to fifteen years. In order to know how Green IT can lower the carbon footprint of IT it is crucial to identify when IT can be called sustainable IT, and how IT impacts the world we live in.

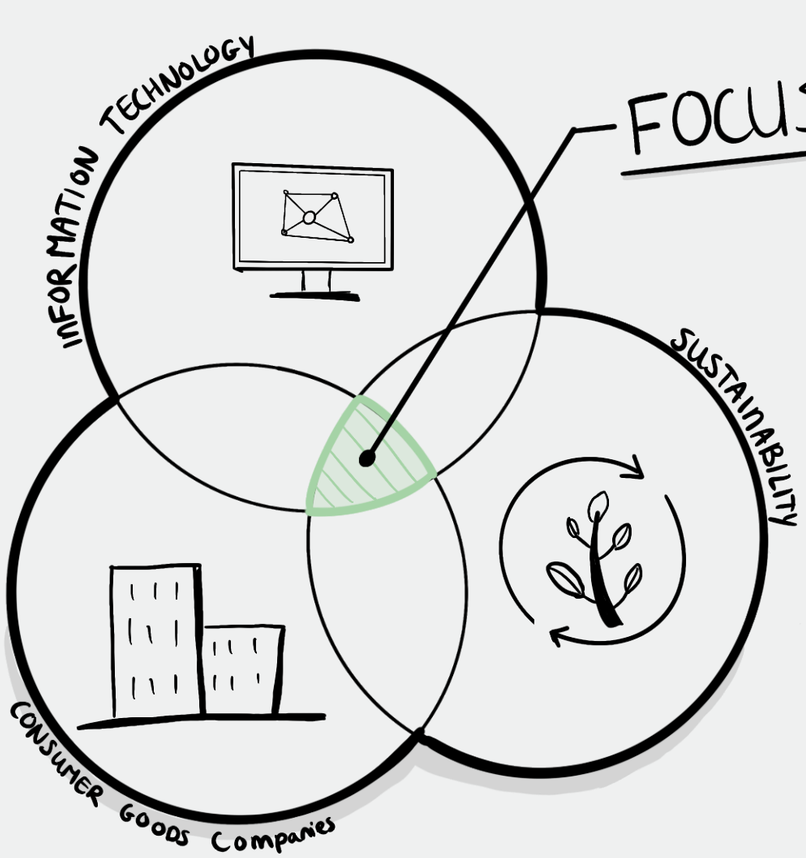



*Figure 3 - Research opportunity*

Chapter 02

# UNDERSTANDING THE CONTEXT

## 2.2 Sustainability

*"The use of natural products and energy in a way that does not harm the environment", or "the ability to continue or be continued for a long time".*
*- Oxford Dictionary*

Sustainability itself is a very broad term, and the definition is often perceived differently by various people. To create an understanding of what sustainability entails in this particular thesis, the three-pillar structure from Barbier is used (Barbier, 1987). The three pillars are social, economic, and environmental sustainability (Purvis, 2019).

Social sustainability is a proactive way of managing and identifying business impacts on employees, workers in the value chain, customers, and local communities. Companies that raise the importance of social sustainability recognize the significance of their relationships with people, communities, and society (ADEC Innovations).

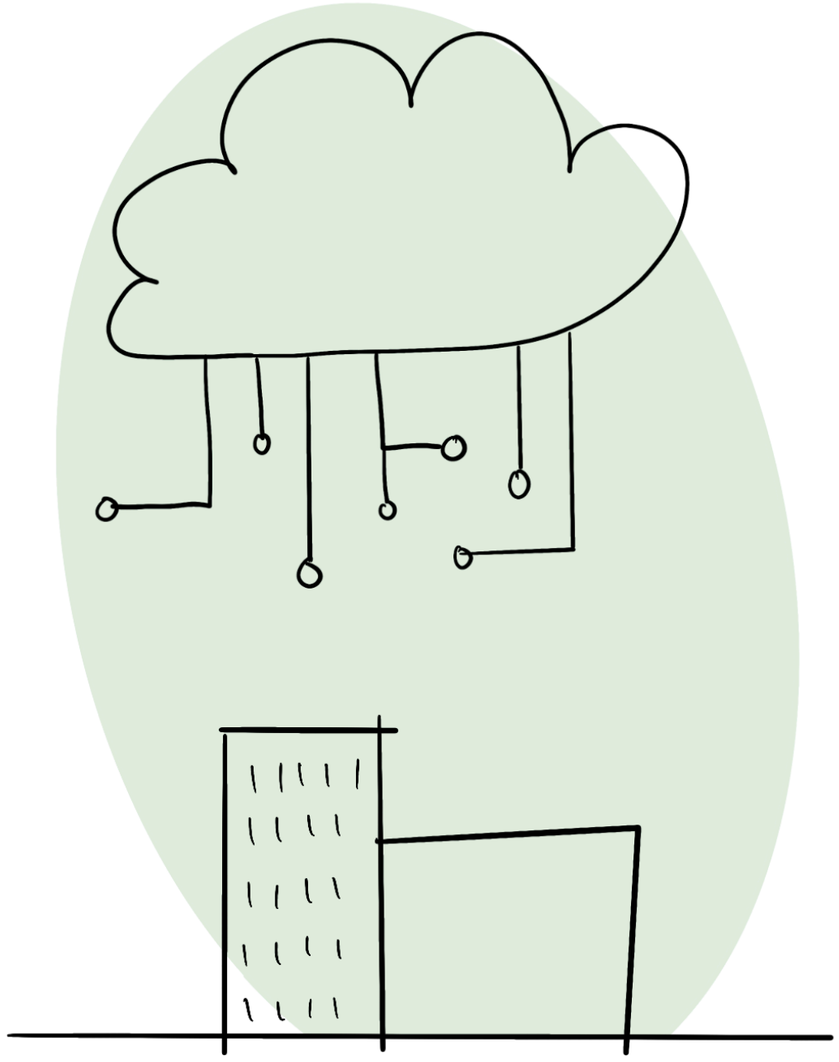
Economic sustainability refers to practices that support long-term economic growth without negatively impacting the social, environmental, and cultural aspects of the community.

Environmental sustainability is the responsibility to conserve natural resources and protect global ecosystems to support health and wellbeing, now and in the future.

***Sustainability and the Consumer goods industry***

In this thesis the focus will be on environmental sustainability, aiming for a reduction in carbon emissions by greening IT processes of consumer goods companies.

Sustainability is becoming an important topic in many businesses. Consumers are demanding transparency and are willing to pay more for sustainable products (First Insight, (z.d.)). Additionally, new legislations and climate goals are forcing companies to take action. Nowadays, consumer goods companies are claiming to see sustainability as a core value, and they need to act upon this. To deliver their promises, every aspect of their business needs to be optimized, including Information Technology services. This raises the question of why organizations are shifting to green IT, or why they are not prioritizing Green IT in their net-zero strategies?



Chapter 02

# UNDERSTANDING THE CONTEXT

## 2.3 Consumer goods industry

*"Goods bought and used by consumers, rather than by manufacturers for producing other goods."*
*– Oxford Dictionary*

Consumer products are the result of production processes and are what consumers buy online or in-store. Examples of consumer goods companies are Unilever, Adidas, and Heineken. The Consumer goods industry is fast-moving, and constantly adapting to its consumers needs.

According to an article published in the Harvard business review in 2014, the third wave of IT-driven competition is currently happening in the consumer goods industry. During the 1960s and 1970s, the first wave of IT-driven competition automated specific processes in a consumer company's value chain, such as order processing and bill payment, as well as computer-aided design and manufacturing resource planning. In the 1980s and 1990s, the rise of the internet drove the second wave of IT-driven revolution. The first two waves resulted in significant productivity improvements and economic growth across the spectrum. However, while the value chain was altered, the products themselves remained essentially unaffected. In the third wave of IT-driven transformation (which we are currently in), information technology is becoming an intrinsic aspect of the product. Embedded sensors, processors, software, and connection in products, together with a product cloud where product data is saved and analyzed, as well as some apps, are driving significant advances in product functionality and performance. To conclude, technological advancement is at the heart of consumer goods sector industry trends and has revolutionized supply chains, marketing, and the products themselves in this sector. Products are being reformed by information technology. Consumer goods have evolved from simple mechanical and electrical components to complex systems that incorporate IT (Porter, 2014).

Nowadays, consumers research, purchase and engage with brands before buying. A strong movement has emerged in the acknowledgment of the relevance of environmental protection (Khan, 2020) and the concept of Mindful Consumption emerged. Various reports show a shift, especially in the younger generations (Gen Z and Y), in shopping motivations (FirstInsight, n.d.). Value driven consumers are willing to pay more for products of sustainable brands. This raises the question, how could IT improve an organization's sustainability performance?

***Consumer goods industry and IT***
Technological advancement is at the heart of consumer goods sector industry trends and has revolutionized supply chains, marketing, and the products themselves in this sector. Products are being reformed by information technology. Consumer goods have evolved from simple mechanical and electrical components to complex systems that incorporate IT such as sensors, data storage, microprocessors, software, and networking in a variety of ways (1. Porter, 2014). Additionally, continuous and interconnected supply chains are driving operational efficiencies. Using new technologies, many consumer goods sector companies are engaging with consumers in more direct and innovative ways.



# 02

# Context Analysis

## KEY TAKEWAYS

The chapter above provides findings from the exploratory research into the three main pillars that provide the context of green IT for this research. The analysis also briefly discusses overlap and relations between the three pillars. The findings resulted in valuable insights but also showed multiple questions that form the foundation of the next section.

1. How does IT impact the world we live in?
2. When is IT sustainable?
3. How can organizations shift to green IT?
4. Why are companies not prioritizing Green IT
5. How can IT improve an organization's sustainability performance?

# 03

# Theoretical Foundation

This section provides the theoretical foundation of the thesis, and highlight what can be found on the topic Green IT in existing literature. The results will be used as buidling block, and as input for later stages of the thesis.

# Chapter 03
# LITERATURE RESEARCH

## 3.1 The research approach

In order to have a better understanding of the underlying problems Deloitte is facing in the shift towards greener Information Technology strategies, literature research is done. As discussed earlier in the introduction (Chapter 01) and context analysis (Chapter 02), a thorough understanding of Green Information Technology is needed as a foundation for possible results in later stages in this project. From the holistic view on IT, the scope will be narrowed down before going into depth into the topic of Green IT. Furthermore, the questions which have risen from the contextual analysis (Chapter 02) will be explored. Additionally, trends in Green IT are analyzed to gain an understanding of how consumer goods companies can shift to Green IT, and the importance of governance in Green IT is researched in the existing literature. The literature review was conducting using desk research on existing literature, trend research, and knowledge obtained by discussions with Deloitte colleagues.

1. How does IT impact the world we live in?
2. How can IT improve an organization's sus tainability performance?
3. Why do companies shift to green IT?
4. How can IT shift to green IT? (trends)
5. When is IT sustainable?
6. Why organizations are not prioritizing Green IT?
7. What is Green IT governance?

## 3.2 How does IT impact the world we live in?

Research conducted by Ericsson, a leading company in providing Information and Communication Technology (ICT) to service providers, examined the potential climate impact of the IT sector. Results show that IT impacts the climate in three ways (Lövehagen, 2020):

1. Direct carbon emissions (CO2-eq) from ICT manufacturing, usage, and disposal (the carbon footprint of ICT). This covers consumer devices such as phones, laptops, and small home routers, and all aspects of fixed and mobile networks, as well as data centers and enterprise networks (scope 1).
2. ICT-related indirect beneficial or harmful emission impacts (e.g. travel substitution, transportation optimization) (scope 2).
3. Changing people's habits and preferences (reshaping how we lead our lives on a societal level) (scope 3).

The first described impact is what comes to mind when we think about the footprint of IT and the climate impacts of digitalization. Moreover, the direct carbon emissions caused by IT have the smallest footprint of the three, but optimizing and creating sustainable solutions for IT's direct impact on the environment will result in a reduction of all three.

## 3.3 How can IT improve an organization's sustainability performance?

Research performed by Capgemini research institute shows that IT is responsible for 3% of global carbon emissions (direct carbon emissions caused by IT). However, results also show the large positive impact Green IT can have if we optimize our IT systems and utilize different possibilities. Up to 20% of global carbon emissions can be reduced (indirect carbon emissions caused by IT) (Capgemini, 2021), since Information Technology is embedded in everything. This tremendous improvement that is within reach in the upcoming years should be taken seriously (Murugesan, 2008).

The main function of the IT department is to support the overall enterprise in its everyday tasks (Tratz-Ryan, 2015). As discussed earlier in the context analysis, recent advancements in IT have led to major changes in the way of operating in offices. Unfortunately, sustainability in a company is most often managed outside of the IT department, and therefore not included when creating the IT strategy (Castagna, 2021).

Despite the increase in awareness, companies are not yet prioritizing green IT in their net-zero strategies. Research done by Capgemini (December 2020 with n=1000 companies) shows that less than half (43%) of executives say they are aware of their organization's IT footprint, and only 50% of firms say they have an enterprise-wide sustainability strategy. The level of awareness varies per sector, consumer goods and banking score higher levels of awareness compared to industrial manufacturing. For most companies sustainable IT is still a challenge, and therefore, a work in progress. 62% of participating companies are still working on developing their IT strategy (Capgemini 2021).

To conclude, the window of opportunity is large and there is room for improvement. Due to IT being part of almost every business process, many processes can become more efficient in their energy usage. Large organizations are taking sustainability more seriously and a trend of having sustainability as a core company value is growing. This growing market could potentially be of great interest for Deloitte and possible new revenue streams can be discovered. This opportunity requires more in detail information on how Deloitte is currently helping its clients to become more sustainable in IT.

## 3.4 Why do companies shift to Green IT?

Why companies want to make the shift towards Green IT is a well-researched topic in the existing literature. A bibliometric study conducted by Ribeiro shows an overview of papers containing answers to this question. Analyzing all motivations in papers between 2012 and 2019 (Califf et al. (2012); Lei and Ngai (2013); Tushi et al. (2014); Khan et al. (2015); Wang et al. (2015); Dalvi-Esfahani et al. (2015); Jailani and Abdullah (2017); Asadi et al. (2017); Howes et al. (2017); Yin et al. (2018); Muslim et al. (2019)) an overlap was found and the six most important motivations are mentioned below.

### Cost saving

Cost savings is a returning topic in the existing literature on motivations for companies to shift to green IT and is a major reason why green IT has momentum. Although initial investments are needed, reduced spending on equipment and energy, tax breaks, and other financial incentives make green IT a practical way for companies to save money. Saving money on vital operational costs enables companies to spend more money on other matters.

### Environmental regulations

Environmental regulations created to address climate change force businesses to become more environmentally friendly. According to National Geographic, climate change is the greatest threat to human health today (McKeever, 2021). The Dutch government has developed goals and measures to reduce the emissions of greenhouse gasses (Source government website). In comparison to 1990 levels, the Climate Act targets a 49 percent reduction in greenhouse gas emissions by 2030, and a 95 percent reduction by 2050 (Paris Agreement, 2015). The National Climate Agreement includes commitments from several sectors on how they will contribute to the achievement of these climate goals. The participating sectors are electricity, industry, the built environment, traffic and transportation, and agriculture. For this research, we will zoom in on the Dutch climate goals (Ministerie van Algmene Zaken, 2021; Ministerie van Economische Zaken en Klimaat, 2020) for the 'electricity' sector are listed below.

- Phasing out coal-fired electricity generation by 2025/2030, the first plant to be closed by 2020.
- Accelerating offshore wind power, also the growth of onshore wind and solar energy.
- Subsidies for additional renewable energy capacity (wind and solar) until 2025; estima ted 70% renewable share in electricity pro duction by 2030.

# Chapter 03
# LITERATURE RESEARCH

- Introduction of a minimum CO2 price for electricity production. For many companies, the introduction of a minimum price for electricity production will play a large motivational factor to shift to using green IT and, indirectly, reducing costs.

### Corporate Social Responsibility

Corporate Social Responsibility (CSR) is a management concept whereby companies integrate social and environmental concerns in their business operations and interactions with their stakeholders (UNIDO, n.d.). Implementing environmental solutions into the service or product portfolio increases a company's CSR. According to Forbes, CSR can help attract and retain employees, improve brand customers' brand perception and customer engagement, show a sign of accountability to investors, and again save money (Heyward, 2017).

### Attracting customers

As already briefly mentioned above, shifting to green IT can attract new customers. Telling people about achieving sustainability goals, is good PR. Research conducted by Gartner shows that people are willing to pay more for products of sustainable brands. Gartner identified consumer goods trends in environmental sustainability. These trends confirm that especially the younger generations (Gen Z and Y) show a large shift in shopping motivations and are becoming more value driven consumers (FirstInsight, z.d.). As a result, more than 90% of the S&P 500 companies publish nowadays sustainability reports which are highly produced and lengthy recitations of corporate "good works" (Clendaniel, 2021).

### Reduced energy consumption.

A more obvious reason to switch to Green IT is the reduction in energy consumption. Depending on the type of product/service developed by the consumer goods company, a significant energy consumption reduction is a large benefit. After all, most companies shift to green IT for this reason, and all other benefits are secondary.

### Potential investors

According to the Global Sustainable Investment Alliance, socially responsible investment has grown to more than $30 trillion, one-third of all professionally managed assets over the last years (GSIA, 2020). Potential investors take sustainability into account when assessing companies where they potentially want to invest in. Several large banks, such as Triodos and ABN AMRO, only loan companies money with sustainable goals or strategies. Therefore, as a company looking for funding or a loan, having a sustainable IT strategy can be a large asset, and in the near future possibly a necessity.

The above mentioned advantages are positive for almost every company, so the question of why not more businesses are shifting towards Greener IT arises. Earlier, the lack of awareness and priority problem is already mentioned and the reason why Green IT is not prioritized is further explained according to the existing literature in section 3.7. However, an opportunity is identified for Deloitte in this paragraph. The motivations above showed good reasons to implement Green IT, but do not provide any structure or guidelines on how companies should manage the process of Green IT adoption.

## 3.5 How to shift to Green IT?

To be able to shift to Green IT, an understanding of the life cycle of IT systems is needed. So that major problems are identified and the scope can be narrowed for further research. As mentioned earlier, the life cycle of an IT product can be simplified into 3 main stages: Manufacturing, Usage, and Disposal.

IT does not only cause carbon emissions during the usage of the device but the majority of CO2 is already emitted in the manufacturing process (Capgemini, 2021). Additionally, end of life strategies of the ICT hardware needs to be further developed. Results of research of Dell on energy consumption of its IT products show that approximately 20% of carbon emissions are released during manufacturing, 79% during usage, and only 1 % at the end of life (Dell, 2019). Therefore, we will further zoom in on the usage stage throughout the research.

Knowing the impact of IT on the environment is only step one, and the question of how IT can become more sustainable arises. How do we transform IT strategies into sustainable IT strategies? To answer this question, trend research is conducted and several scientific articles and trend forecasters are used. In the table below all main trends are categorized into the three identified stages of IT products.

Sources used: Patil, 2019; Soomro, 2012; Gartner, 2015; Ranjith, 2017; Deloitte, 2020; Hemalatha, 2017; Cademartori, 2007); Sivaramanan, 2013.

### Manufacturing

#### The "Green Machine"

Developing a more sustainable computer which consumes less energy consumption would be ideal. To make the device more environmentally friendly, sleep and hibernate settings are for example integrated. These functions can be turned on manually or through the operating system's power management settings.

*Sleep*

When a computer system is inactive over a period of time, the system automatically shifts to a reduced power mode. When Hibernate Mode is enabled, data is moved to the system's hard disk first, and then the machine is turned down fully. When the system is turned on, all files and documents appear exactly as they were when the system was turned off. Battery power can be saved by putting the system into hibernation mode.

Next to these examples, more smart and energy efficient tools can be integrated into future computers, making them more sustainable.

| Manufacturing | Usage | Disposal |
|---|---|---|
| The "Green Machine" | Energy consumption | Reduce E-waste |
| IT product and eco labeling | Virtualization | Material recycling |
| Product Longevity | Cloud services | Leveraging unused computer resource |
| | Data Center Consolidation & Optimization | |
| | Data Compression | |

*Figure 4 - Table with overview Green IT possibilities*

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### IT product and eco Labeling
Eco-labels are given to IT products based on several criteria aimed at conserving the environment. It also takes into account the system's recycling capabilities, as well as noise and energy consumption. Ecolabels will enable consumers and companies to make more conscious decisions when buying IT products.

### Product Longevity
According to Gartner and Fujitsu product life cycle assessments, product durability and longevity are one of the greatest techniques to achieving Green Computing goals. Enhanced product life allows for increased product use and reduces the need for unnecessary product manufacturing. Government regulations will encourage product vendors to make more efforts to extend product life.

## Usage

### Energy consumption efficiency
According to the Environmental protection Agency, 30 to 40% of laptops are left on over the weekend and after office hours, with 90% of these devices inactive. Even though sleep mode functions already exist, energy consumption efficiency can still be enhanced. The Climate Savers Computing Initiative (CSCI) aims to minimize the amount of electricity used by computers in both active, and inactive modes. Another method is energy-efficient coding, which entails lowering the hardware's software use. More efficient algorithms will result in fewer resources being used to accomplish certain computer functions.

### Virtualization
Virtualization is a current hot topic in green computing and can be explained as the process of running several computer systems on a single physical computer system. By plugging in fewer physical devices, energy efficiency can be accomplished, reducing power consumption and usage. This trend provides virtualization software as well as virtualized environment management tools.

Green Computing in this form will result in server consolidation and improved computer security. Virtualization allows you to run fewer systems at higher utilization levels. Virtualization enables the full usage of computer resources and provides the following advantages:

- Reduce the total amount of space, air, and rent requirements, which lowers the utility costs
- Reduce the total quantity of hardware

### Cloud computing and cloud services
Cloud computing in simple terms is the delivery of on-demand computing services, from applications to storage and processing power. Cloud computing is typically on a pay-as-you-go basis. Companies can rent access to anything from applications to storage from a cloud service provider rather than owning their computing infrastructure or data centers. Firms can avoid the upfront cost and complexity of creating and maintaining their own IT infrastructure by employing cloud computing services, instead of paying for what they need, when they use it. As a result, cloud computing service providers can realize significant efficiencies of scale by providing the same services to a diverse set of consumers.

Cloud computing services today include everything from basic storage, networking, and processing power to natural language processing and artificial intelligence, as well as common office programs. Almost any service that does not require you to be physically near the computer gear you are using, can now be supplied through the cloud.

Infrastructure-as-a-Service (IaaS), Platforms-as-a-Service (PaaS), and Software-as-a-Service (SaaS) are the three primary categories of cloud computing services (SaaS) (RedHat, 2018)

*IaaS*
IaaS means a cloud service provider manages the infrastructure for you. The actual servers, network, virtualization, and data storage through an internet connection. The user has access to the infrastructure via an API or dashboard and is essentially renting it. The user is in charge of the operating system, programs, and middleware, while the provider is in charge of the hardware, networking, hard drives, data storage, and servers, as well as outages, repairs, and hardware difficulties. This is how most cloud storage companies deploy their services.

*PaaS*
PaaS means the hardware and an application-software platform are provided and managed by an outside cloud service provider, but the user handles the apps running on top of the platform and the data the app relies on. PaaS provides a shared cloud platform for application development and management without the need to create and maintain the infrastructure typically involved with the process.

*SaaS*
SaaS is a service that delivers a software application—which the cloud service provider manages—to its users. SaaS apps are typically web applications or mobile apps that may be accessed using a web browser. The user is responsible for software updates, bug fixes, and other basic software maintenance, and they connect to cloud apps via a dashboard or API. SaaS also eliminates the requirement for each user's computer to have an app installed locally, allowing for more group or team access to the software.

### Data Center Consolidation & Optimization
Currently, much of the attention in the Green IT field is on Data Centers, which are known for their high energy usage and waste. According to a 2006 research by the US Department of Energy (DoE), data centers consumed 1.5 percent of all electricity in the US, and their demand is growing at a rate of 12 % per year, costing $7.4 billion per year by 2011. It is worthwhile to concentrate on the following to reduce energy usage in Data Centers:

- Information Systems (IS): to develop Green Data Centers, it is necessary to have efficient and appropriate information systems in place. In the architecture of information systems, efficient servers, storage devices, networking equipment, and power supply selection play a crucial role, according to green computing best practices.
- Cooling Systems: according to previous research, it is critical to consider both current and future requirements when designing data center cooling systems, and to design the cooling system in such a way that it can be expanded if needed.
- For Data Center Air Management and Cooling System, a standardized environ ment for equipment is required.
- When developing and selecting data center electrical system equipment, keep in mind initial and future demands.
- PUE: the Power Usage Effectiveness opti mization by smart and efficient infrastructure.

### Data Compression
In the enterprise, a large volume of data is stored that is duplicated in some manner. Backups of information systems are a perfect example of duplicated data. Intelligent compression strategies can significantly reduce data storage requirements by compressing data and eliminating duplicates.

### Disposal

Reduce E-waste

This trend circles back to the manufacturing stage of the life cycle of IT products. When creating IT devices with longer product longevity, E-waste will be reduced.

Creating circular IT products will also reduce waste, this can be achieved by developing a bill of material for newly made IT products and designing for disassembly. When the device is at the end of its life, materials can be separated and reused.

Material recycling

Every day, a big number of computer systems and related products are discarded because many industrialized countries are technologically stronger.

These products are sold in other developing countries. Recycling keeps materials like lead and mercury out of landfills, and reusing outdated computer components to repair or upgrade other computer systems saves energy, reducing the quantity of dangerous E-waste.

Leveraging Unused Computer Resource

One of the areas where Green Computing can expand is the sharing and efficient use of idle computing resources. It is a cost-effective way to harness the unused computing capacity of current devices to produce an environmentally friendly alternative to regular desktop computing. This allows for a reduction in CO2 emissions of up to 15 tons per year per system, as well as a reduction in electronic waste of up to 80%.

As mentioned above, further research will be focused on the ‘usage’ part of the life cycle. However, having a clear overview of the possible ways to green IT does not provide answers on which method a company should choose. This again (also in section 3.3) shows the possibility for further research into how to determine which way of greening IT is the best fit for a company. Companies will likely need to do a zero-measurement of their current IT carbon footprint to see where their biggest opportunities are.

## 3.6 When is IT sustainable?

Now that the definition of green IT is established, key motivations are identified of why companies should develop sustainable IT strategies, and various trends are discussed on how IT can become sustainable, a theoretical foundation of when IT can be called sustainable is needed. Unfortunately, this is a rather difficult question to answer. Companies within the consumer goods sector differ considerably and there is no one answer to when IT is sustainable.

In December 2015 the Paris climate conference (COP21) took place and the famous Paris Agreement was made. This agreement was the first universal, legally binding global climate agreement. It sets out a global framework to avoid climate change to exceed global warming. Temperature levels cannot rise more than 2 degrees Celsius and pursuing efforts to limit to only 1.5°C. To realize this, emissions need to be reduced. In December 2020, the EU submitted its updated and enhanced National Determined Contributions (NDC), the raised the target to reduce emissions by at least 55% by 2030 from 1990 levels. A long-term strategy was also created, and the EU aims to be climate neutral by 2050 (UN, n.d.). This entails an economy with net-zero greenhouse gas emissions. To reach those goals, businesses are forced to rethink their carbon emissions and create strategies to meet the goals.

According to the article published by the NOS in October 2021, Dutch companies have very diverse climate goals. Although an increasing number of Dutch firms intend to reduce substantially or even be carbon neutral by 2030, the number of organizations with no climate intentions is also increasing this century. The Dutch Innovation Monitor 2021, published by the University of Amsterdam and the Amsterdam University of Applied Sciences, confirms this. A good reason for this wide variety in strategies is COVID-19, due to the pandemic many companies are now focused on surviving instead of becoming more sustainable.

To answer the question of when we can call IT sustainable, an analysis of the climate goals of large consumer goods companies is conducted. In this analysis, various terms and statements are found. Companies mention the following: carbon neutral, 100% renewable energy, and 24/7 carbon-free energy. Even though they might appear similar at first look, they have substantial differences.

- Carbon neutral (net zero) means that any CO2 released into the atmosphere from a company’s activities is balanced by an equivalent amount being removed (Oxford l anguage).
- 100% renewable energy is where all energy use is sourced from renewable energy sources (e.g. solar or wind).
- 24/7 carbon-free energy (CFE) means that every kilowatt-hour of electricity consumpti on is fulfilled with carbon-free energy sour ces at all times, both day and night. It is both the end state of a fully decarbonized electricity system and a paradigm shift in energy procurement, supply, and policy design that will accelerate its arrival (UN).

Numerous company websites and whitepapers in the consumer goods industry were analyzed to create an understanding of their sustainable goals are, and how they might differ from each other. With this knowledge, a baseline of future sustainability performance can be developed and taken into account when creating the solution roadmap in later stages of this research. Four examples are discussed next, they were selected due to the variety in purpose and type of consumer goods.

*Unilever:*

The first company analyzed is Unilever. Unilever is aiming to achieve zero emissions across their operations by 2030, against a 2015 baseline. This medium-term absolute emissions reduction target is approved by the Science Based Targets initiative (SBTi) and is consistent with the 1.5°C ambition of the Paris Agreement. Additionally, they have set a short-term target to achieve a 70% absolute emissions reduction by 2025, compared to the 2015 baseline. The reason for adding this additional short term goal is to help them measure their progress and check if are they on track for the long-term goals. (Unilever 2021).

*Nike:*

The second company is Nike. Nike’s 2025 targets on carbon emission reductions are a 70% decrease of absolute reduction of greenhouse gas (GHG) emissions in owned or operated facilities, through 100% renewable electricity and fleet electrification, and Nike will decarbonize its supply chain. This entails bending the curve of greenhouse gas emissions from key suppliers’ operations, flatlining at 2020 levels or below despite anticipated business growth, through renewable energy, energy efficiency, and alternative fuels.

By 2030, their commitment is to reduce greenhouse gas emissions by 65% in all their owned or operated spaces, and by 30 percent across our extended supply chain. Lastly, by 2050, they will need net-zero (Kinder, N).

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*Patagonia*

The third company included is Patagonia, which has shown the most ambition and progress of them all. Patagonia claims to become carbon neutral by 2025. They see switching our stores and offices to renewable energy as the easy part. However, to truly limit its emissions, Patagonia has to have mitigated the overwhelming impact of its supply chain. Nearly 86 percent of Patagonia's total carbon emissions come from the creation of the materials used in our products. Therefore, to become carbon-neutral by 2025, Patagonia needs to reduce and eliminate these emissions by 2025, Patagonia needs to reduce and eliminate these emissions (Patagonia, n.d.).

"I see Patagonia's carbon-neutral by 2025 goal more as the starting point in our carbon-neutrality journey. Ultimately, we want to rely less and less on offset mechanisms and see our gross emissions plummet towards zero." – Paul Hendricks, Patagonia's senior manager of environmental sustainability (Bustamante, 2020).

Lush

The fourth consumer goods company is Lush. Lush's climate commitment is to cut its greenhouse gas emissions in half by 2030 and become net zero by 2050 (Lush Fresh Handmade Cosmetics, 2021).

An important finding is that most (consumer goods) companies of a larger size have signed the Science-Based Targets, including all companies mentioned above. Science-based targets show companies how much and how quickly they need to reduce their greenhouse gas (GHG) emissions to prevent the worst effects of climate change (STBi, 2021). The SBTi is a partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI), and the World Wide Fund for Nature (WWF). Another important finding is that they are mostly in line with the developed climate goals at the Paris agreement, except for Patagonia which has additional sustainable goals.

However, when looking deeper into how companies are planning to reach their climate goals, greening IT is not mentioned. Most companies are restrictive and untransparent in how to achieve their goals. If companies disclose information about their sustainable strategies, they often prioritize supply chain, materials, and manufacturing over sustainable IT. Therefore, we can conclude that sustainable IT is disconnected from the wider sustainability agenda (Capgemini, 2021). The next section: Why organizations are not prioritizing Green IT, is this topic further researched.

The answer the question which was asked at the start of this chapter, when is IT sustainable?is as follows: when the net-zero goals are achieved, which also includes that IT processes are carbon neutral. However, it is unclear how companies measure or plan to improve their IT footprint. Therefore the question for further research arises: How can Deloitte incorporate evaluating the level of Green IT in its current frameworks?



## 3.7 Why organizations are not prioritizing Green IT?

Capgemini research institute identified two key factors:

The first factor is due to IT's complexity of common standards or ratings by IT providers to measure impact on the environment. In Capgemini's survey, 49% of the respondents answered that they do not have access to or the capabilities to use the tools to evaluate their current IT carbon footprint, and 53% say they do not have the required expertise for the implementation of green IT. A senior executive for environmental sustainability adds, "The energy impact of infrastructure, like a boiler, has been studied so well that organizations are very clear on the carbon impact. But that is not true of IT infrastructure yet. I think the IT industry has to come up with green labeling for their products, which would then make it easier for companies like us to make greener purchase decisions." Additional research on the carbon footprint associated with both the manufacture and use of IT hardware is essential.

The second factor is the challenges of implementation for sustainable IT. Within this factor, the four main challenges are listed below:

- Lack of domain expertise within a company to implement sustainable IT initiatives.
- The expense of setting up a sustainable IT infrastructure is high.
- Impact on business continuity when shifting away from legacy systems.
- The trouble of determining the best Green IT use case to invest in.

Existing literature confirms those challenges. Gourav's research shows that educating stakeholders regarding the environmental impact of computers was one of the main problems. The major problem was educating the stakeholders regarding the environmental impact of Information Technology. The benefits of a project which includes greening are usually visible after a considerable period of time. As a result, demonstrating the rapid return of investment after the successful implementation of Green IT is a major difficulty (Gourav et al, 2018).

Additionally, the perception of sustainable products is an issue. The general perception of going green means a decrease in the quality of the product (D'Souza, 2006). A quote from a senior executive for environmental sustainability in Capgemini's research says: "Production IT infrastructure plays such a critical role in day-to-day operations as well as in data security. Therefore, there is a fear that you don't want to take a risk with any. The idea is that you are somehow compromising on quality if you go for a greener product. It's more of a perception issue."

Lastly, determining in which way to green a company's IT is an issue. As established earlier, companies do not think they have the right capabilities to use existing tooling to research their best use cases to start with.

Using those two key factors as a baseline of why companies chose to not incorporate Green IT in their sustainable strategies, further research can be done into how the mindset of corporations towards the perceived difficulties of Green IT can be changed.

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### 3.8 Governance

Consumer goods companies are setting goals to reduce their carbon footprint according to the outcome of the Paris Agreement, however, companies need to be assessed to see if the goals are achieved. Therefore, the EU has adopted integrated rules to ensure planning, monitoring, and reporting of progress towards its targets for all EU and its member countries to report to the UN (EU, n.d.).

However, most companies in the EU are not obligated to report their carbon emissions, and according to previous research, voluntary environmental governance structures boost a company's environmental legitimacy rather than driving proactive environmental performance actions (Peters, 2014). Greenhouse gas (GHG) information is non-financial information concerning a company's exposure to environmental risks that are relevant to the company's operations and future profitability.

From having conversations with various people from the sustainability department within Deloitte, was learned that Deloitte and other Big 4 companies are seeing an increase in the ask for 'sustainable auditing'. Environmental, Social Governance (ESG) departments are rapidly growing and specialized in helping their clients integrate sustainability criteria into their performance management, financial disclosure, and external communication. The IT strategy team at Deloitte rarely encounters questions regarding sustainable IT. Current climate goals are focused on general CO2 reduction, and not focused on Information Technology.

To conclude, a change in policy - regarding IT's carbon emission becoming mandatory to report will very likely accelerate the demand for Green IT. How Deloitte can contribute, and to what extend governance mechanisms and policies could impact the demand for green IT is a topic for further research.



# 03

# Context Analysis

## KEY TAKEWAYS

Sufficient research on the definition of Green IT, how IT impacts our climate, trends, and motivational drivers for companies to switch to green IT is conducted in the past. However, having this knowledge is not enough. There still is room for improvement in awareness, perception, the direct implementation, and governance of Green IT. The opportuniities for research are the foundation for further stages of this thesis and are formulated in research questions.

1. 3.3: How is Deloitte currently helping its clients to become more sustainable in IT?
2. 3.4: How should a company manage the process of Green IT adoption?
3. 3.5: How to determine which way of greening IT is the fit for a company?
4. 3.6: How can Deloitte incorporate evaluating the level of Green IT in its current IT assessment frameworks?
5. 3.7: How can the mindset towards the perceived difficulties of Green IT be changed?
6. 3.8: How will increased governance and legislation impact the demand to shift to green IT?

# 04

# Talking with experts

This chapter discribes the process in which the key take-aways were translated into interview goals, how the interviews were conducted, who were selected, and how the large amount of quantative data was analyzed.

# Chapter 04
# TALKING WITH EXPERTS

## 4.1 The Approach

To further explore what the future of IT looks like, and how sustainability can be incorporated in IT, 10 experts within Deloitte were interviewed to gain a deeper understanding of their knowledge and experience. In this chapter, interview goals were developed, the interview format and composition of interviewed experts are explained, results are analyzed and iterated on, and lastly divided into meaningful clusters.

## 4.2 Interview goals

This explorative research had three main goals which resulted from the initial assignment (to create a future vision of IT in 2025, and the roadmap to achieve the desired future) and further research question one, two, four, and five (chapter 3.9) found in the literare research.

To create a future proof strategy, a basic understanding of what the future of IT will look like needs to be established. Therefore, the first goal aimed to receive expert input on the future of IT. The second goal aimed to identify how sustainability is currently incorporated into IT and aimed to identify how sustainability can be incorporated into IT in the future. This includes understanding the current mindset towards sustainability in IT, interest in sustainability, and level of knowledge experts have on incorporating sustainability into IT, illustrated and sustained by their experience in previous projects.

The third goal aimed to discover experts' opinions on frameworks by identifying what core elements make a framework useful and if sustainability is or can be incorporated.

1. Expert input on the future vision of Green IT.
2. Identify how sustainability is/can be incorporated in IT.
3. Discover Deloitte consultants' needs and challenges in applying frameworks, and discover how sustainability can be incorporated into IT strategy frameworks.

## 4.3 The interview format

The interviews were conducted through Zoom and lasted approximately 30 to 45 minutes each. To subtract the most in-depth, high quality, open-ended data from the experts, semi-structured interviews were most suited in this exploratory stage of the project (Adems, 2015). Due to the two different areas of expertise (IT and sustainability), two versions of the semi-structured interview guides were made and applied. To ensure comparison is possible between the experts of different fields, the interview guides differ as minimum as possible, more information on the interview guide can be read in the next section 4.3.1.

### 4.3.1. The interview Guide

With the main focus on exploring the experts' opinions, semi-structured interviews were appropriate, since they provide an open atmosphere in which the participant is free to speak his/her mind. To make sure the three goals defined are achieved interview guides were made. The interview guides were based on the article 'CONDUCTING SEMI-STRUCTURED INTERVIEWS' written by Adams (2015). The interviews progressed from low to high abstraction levels to establish a sense of trust and comfort. All interviews contained three themes, with the first theme topic depending on their expertise. This resulted in two varieties of the first theme, the first version focused on IT and the future of IT for IT experts, and the second version on the role of sustainability within Deloitte for sustainability experts. The second and third themes were similar in both interview guides. Questions were formulated in such a way, that the interviewee was probed to think in challenges and talk about their own experience. The interviews can be found in Appendix C.

### 4.3.2. Pilot Interview

After the development of the initial interview guide, a pilot interview was conducted with a consultant in the Tech Strategy & Operating Model team. In this interview, the logical order of questioning, and introductions to each theme were assessed and resulted in a few small changes. In the first section, some additions were made to create a more logical order and reduce repetitive answers. Additionally, feedback was given on the amount of information that was given when switching to a new theme. A more elaborate theme description was developed for the final interviews.

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# TALKING WITH EXPERTS

## 4.4 The experts

To make sure the qualitative data collected from the interviews would bring a holistic perspective on the topic of IT and sustainability in IT, the experts were selected purposely. Within the IT and sustainability pillars, various levels of expertise were chosen to range from starting consultants to experienced partners within Deloitte.

Participant 0 (Pilot Interview)
IT expert
Business analyst, Tech Strategy Operating Model, Deloitte

Participant 1
IT expert
Business analyst, Tech Strategy Operating Model, Deloitte

Participant 2
IT expert
Jnr Consultant, Tech Strategy Operating Model, Deloitte

Participant 3
IT expert
Snr Consultant, Tech Strategy Operating Model, Deloitte

Participant 4
IT expert
Manager, Tech Strategy Operating Model, Deloitte

Participant 5
IT expert
Snr Manager, Tech Strategy Operating Model, Deloitte

Participant 6
IT expert
Team lead/ Snr Manager, Tech Strategy Operating Model, Deloitte

Participant 7
IT / Sustainability expert
Jnr Consultant, Tech Vision & Architecture, Deloitte

Participant 8
IT / Sustainability in IT expert
Director in Consulting, Enterprise Technology and Performance, Deloitte

Participant 9
IT / Sustainability expert
Manager, Internal Services, Deloitte

Participant 10
Sustainability expert
Project Manager Sustainability, Deloitte

Participant 11
Sustainability expert
Snr Consultant, Risk Advisory, Deloitte

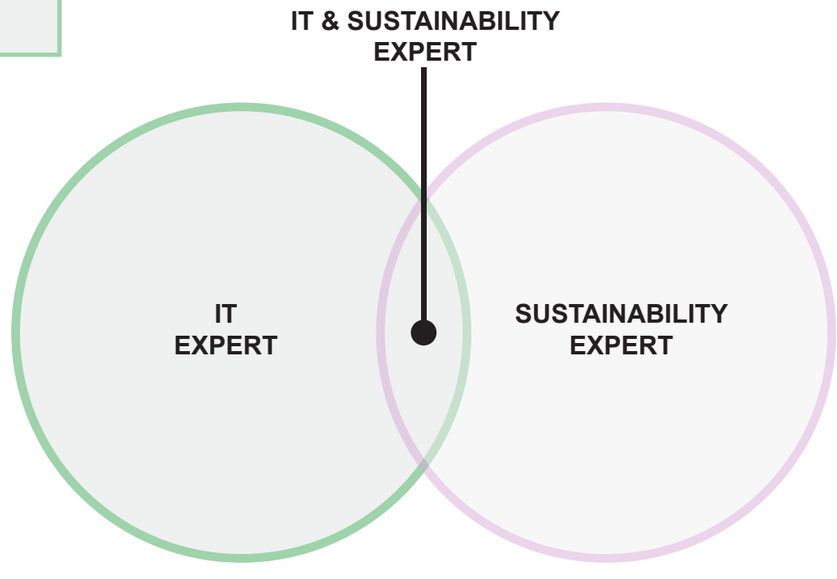


*Figure 5 - Overview IT and Sustainability experts*

# Chapter 04
# TALKING WITH EXPERTS

## 4.5 The analysis

### 4.5.1 The analysis process

During the interviews, a large quantity of raw data was collected. After conducting the interviews online on Zoom, the recordings were transcribed with Otter.ai software. The interviews are relistened to and the transcripts were manually checked and adjusted if needed. Afterwards, inductive thematic analysis was conducted. This included various steps. First, participants' quotes were selected. Second, the quotes were clustered according to topic and relevance, this is shown in figure 6. (figure 6 is ment to give an abstract overview. The quotes in each cluster can be found in Appendix D). Third, the clusters were divided into 'Future vision', 'Framework requirements', or 'input' or 'output' for the future IT strategy. Finally, after the interviews were conducted and the data were clustered, another iteration with Deloitte colleagues was done.

### 4.5.2 Iteration session with Deloitte

A two-hour session was done with two participants from Deloitte; A consultant and Manager of the Technology Strategy & Operating Model team. This interactive session was meant to iterate on the first results of the processed interview data, and form the basis of what the design requirements will be. In this session, it was important to discover what the Deloitte employees saw as challenges and key findings of my initial results. The session was done in real life while using a Miro board to go over the collected data. Various minor changes were made to increase the logic within the clusters. During the session, participants were stimulated to think in challenges and were asked frequently which topics they saw as more important or relevant in terms of

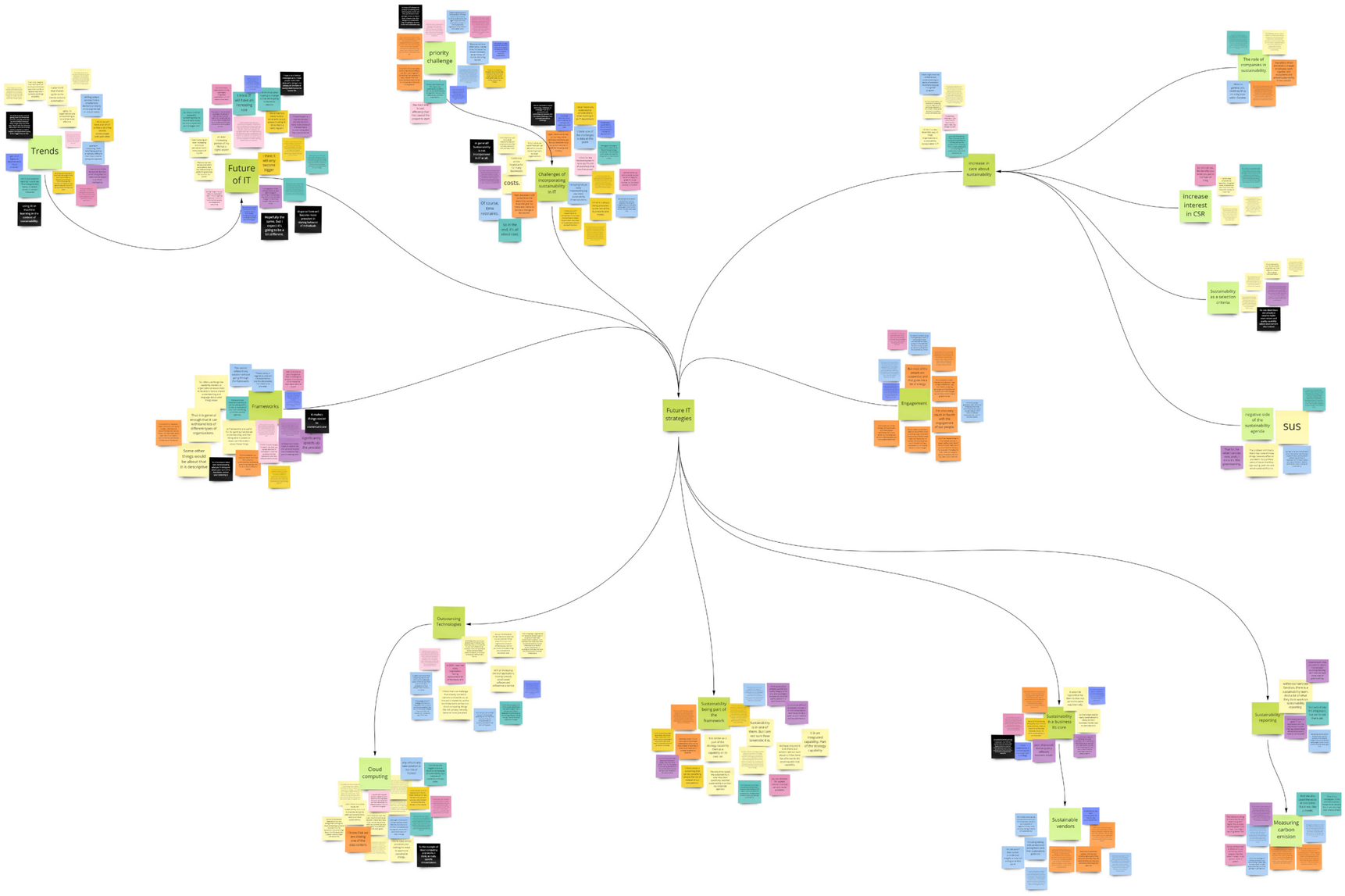


*Figure 6 - Overview quotes clustered*


*Figure 7 - Overview quotes*

the solution.

### 4.5.3 The insights

From the interactive session, several key insights were acquired and are described hereunder.

1. Engagement is crucial. Employees need to be involved in the outcome of the solution. The importance of sustainability must be thoroughly communicated to the employees. Additionally, employees need to be involved to create the best outcome.

2. Sustainability can not be achieved at the cost of quality. This means that to Deloitte, the quality of the delivered work can not be lower in quality to the client. Sustainability can be an extra benefit but functionality is still more important.

3. Sustainability reporting and measurement must be included. For Green IT to be of value for Deloitte's clients, it should be expressed in quantities of carbon emission.

4. With the current market and technology advancements, outsoursing of IT systems must be considered.

Secondly, during the session participants were having interesting discussions on the importance of company care in sustainability, and what kind of companies would come to Deloitte for help for help in their transition to Green IT. In a way, it can be simplified to the chicken and the egg question, what was first: the chicken or the egg? In this case, it would be: Who cares about sustainability first: the company employees or the customers. What I learned from this discussion is that the type of company can be of great importance when establishing if the solution provides value for the company.

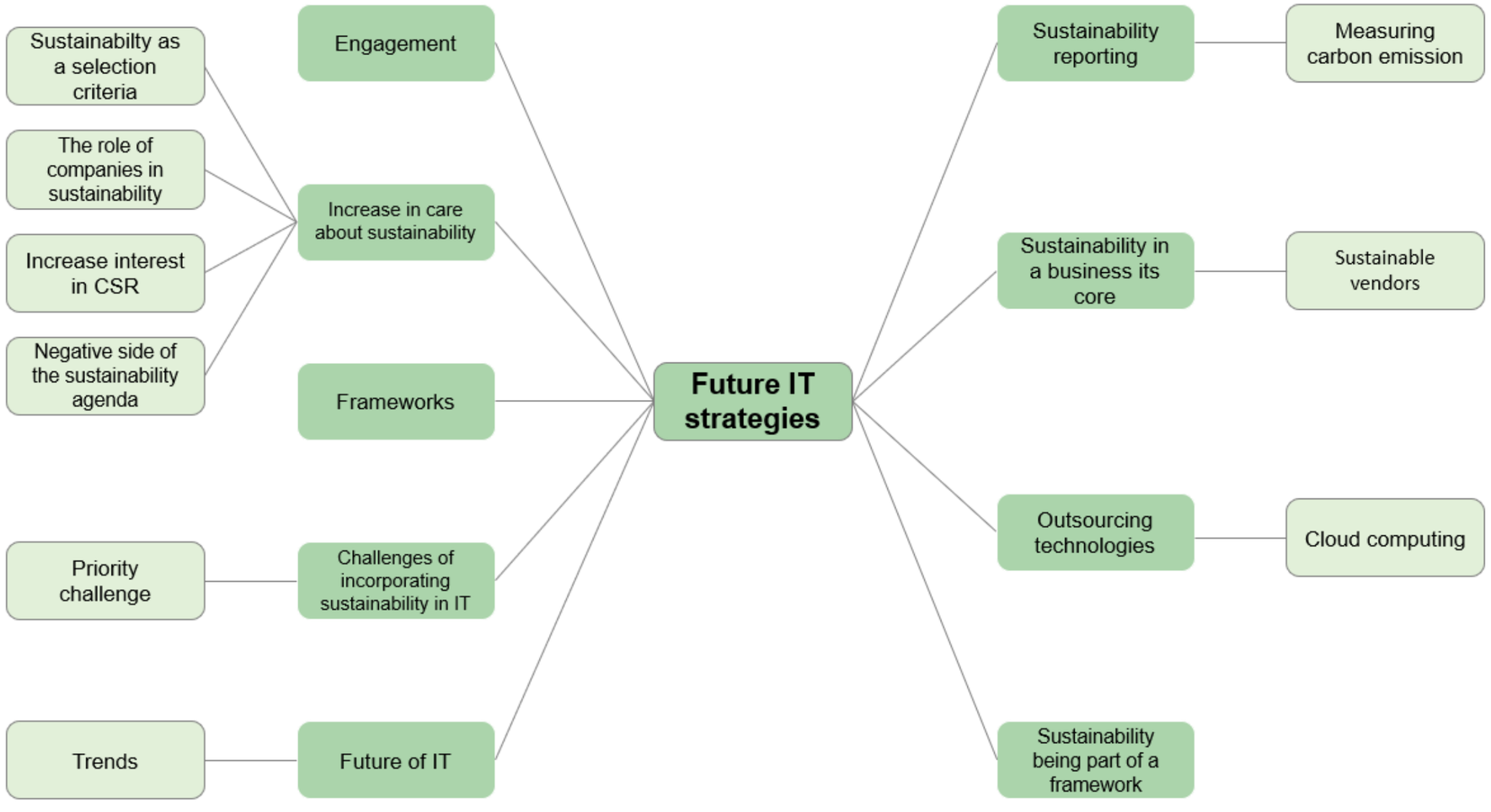


*Figure 8 - Overview clusters*

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# TALKING WITH EXPERTS

### 4.5.4 The final clusters
The insights were translated to final clusters. This section provides a brief description for clarification purposes.

### Future vision

*Future of IT*
To start, relevant quotes on which IT trends are considered interesting and how IT experts envision the future of IT are selected in the first cluster. An interesting finding is the high level of agreement of the interviewees.
“I think IT will have an increasing role”
“IT will only become bigger”
“I see it playing an ever-increasing and more pervasive role in every aspect of my life.”

Not only did all interviewees expect IT to grow before 2025, most agreed on IT devices becoming more seamlessly integrated into humans’ everyday life, and AI being the most interesting trend to follow in the upcoming years. This cluster, combined with information from the literature research will form the theoretical foundation for the development of the future vision (Chapter 06)

### Input
The clusters selected to be relevant for the input side for the future IT strategy are; Challenges of incorporating sustainability into IT, Engagement, Increase care in sustainability. These three main clusters form the foundation of why sustainability should be incorporated into future IT strategies. Together with the Future Vision clusters, they give an overview of recent developments, the desired future, and what is needed to achieve sustainable IT.

*Engagement*
The category ‘engagement’ is intertwined with the other two selected categories. Changes in engagement would have a large effect on both ‘increase in care about sustainability, and ‘challenges of incorporating sustainability into IT’. The category Engagement can be divided into two subcategories: Customer or Employee engagement. As discussed above, employee engagement is crucial in the execution of making IT more sustainable. On the other side, customer engagement is intertwined with the ‘Challenges of incorporating sustainability into IT’ and in the ‘Increase care in sustainability’. If customers of consumer goods companies are more engaged in the shift to a greener company, the care of the company in sustainability will most likely increase simultaneously.

Challenges of incorporating sustainability into IT
This cluster gives an overview of what challenges the experts see in incorporating sustainability into IT. An important finding is that almost all mention the priority challenge. This means that when companies decide they want to do something about their carbon emissions, greening their IT is not the first thing they do. According to the previously conducted literature research, this can have various reasons. From lack of awareness of the large carbon footprint of IT to the fear of a decrease in quality, to the missing capabilities.

Increase care in sustainability
This cluster consists of four subclusters: Increase interest in Corporate Social Responsibility, the role of companies in sustainability, sustainability as a selection criterion, the negative side of the sustainability agenda. First of all, a growing trend mentioned by multiple experts, which is also confirmed in the literature research, is the increased interest in CSR. Especially larger corporations have shown an increase in care about their role within society, and therefore sustainability. Some companies are using sustainability as a selection criterion for important decisions they have to make. These decisions can vary from material selection to the supply chain process. However, the term “greenwashing” has also been said more than once while discussing the positive change in the attitude of larger corporations towards sustainability.
“I think most corporations, especially like global scale, corporations, also think that their role within society is important.”
“So a lot of that is sort of virtue signaling at the moment where people talk about having a sustainability agenda, and then don’t do very much about it”

### Output
The clusters selected to be relevant for the output side for the future IT strategy are; Sustainability reporting, sustainability in a business its core, and outsoursing technologies. These three clusters form the basis of what experts find the most needed elements to incorporate sustainability in IT.

Sustainability reporting
Sustainability reporting is considered an important element for giving Green IT more value. Being able to measure and report the carbon emissions of IT will give a company an overview of the reduced carbon emission. Currently, the software is being developed to measure the carbon footprint of IT. Scope 1 and Scope 2 are already measurable, however, Scope 3 is still under development, and is expected to have the biggest impact.

Sustainability in a business core
For sustainability to make a difference in the direction of a company, it should be embedded in the core. If not, and sustainability stays an afterthought, it will be overlooked and costs will be a more important factor in most tradeoffs.

Outsoursing technologies
Considering the timeframe decided in this thesis, outsourcing strategies will most likely be the way to go to green IT in the upcoming 3-5 years. Additionally, Cloud Computing is identified as an important trend by IT experts. “almost any new solution is our cloud-hosted.“ However, Cloud Computing is not a trend because of sustainability, but because of costs, scalability, and needed recourses. “I would say the biggest move to the cloud is not because of sustainability, but because of scalability and also costs.”

### Framework
At the end of the interviews, participants were asked about their opinion on frameworks. The goal of this question was to identify what elements make a good and functional framework. Additionally, participants were asked if they thought sustainability could be implemented in the frameworks they usually use, and if yes, how? An interesting finding was that not many participants knew sustainability already is part of the most used framework, and those who did say: “Sustainability is in one of them. But I am not sure how tokenistic it is.”
In an attempt to display the relations between the categories and subcategories an integrative diagram was created.

# Chapter 04
# TALKING WITH EXPERTS

### 4.6 Reflecting on the goals

After analyzing the data of the interviews, the findings were compared with the interview goals. This was done to reflect on the quality of the data and to assess if enough knowledge was obtained to move on to the next phase in which the design requirements are developed.

**GOAL 1: Expert input on the future vision of Green IT.**

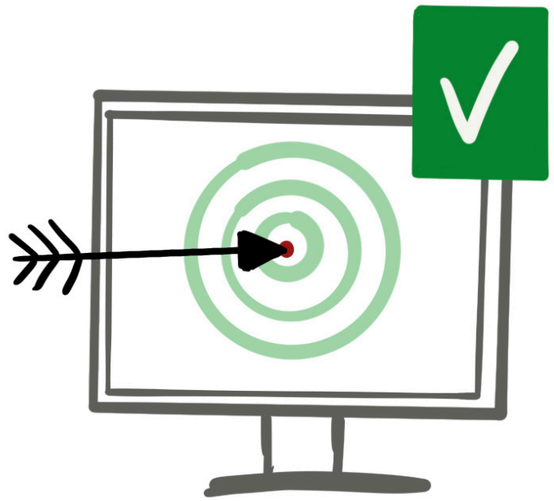
The first goal was to gain experts' opinions on how they see the near future of IT, and what trends they find important. The sub-cluster trends and the cluster the future of IT provide rich data on the topics. Therefore, we can say that the first goal is achieved.

**GOAL 2: Identify how sustainability is/can be incorporated in IT.**

The second goal was to identify how sustainability is currently incorporated in IT according to the experts and to gain their opinion on how sustainability could be incorporated. Most clusters answer this question. It was made clear that Green IT is still in its infancy, but most participants did notice a change towards in demand in sustainability in their projects. However, the question of how sustainability could be best incorporated was found difficult to answer for al participatns. Therefore, it was corded that goal two was partially met.

**GOAL 3: Discover Deloitte consultants' needs and challenges in applying frameworks, and discover how sustainability can be incorporated into IT strategy frameworks.**

The third goal was to establish participants' opinions on why they use certain frameworks and what they find useful attributes of those frameworks. Additionally, the question of how sustainability could be incorporated was asked. A wide range of answers resulted from this question. It was interesting to see that many did not think about including sustainability prior to the interview. But when they were forced to think about it they gave different answers. To conclude, the needs and challenges of the experts were identified, and various ways to incorporate sustainability were discovered. Therefore, the third goal is achieved.





# 04
# Talking with experts

## KEY TAKEWAYS

By interviewing ten experts, insights were collected about the role of sustainability in the field of IT. Analyzing the data resulted in 9 clusters, providing insights into the future of IT, what role sustainability plays in it, and how sustainability can be implemented in frameworks. The clusters in combination the theoretical background form the basis of the next chapter, specifying the solution space.

# 05

# Specifying the solution space

This chapter describes the process of moving from empirical and desk research to defining principles for the solution. As a result, 15 principles were defined that serve as guidelines for the development of the future vision, design vision, and final solution.

# Chapter 05
# SPECIFYING THE SOLUTION SPACE

## 5.1. The approach

From talking with the experts a large amount of data was collected. Afterward, relevant quotes were selected and clustered in Miro. This helped to iteratively structure and visualize insights. After the clusters were final and the feedback resulting from the iterative session with the Deloitte consultants was implemented, it was time to translate the clusters into key insights. However, to do so, the key insights needed to be developed with care and formulated in such a way that prevents bias or an incomplete set of principles.

## 5.2. The principles

Figure 9 presents an overview of the developed key insights per interview goal. The process of translating the quotes of the clusters to key insights was iteratively done. To make these key insights more actionable and applicable for further stages, 15 design principles were formulated. However, the design principles resulting from interview goals one and three are for more practical purposes. Therefore, they are separated for the upcoming steps. This entails that the key insights from Goal 1 are used for the development of the future vision (Chapter 6) and the design principles of Goal 3 are only used for the development of a framework (Chapter 7). The next subchapter (Chapter 5.2) describes the eleven formulated principles of Goal 2.

Defining the design principles provide guidelines for the ideation phase, using these principles as areas to explore and include in the final solutions. The principles have been based on the findings from the research phase, and expert interviews. As explained earlier, the Key insights of Goal 1 and Goal 3 will be discussed in the next chapters.

| Interview goal | Cluster | Key insights | Design principle |
|---|---|---|---|
| Expert view on the future of IT | Future of IT | • IT will have an even bigger role in our everyday lives in the future<br>• IT devices will work more seamlessly together<br>• Artificial Intelligence will become more profound within applications | future vision |
| Experts opinion on how sustainability can be incorporated into IT | Engagement | • Engagement is growing, but still a group is not interested/sees no business value<br>• Especially the younger employees are engaged<br>• Two forms: employee and customer engagement | Increase employee engagement<br>Increase customer engagement |
| | increase in care about sustainability (companies) | • Companies are taking action to increase CSR mostly for reputational reasons<br>• Companies play an even bigger role in the journey towards sustainability compared to individuals<br>• Companies try to include sustainability as a selection measure, however, mostly in a tokenistic way<br>• Companies sustainability efforts are often (perceived as) greenwashing | Be meassurable/ reportable |
| | Challenges of incorporating sustainability in IT | • When a company wants to become sustainable, Green IT is overlooked (not a high item on the sustainability agenda)<br>• Green IT is not a business priority<br>• If the price is higher, costs are often a deciding factor. Which is an obstacle in the grow of Green IT<br>• No accurate data on how the amount of reduced carbon emissions<br>• Fear of Green IT decreasing the quality of the IT | Be of equal quality |

# Chapter 05
# SPECIFYING THE SOLUTION SPACE

### 5.2.1. The principles explained

Increase engagement: A key takeaway is that engagement in sustainability within companies is already growing, however, including and engaging employees in new directions is crucial to success.

Be measurable/Reportable: To give value to sustainability, the reduction in carbon emission needs to be measured and reported.

Be of equal quality: Consumer goods companies nowadays are very dependent on their IT systems. Therefore, shifting to green IT cannot reduce the quality of the IT in the consumer goods company.

Be transparent: Transparency between companies and customers can accelerate the transition face we are currently in.

State data limitations:Currently, carbon emission measurement is based on various estimates. To prevent biases, data limitations must be explicitly stated.

Include standards: Definitions and standards are needed to know when IT can be called sustainable. With what percentage of reduction is a sustainable IT transformation succeeded.

Become a business priority: For sustainability to make a difference in a company, it should become a high priority.

Include sustainable vendor selection: Scope 3 of IT consists of the biggest amount of carbon emission. Therefore, it is important to look outside your own company and select sustainable vendors.

Include outsoursing: In the coming years, cloud computing will grow and should also become known for its reduction in carbon emissions.

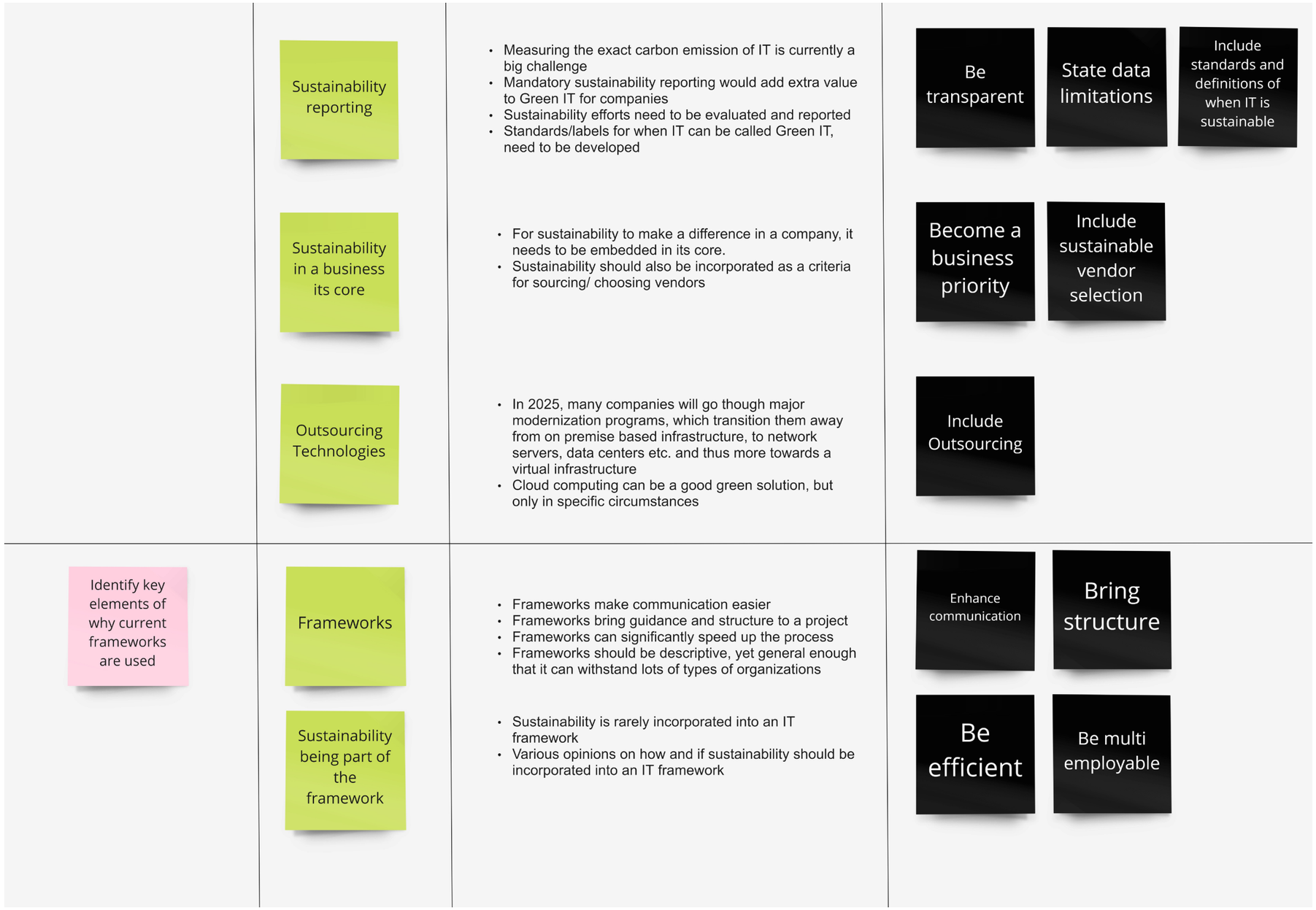



*Figure 9 - Overview key insights*

# Chapter 05
# SPECIFYING THE SOLUTION SPACE

## 5.3. Prioritizing the principles

Now that the nine principles are established, they were numbered to establish priority within the principles. Adding this extra step enhances the ease of developing the final solution. Having on top of mind was is seen as a must and what should be incorporated also eases the communication of the solution.

### Level 1: First priority

#### 01 Increasing Engagement
WHAT? Employee engagement is the key to the success of the solution.
WHY? If employees are motivated to adopt the result, sustainability will be more included in the IT transformations
HOW? Create interesting incentives to increase the motivation to participate

***"So compared to when I started working here, I see a major difference, I see that there is a big, big group of people who support all of the changes we make, which is really great to see."***
***- Interview participant***

#### 02 Equal Quality
WHAT? The quality the company experiences in their IT products must be the same when shifting to Green IT
WHY? Consumer goods companies rely heavily in their everyday business on IT systems
HOW? By assessing the quality and conducting satisfaction surveys at the client

***"Often have negative associations with sustainable product options, viewing them as being of lower quality"***
***- Loyd Millder, in Harvard Business Review***

#### 03 Be Measurable and Reportable
WHAT? The amount of carbon emission a company has should be measured and reported
WHY? Only when we can measure the decrease of carbon emission, we can add value to it.
HOW? By implementing new software/AI tools in collaboration with the Audit sustainability team

***"Companies are decreasing the carbon emissions as much as possible. However, providing the insights that you're actually doing it, again, which is kind of the kind of an issue right now"***
***- Interview participant***

#### 04 Outsourcing
WHAT? Outsourcing IT infrastructure is growing and will be very present in 2025
WHY? It is a cheaper, less maintenance, and more sustainable solution for in-house data centers
HOW? By selecting the right outsourcing partner which fits the clients' customizable needs.
"
***A rapidly growing trend is that applications are moving towards cloud-based software and software as a service"***
***- Interview participant***

***"In 2025, I see I see many organizations having outsourced a lot of the basics of IT"***
***- Interview participant***

### Level 2: Second priority

#### 05 Business priority
WHAT? Sustainability must be more a top priority while making important decisions
WHY? Only then it will make a substantial impact on important business decisions, otherwise, costs will always be a more important factor
HOW? By making sustainability part of a business strategy

***"I think sustainability is something that should go back to strategy"***
***- Interview participant***

#### 06 Be transparent
WHAT? Only what companies want to report, is reported. This results in a negative outlook and associations with greenwashing to companies who show their sustainable progress
WHY? Acknowledge and understand what influences companies to become more transparent
HOW? Provide a few concrete options to companies on how they can report in a transparent way

***"Depending on what you want to report, I've not seen anything that doesn't have at least some level of greenwashing."***
***- Interview participant***

### Level 3: Nice-to-have's

#### 07 Include standards
WHAT? There is a lack of available knowledge of when something is sustainable
WHY? Because the standards were never developed, due to not being able to accurately measure carbon emissions of IT
HOW? Recognize which standers need to be set, and start with goals and estimates

***"I think one of the challenges is lack of data at this point"***
***- Interview participant***

#### 08 State data limitations
WHAT? Many numbers for carbon emissions are estimates
WHY? Because the real numbers are hard to measure
HOW? Create symbols to show which numbers are actually accurate and which are merely based on general estimates

***"I think the challenge now is that you have to bring in data. The data needs to make sense otherwise, you know, garbage in, garbage out"***
***- Interview participant***

#### 09 Vendor selection
WHAT? Include sustainable vendor selection when buying new equipment
WHY? Because the indirect emissions are usually the largest part of the emissions
HOW? By having an ongoing conversation with vendors, and asking them about what they are doing in terms of sustainability

***"Scope 3, so for example our vendors, have the biggest impact on our carbon emission."***
***- Interview participant***

### 5.3.1 Prioritizing explained

The first priority principles are selected on their influence on the succession of the solution, you can also say that these are the bare minimum requirements that the solution must have. For example, if there is no engagement of employees, the solution will not be implemented. Or if the quality of the IT processes decreases, no client will be interested in paying more for less. If the progression of reduction of the carbon emission cannot be displayed, we will not be able to measure success. And lastly, the near future will be focused on Cloud-Based solutions, so if I do not make it fit for outsourcing, it cannot be implemented.

The second priority principles are still reasonable to implement but form a bit more of a challenge. This is because these principles also require cooperation of the clients of Deloitte. The solution I provide can only encourage making sustainability a business priority, but in the end, it is up to the client to decide to do so. Additionally, transparency is something the whole sector needs to adapt to. Again, my solution will most likely encourage transparency but it is unfortunately not completely in the hands of the Deloitte consultants.

The Nice-to-have principles are more future-oriented. When more data is available, standards can be developed and limitations will be reduced. Currently, only conversations with vendors can be encouraged. Sustainable IT devices are not price competitive and are, therefore, a goal for the future.



# 05

# Specifying the solution space

## KEY TAKEWAYS

Out of every cluster, key insights were subtracted, analyzed, and fifteen actionable design principles were established. Nine are of importance for the development of the solution. One for the development of the future vision, and four to take into account when developing the framework. Next, three levels of priority were identified and the design principles were categorized. The fifteen design principles will help redefine the brief, and guide the development of the solution.

# 06

# The design vision

The insights gained during the context analysis, literature research, and interviews are used to define to create the final design brief. To further scope the project, the future vision, design vision, and design goals are identified in this chapter.

Chapter 06

# THE DESIGN VISION

## 6.1. The approach

The insights gained during the context analysis, literature research, and interviews are used to define to create the final design brief. To further scope the project, the future vision, design vision, and design goals are identified. The future vision provides a high overview of what the future of sustainability in IT will look like, in the design vision it becomes clear what the role of Deloitte can be in this future, and the design goals define the design challenge for the solution.

## 6.2. The future vision

The outcome of the literature research combined with the input of the IT experts forms the basis of the future vision. Establishing what the future will look like for sustainability in IT is beneficial for Deloitte and my project due to the abstract overview it provides. The future vision will stir up the results of this project towards a more implementable outcome and can help organizations incorporate a long-term, future-oriented perspective (Calabretta & Gemser, 2016).

A key finding of the context analysis (chapter 02) is that IT is constantly growing, and IT is not expected to stop extending its influence on society any time soon. The role IT plays in our lives is growing, and according to the interviewed IT experts, it will be integrated even more seamlessly. Modern companies will become more reliant on the use of their devices. They mention that the past shows that if companies do not adopt technology advancements it can lead to serious problems. The use of abundant technologies like AI, big data analytics, and cloud computing will continue to get stronger and stronger with most companies, and this will drive the strategic agenda.

Another aspect that forms the basis of the future vision is sustainability. The literature research already discusses how sustainability increasingly affects the business's agenda. Due to the encouragement of the UN and the initiative of Science-Based Targets, companies are committing to reduce their carbon emissions rapidly. There is a large consumer-driven market opportunity to become more sustainable, and soon it will become a must. In various sectors, carbon taxes are rising and the consumer goods sector will follow.

With these two main factors together form the future vision of sustainability will look like in the domain of IT:

**FUTURE VISION**

**In 2025, Information Technology will be incorporated even more into our everyday lives. Due to the growing engagement of employees and customers in environmental sustainability, and an increase in care about carbon emissions of companies, developing sustainable IT strategies will be a necessity to become net-zero and future-proof.**

Chapter 06

# THE DESIGN VISION

## 6.3. From future vision to design vision

In the previous chapter (chapter 5.2.1) the general future vision for sustainability in IT was established. To move to a specified design vision relevant for Deloitte, and in particular the department TSOM within Deloitte it is needed to go one step further. To do so the question: “what role can Deloitte play in the transition towards sustainable IT?’ was asked.

To answer this question, the role of the Technology Strategy & Operating Model team within Deloitte must be clear and well defined. Deloitte is committed to driving societal change by guiding with the purpose to “make an impact that matters”.

TSOM delivers the right strategy and transformation approach for their clients, and prepares their business operations to grow, embrace the digital agenda, maximize operational efficiency, and optimize capital assets.

### DESIGN VISION

**For employees working in the Technology Strategy & Operating Model team at Deloitte Consulting, I offer a tool that makes sustainability in IT implementable. This tool provides actionable capabilities and provides the employees with insightful knowledge and guidelines to be an IT consultant who enables their clients’ IT to be future-proof and with the smallest carbon footprint possible.**



## 6.4 The design goals

Now that the future vision and the design vision are established, four design goals are identified based on the developed principles and design vision.

The first design goal is the main focus for the next phase. Engagement that results in actions of Deloitte’s employees is vital for the solution to be implemented. It is expected that the first two design goals positively influence each other. When engagement grows, there will be natural growth in curiosity, and this will then lead to an increase in knowledge about the topic. Additionally, it is also expected to work the other way around: when knowledge of the topic grows, an increase in engagement can be expected. The third design goal focuses on measurement and reporting efforts to increase knowledge on the released carbon emission by IT. By including this goal, the solution will have a non-monetary value that can be measured.

### DESIGN GOALS

**Engage Deloitte’s employees to engage in the solution**

**Increase Deloitte’s employees’ knowledge on how sustainability can be implemented in IT**

**Increase measuring and reporting adherence**

# Chapter 06
# THE DESIGN VISION

## 6.5 Redefining the scope for further directions

To set a clear starting point for the design phase of this project, the scope will be narrowed down once more with the input of sections 6.2, 6.3, and 6.4.

### 6.5.1 The end-users

The users of this solution are the Technology Strategy & Operating Model employees within Deloitte consulting. They work with projects regarding the clients' IT transformations, IT capability assessments, and other related IT questions of the client. Thus, TSOM could benefit from the insights this solution provides.

### 6.5.2 Other stakeholders

First, Deloitte TSOM clients are stakeholders of this solution, as they are directly influenced by the outcome the solution provides.
Second, Deloitte's internal sustainability team is stakeholder of this solution. Parts of the knowledge, trainings, and opportunities to share the outcome with others will be organized by them.
Third, other Deloitte departments could be interested in the solution. It will provide knowledge on sustainability and how to engage employees. The knowledge and engagement aspect of the solution might be multi-implementable in other disciplines.

### 6.5.3 Context of use

The solution will mainly be used in projects regarding IT transformations during the start of the project. It will be used at the first stage of the project because in this stage the client needs to be convinced to incorporate sustainability as a key factor for their IT strategy. The solution needs to provoke a conversation between Deloitte employees and the client and contain why implementing sustainability can be beneficial.

### 6.5.4. Design statement.

As the last step in defining the solution space, the design statement is made explicit. Formulation of the design statement is constructed using branding literature (Van der Vorst, 2017). This statement includes the description of product category1, target group2, and benefits of the aimed design on different levels: functional3, emotional4, and self-expressive5.

**DESIGN STATEMENT**

**"Develop a framework1 for Deloitte TSOM employees2 (TSOM employees of all levels), that stimulates them to incorporate sustainability in their IT projects, and includes actionable capabilities to measure or reduce the clients' IT's carbon footprint3 and gives the employee the possibility to engage meaningfully4 while being a proactive consultant who enables their client's IT to be future-proof5."**



# 06
# The design vision

## KEY TAKEWAYS

**Future vision:**
In 2025, Information Technology will be incorporated even more into our everyday lives. Due to the growing engagement of employees and customers in environmental sustainability, and an increase in care about carbon emissions of companies, developing sustainable IT strategies will be a necessity to become net-zero and future-proof.

**Design vision:**
For employees working in the Technology Strategy & Operating Model team at Deloitte Consulting, I offer a tool that makes sustainability in IT implementable. This tool provides actionable capabilities and provides the employees with insightful knowledge and guidelines to be an IT consultant who enables their clients' IT to be future-proof and with the smallest carbon footprint possible.

**Design goals:**
**1.** Engage Deloitte's employees to engage in the solution
**2**. Increase Deloitte's employees' knowledge on how sustainability can be implemented in IT
**3**. Increase measuring and reporting adherence

**Design statement:**
"Develop a framework1 for Deloitte TSOM employees2 (TSOM employees of all levels), that stimulates them to incorporate sustainability in their IT projects, and includes actionable capabilities to measure or reduce the clients' IT's carbon footprint3 and gives the employee the possibility to engage meaningfully4 while being a proactive consultant who enables their client's IT to be future-proof5."

# 07

# The road to the solution

The upcoming chapter will provide an overview of the steps towards the final solution. Two collaborative sessions were organized to discover the best and most fitting solution for the TSOM department.

# Chapter 07
# THE ROAD TO THE SOLUTION

## 7.1 The approach

To discover the best solution, a collaborative design approach was applied for this phase of the thesis. Collaborative design is also known as cocreation or participatory design, and this design strategy helps foster effective collaboration among stakeholders (Your Guide to Collaborative Design, 2021). Starting with a creative session with design students helped develop creative and out-of-the-box concepts, which were assessed and further brainstormed on with Deloitte employees in the second co-creation workshop. Involving the end-user has proven to be a more effective method of resolving issues and produces more implementable solutions. Afterward, the insights from both creative sessions will be taken into account when developing the final framework. The approach can be compared with a diamond. First, a divergent session was held, to create choices. Second, a convergent session was done to eliminate the non-feasible or viable options.

## 7.2 Creative session with design students

The purpose of the first creative session was to come up with out-of-the-box concepts that answer the question: *How can the value of Green IT be increased for consumer goods companies?* When an increase in value towards Green IT can be achieved for consumer good companies, the level of interest of those companies in Green IT will also increase. And as a result, the opportunities for Deloitte will grow. Another reason to look at the solution space in a more broad sense than the design vision is formulated, is to let the creativity flow during brainstorming. Every idea was valued even if it might not be feasible. To ensure a high-quality workshop an SPD Alumni was consulted. Her experience as a service designer at EY helped structure the workshop and elevated the agenda to a professional level.

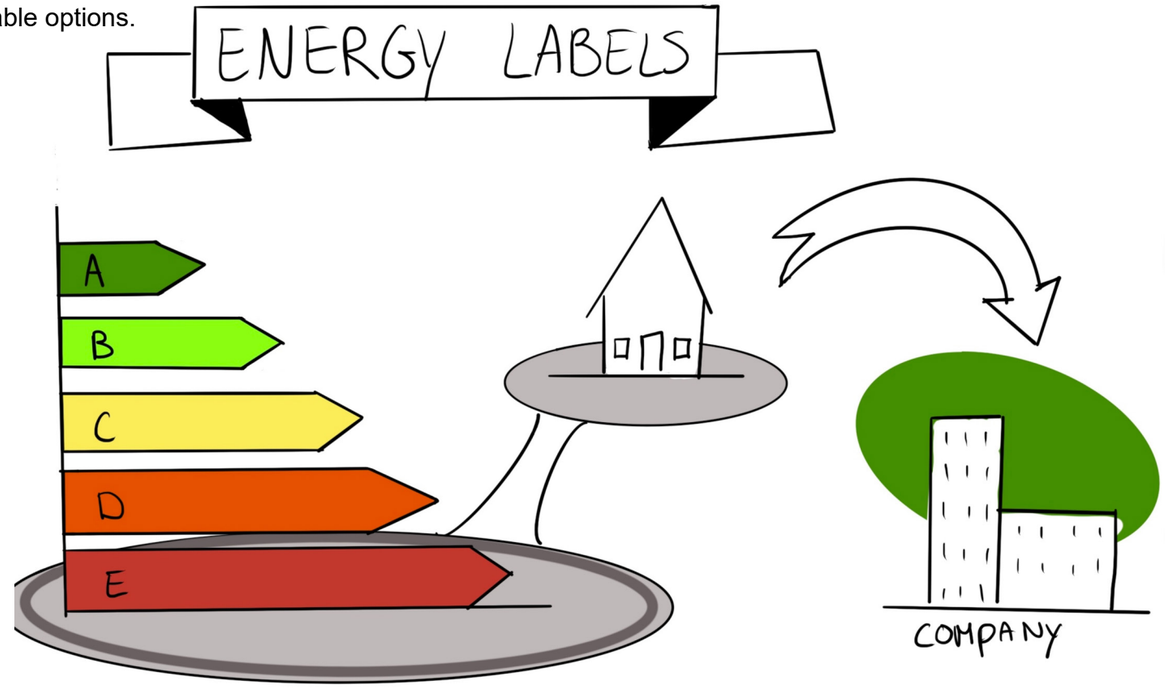



*Figure 10 - Concept energy labels*

The Creative session had a 1.5-hour time span in which three Strategic Product Design students participated. To introduce the topic to the students a short presentation was given at the start in which the term Green IT, and the need for Green IT was explained. Next up, three questions were asked during an introduction brainstorm to establish that every design student was on the same page about the topic. Through the questions, the students were forced to think which consumer goods companies would be frontrunners in shifting to Green IT, who in a company would be responsible for it, and how it could be of (more) value to the company. This first introduction brainstorm enhanced the value-driven mindset of the participants and created a safe environment in which participants could freely speak their minds.

In the next part of the workshop, ideas were developed and built on. Lastly, the ideas were looked at and reflected on. Two ideas were selected and further developed to be presented in the workshop with Deloitte employees.

# Chapter 07
# THE ROAD TO THE SOLUTION

## 7.3 Co-creation with Deloitte

At the start of the Co-creation session with Deloitte, a more detailed presentation was given, including an explanation of the design principles developed in chapter 05. The emphasis of this session was, instead of creating inspiring and out-of-the-box ideas, to find a fitting solution for the problem defined in my research. To start, the same brainstorm was included to create a value-driven mindset and save atmosphere in which the participants can speak freely. However, the participants in this session are IT experts and not designers. Therefore, the first presented concept was an out-of-the-box idea to start the creative flow. The participants were challenged to think about how this concept could work, instead of shooting it down.

The second concept was a serious concept proposition to see how it was received. The reactions to this concept were positive at first, they saw the added benefit it could be to Deloitte and its clients. The solution checked the boxes of most requirements and could potentially be a well-working solution. However, Deloitte employees also provided substantial reasons why this solution might be a better fit as a small concept in a more broad solution. Which would be best executed at another department within Deloitte. Additionally, the development of a platform is not something Deloitte does within serious belief and evidence of use. In the past a few projects which involves software engineers building a platform resulted in no use, and thus lost money.

Therefore, I was advised to look further. I was specifically asked to think less general in terms of Deloitte.

By really focusing on the department I am currently working for, the chances of implementation of my solution will increase. During this brainstorm, it was made very clear by the manager of the team that they are looking for a focused and implementable solution for their department only.
client”

Lastly, the next steps were discussed and my main assignment was defined:
“For Deloitte (TSOM): Embed sustainability in the topics to discuss with the client”

The Miro boards used during this session can be found in Appendix E.

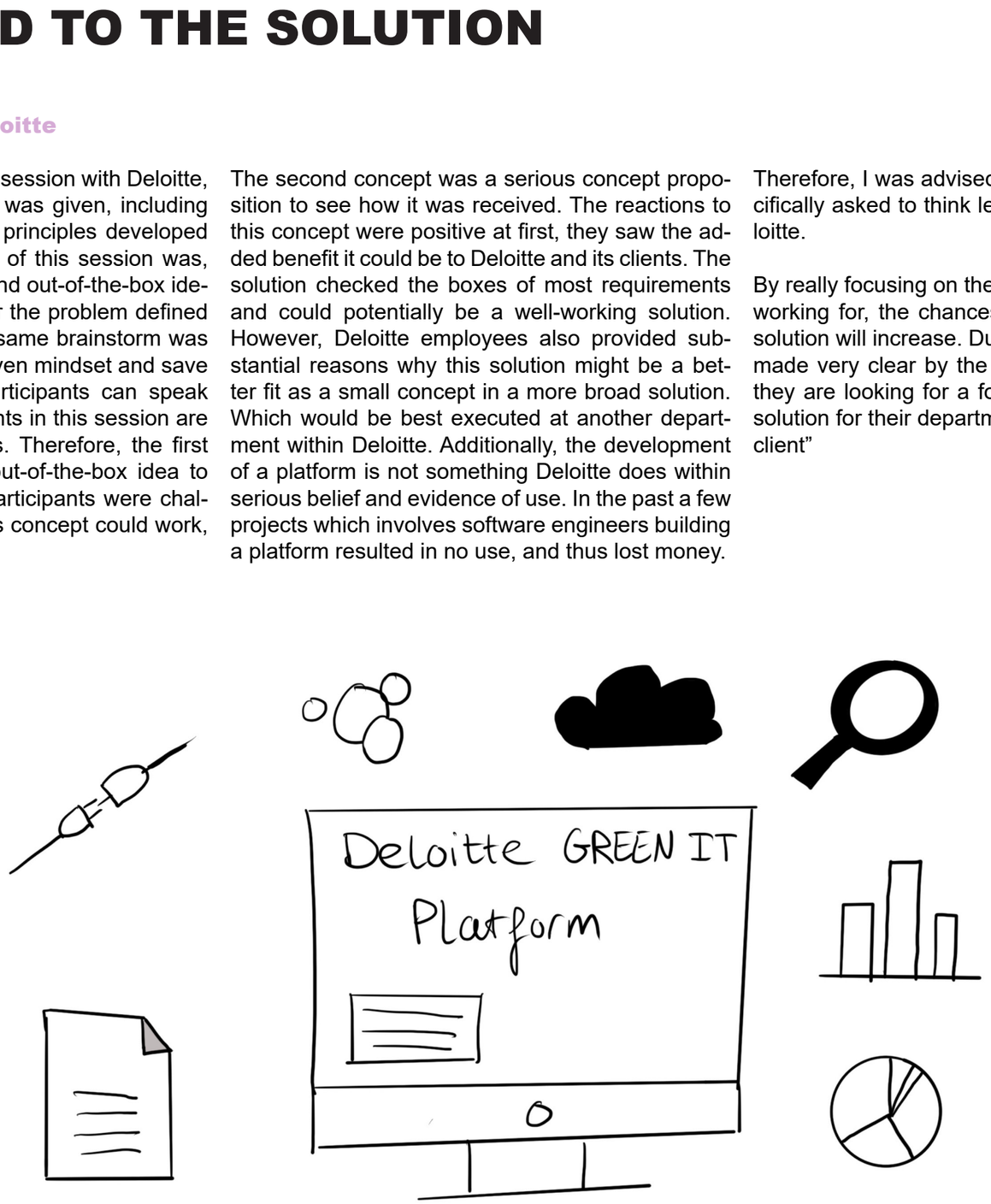



*Figure 11 - Concept platform*

Chapter 07

# THE ROAD TO THE SOLUTION

## 7.4 From insights to concept

Including this cocreation phase in my research provided an even clearer picture of what Deloitte wants. By co-creating with my client (Deloitte), a deeper understanding of the latent needs was discovered and a sharp approach for the next steps was defined. Although the design principles were developed beforehand, it was not completely clear to me how focused the desired solution needed to be. From the session with Deloitte, I learned that to implement the solution it needed to be more focused than expected. By implementing this cocreation stage, I believe I have discovered a wide range of possible solutions at first (with SPD students), was able to show the possibilities to Deloitte, and landed on a clear focused desired outcome with actionable next steps.

The next step is to look at what is discussed with Deloitte. One of the frameworks which are currently used is the Tech TOM in a box framework. This framework is especially the TSOM capability model is fitted to implement sustainability into it. However, only adjusting and adding capabilities to an existing framework does not guarantee implementation by consultants. Therefore it was decided a clear implementation strategy also needed to be developed.

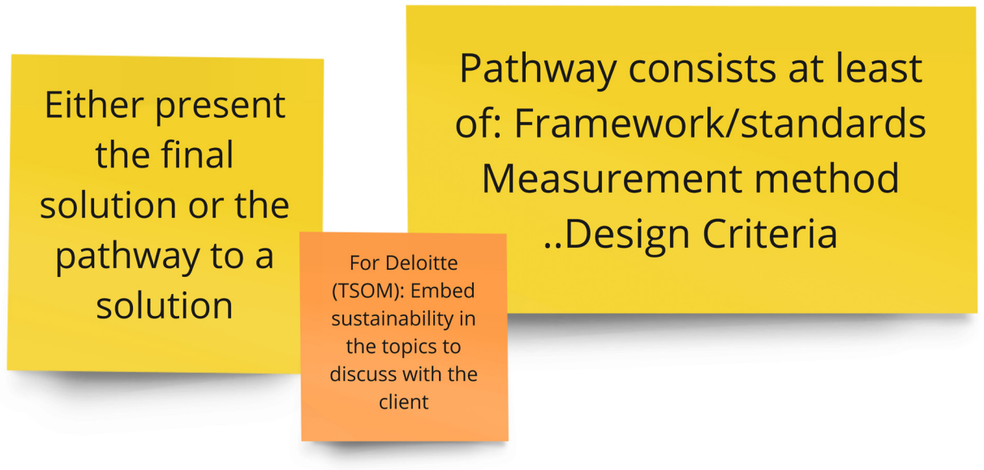



*Figure 12 - Feedback next steps*



# 07

# The road to the solutuion

## KEY TAKEWAYS

The collaborative approach let to more detailed insights into what Deloitte is looking for in the solution. Various possibilities were explored, concepts were developed and assessed. Finally, one clear path to the solution was found for TSOM: Embed sustainability in the topics we discuss with our client. The insights confirm the change of direction in the design brief.

# 08

# The solution

This chapter provides an overview of the development of the new framework, the developed attributes, and the final roadmap. Additionally, the documentation which needed updates is discussed and adjusted.

# Chapter 08
# THE SOLUTION

## 8.1 The approach

After the co-creation sessions it was decided that the solution should be an adjusted version of the current Tech Target Operating Model (TOM in) a box framework. Combined with an implementation plan, the development had started. First of all, the current framework had discussed in detail, with an explicit focus on sustainability. Second, the new capabilities were defined and iterated on, the implementation is further explored and the onboarding strategy is defined. The whole process is finally summarized in one road map.

Current PowerPoints and additional documentation are adjusted and made ready for implementation. A template pitch is developed for the consultants to use when convincing the client of sustainability implementation. Lastly, the first workshop of the implementation roadmap is developed to engage TSOM employees.

The above dicsribed process is presented in a four step delivery of the solution in 8.3. All four steps include a description of the goal of the step at the left corner of the page.

## 8.2 The current framework

Before simply adjusting the framework, it needed to be fully understood. Therefore, a meeting was set to discuss the documentation with one of the Tech TOM in the box model owners. In this meeting, we discussed the various domains and content of the capabilities. As shown in the image below, the capability model consists of 5 different domains, and every domain has at least 4 capabilities. If we take a closer look at those capabilities, we see that sustainability is currently not included. However, when taking a closer look at the sub-capabilities, within the domain Strategy & Portfolio, capability Business – Technology Strategy has the sub-capability sustainability. This sub-capability has the following description: Assessing current sustainability and proactively enabling the organization to become a more responsible business, focusing on enabling sustainable growth and creating healthy communities and environment.

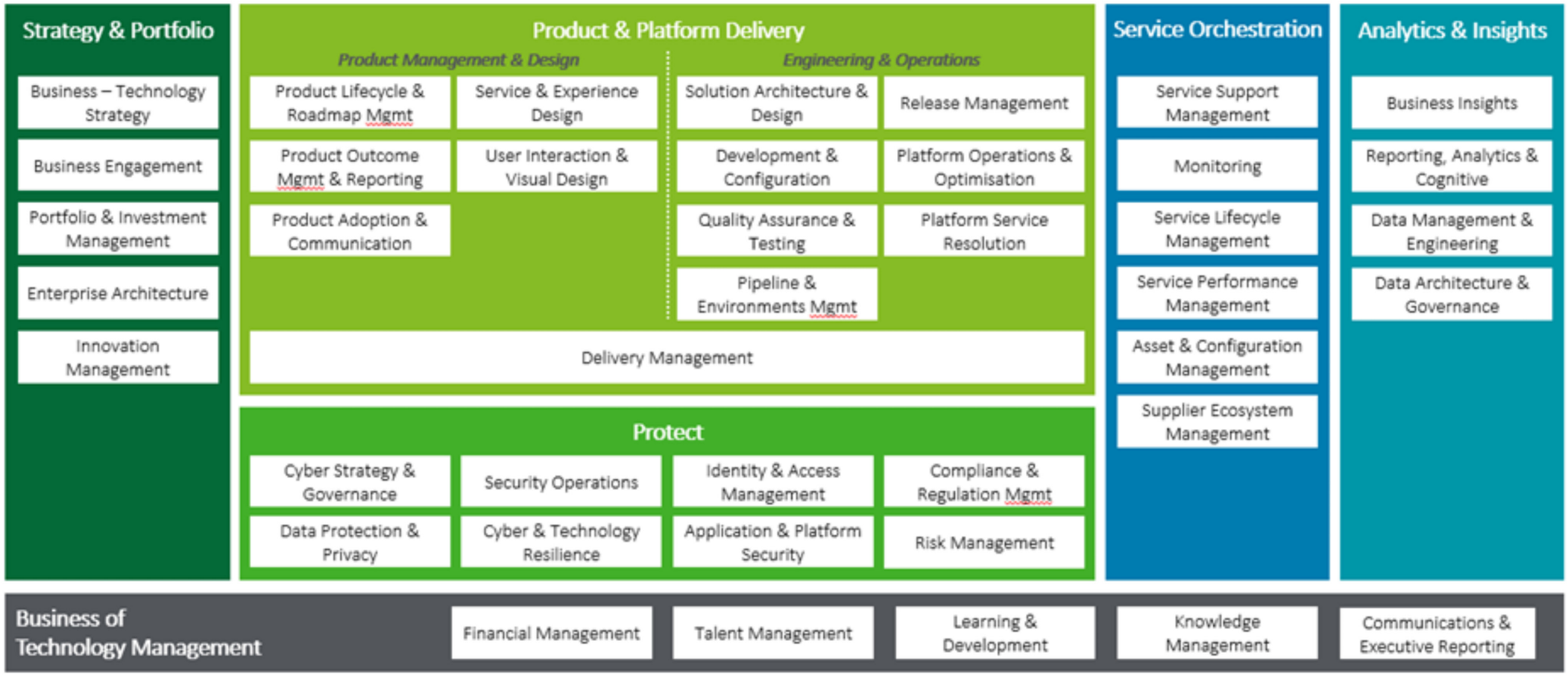



*Figure 13 - Current Tech TOM model*

# Chapter 08
# THE SOLUTION

When assessing the capabilities, there is an additional file developed with descriptions to score the client on. As you can see, sustainability is currently a topic to take into account from level 3 onwards.

| E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|
| **Capability** | **Capability Definition** | **Current Rating** | **Target Rating** | **Level 0 - Non-Existent** | **Level 1 - Initial** | **Level 2 - Repeatable** | **Level 3 - Defined** | **Level 4 - Managed** | **Level 5 - Optimised** |
| **Business – Technology Strategy** | Establish and communicate the integrated business-technology strategy, and underpinning technology sourcing and service strategies, to enable the realisation of the organisation's vision. Continuously monitor the external technology and competitive landscape, and internal performance, adapting the strategy as needed. | | | Absent capability | A formalised Technology strategy does not exist, or is limited and informal. No process or procedure is in place to develop and manage a Technology strategy. Some Technology leaders in the organisation informally create some direction, but no clear ownership roles or accountability are agreed. | An initial technology strategy exists, however there is no formal process or approach to continuously manage and own the strategy. Ownership and accountability for the strategy is informally agreed, however there is are no agreed roles who monitor and assess the strategy. The strategy is not aligned with business strategy, and the two are not developed collaboratively. | A clearly defined technology strategy exists and is reviewed and monitored on a regular process through a formalised process and agreed ownership model. Business strategy and priorities are set then cascaded to technology teams to inform the technology strategy. Opportunity scanning and prototyping identifies technologies and solutions of interest, in some occasions the adoption of this is part of the broader technology strategy. Sustainability is increasingly becoming a focus for leadership, and may influence some strategic decisions across the business and technology. | Technology and the business undertake regular strategic assessments to understand the market spaces available and opportunities for Technology to support the business in achieving and enhancing their market objectives. Agreed service opportunities are documented in the service portfolio and progressed through the service lifecycle. The Technology strategy is used as a cornerstone to Technology delivery and development. Technology Strategy supports with effective decision making on sourcing strategy for services provided. Emerging technologies, solutions and ways of working are considered for their potential to disrupt certain areas of the business. Sustainability is becoming an important focus for the organisation, and certain elements of the strategy are defined to support sustainablity iniatiatives. | A fully matured and effective capability exists for the development and ongoing management of the Business & Technology strategy together. The technology strategy is a cornerstone of the business strategy and is developed as a key enabler for it. There is a regular cadence to monitor and refresh both in alignment with each other. Emerging technologies, solutions and ways of working are frequently explored and evaluated through oppportunity scanning, and built into the technology strategy based on their potential to advance the organisation. A sustainability agenda is a top priority across the organisation, and this is reflected in both the technolgoy and business strategy. |

*Figure 14 - Current assessment form*

## STEP 1: DEFINE THE NEW CAPABILITIES

**GOAL:**
**Current domains were examined, and capabilities were added where needed to include sustainability into the category.**

**Domain: Strategy & Portfolio**
Explanation: Works closely with the organization to set the business-technology strategy, manage the enterprise architecture and pursue innovation opportunities. Oversees portfolio delivery and prioritization to maximize investment outcomes

This domain currently holds the sub-capability sustainability. In the future, sustainability will no longer be a sub-capability of Business – Technology Strategy but will be a capability of its own called Sustainability Strategy.

**Capability to add:**
Sustainability Strategy: Assesses the current sustainability strategy and proactively enables the organization to become a more responsible business, focusing on enabling sustainable growth and creating healthy communities and the environment.

**Domain: Product & Platform delivery**
Explanation: Delivers, enhances and maintains products and platforms that provide tangible business value and great customer experiences by delivering at the right speed and in close collaboration with the organization

**Capability to add:**
Responsible design: Assesses if the company takes the emissions emitted in the development of a product or platform into account in the design and development stages.

**Domain: Protect**
Explanation: Protects the organization's technology, and ultimately the organization from exposure to information security breaches and cyber-attacks, minimizing any operational and reputational risk.

**Capability to add:**
Sustainable Compliance management: Assesses the current level of how the companies (IT) carbon emissions are reported.

**Domain: Service Orchestration**
Explanation: Orchestrates all parties involved in the delivery of products and services, providing a front door for user engagement, maintaining quality standards, and making service performance visible

**Capability to add:**
Sustainable Sourcing strategy: Assesses the current level of sustainable vendor selection when selecting parties involved in the delivery of products and services.
Note*: There is some overlap in the capabilities within the domain of Service orchestration. However, the choice is made to still include this as a capability instead of a sub-capability, because it is important to give extra attention so that it will not be overlooked.

**Domain: Analytics & Insights**
Explanation: Builds a world-class "data-driven" organisation, generating business insights from well-managed data assets, while building trust and confidence in the data through proactive data governance

**Capability to add:**
Emission Measurement: Assesses the current state in which the company is able to do emission measurement, while looking at data input, data generation, and used software.

**Domain: Business of Technology Management**
Explanation: Supports technology to operate as an effective business, managing and growing the technology workforce, making technology a great place to work and overseeing financial performance.

**Capability to add:**
Sustainability Engagement Management: Assesses the current state of the level of engagement employees show in transition to sustainable IT, including looking at the future engagement strategy.

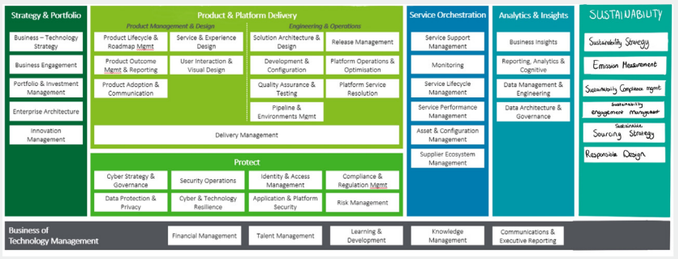
## STEP 2: DEFINE IMPLEMENTATION STRATEGY

**GOAL:**

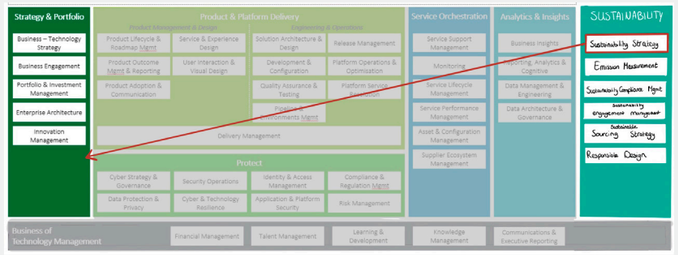
**Now that in every domain a new capability is added, a strategy of implementing them is needed. The goal of this step is to provide a logical order of implementing the capabilities.**

Adding the capabilities without a logical order or without educating the employees of TSOM what the new capabilities entail, could lead to no use or misusage of the final solution. To prevent this, an implementation strategy is developed.

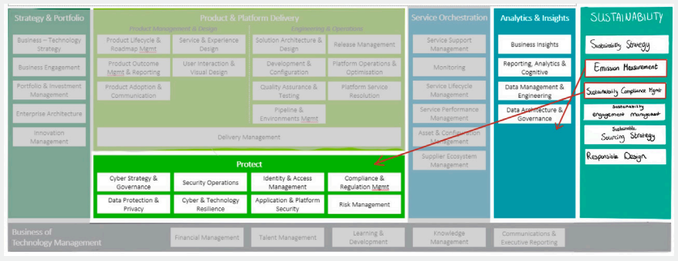
At first, to gain extra attention, the capabilities are not added to all the separate domains, but as one 'Sustainability' domain. Adding one extra domain is very obvious, and can not be overlooked. Additionally, when discussing the capability model with the client the new domain can not be overlooked either. It is possible that the client still decides not to assess any of the sustainability capabilities, but it has been discussed. Which is at the beginning one of the main goals of adding the sustainability domain.



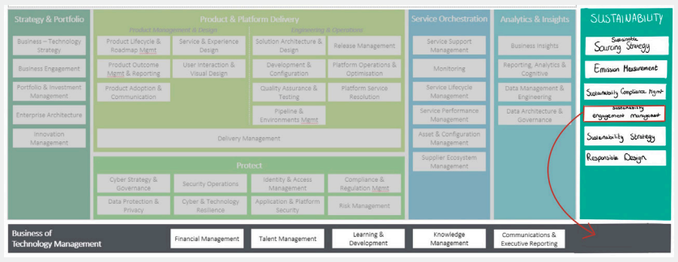

In the second phase, the capabilities will one by one move to their end locations. The capabilities are compared on how soon they are expected to make an impact and be chosen to be included in an IT assessment. The first capability to be implemented in its final domain is Sustainability Strategy. This is most likely the first capability to make an impact because it is already a sub-capability in the current model. As explained in the literature research, companies care more about sustainability and are implementing this topic into their core strategy. Therefore, it is only fitting that this is the capability expected to make the most impact the earliest.



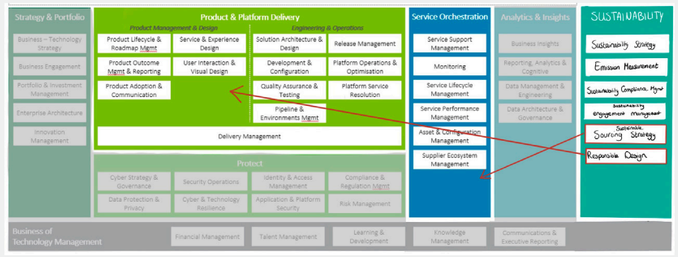

Next up are sustainability Emission Measurement and Sustainability Governance. Within other Deloitte departments, this is already a growing topic, and it is expected to also expand in Information Technology.




Thirdly, the capability of Sustainability Engagement Management will follow. This capability is not merely focused on IT, but more in general how the company is engaging its employees to contribute towards becoming more sustainable.




Lastly, Responsible Design and Sourcing Strategy will move to Product & Platform Delivery and Service Orchestration. Those topics are expected to be the latest to move due to their level of priority for the companies.




To final image proves an overview of the final Capability Model. All images can be found at full scale in Apendix X.

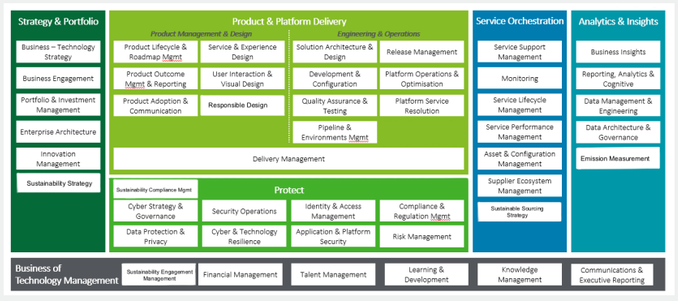
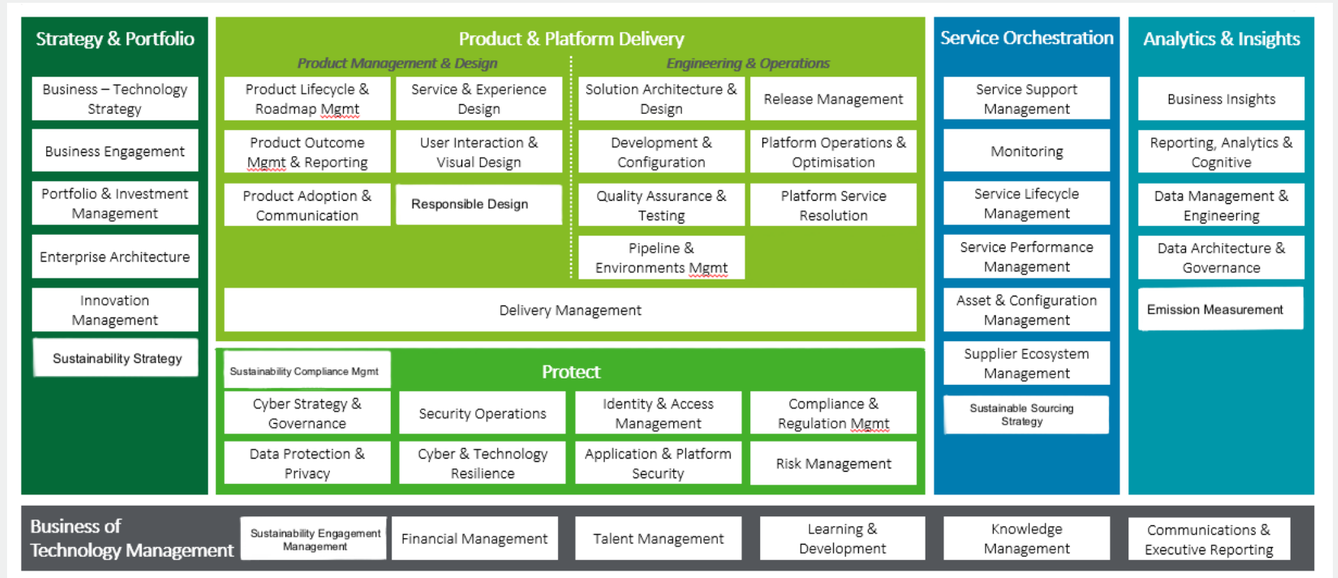



*Figure 15.1 - The developed implementation strategy*

## STEP 3: DEVELOP THE ROADMAP

**GOAL:**

**Step 3 is to piece everything together. The image above shows the final result of the new capability model, and the roadmap below shows the road and timeframe to get there.**
(A bigger version of the final capability model can be found in Appendix F)



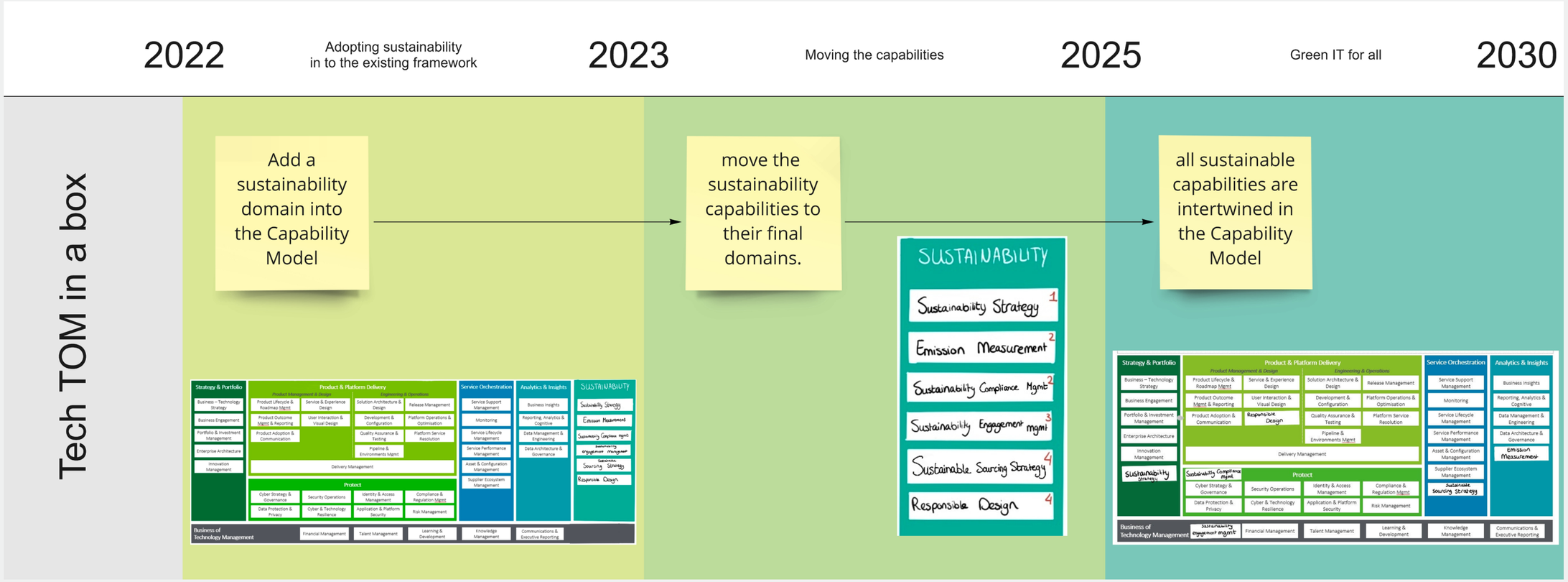




*Figure 15.2 - The developed implementation strategy*

## STEP 4: DEVELOP THE ONBOARDING STRATEGY

**GOAL:**
**TO CREATE A STRATEGY/ROADMAP TO ONBOARD THE TSOM EMPLOYEES**

Step 4 answers the question: How are TSOM employees going to be convinced to start implementing sustainability into their everyday work? What is needed for them to convince their client they should also consider assessing, and improving their sustainable IT goals?

To make sure the updated framework will be used, an onboarding roadmap was created. To create this roadmap, the AIDA model was used. This model is created and designed to lead people through a logical process that catches their attention and creates awareness, sparks interest, creates a desire, and lastly closes the deal with a call to action. Guiding people through these steps in order is known as one of the best ways to convince someone to do or buy something.

The roadmap indicates a set-in-stone linear process, but in reality, a more dynamic process to onboard the employees is expected. Some steps might not be needed, and in some cases more convincing could be necessary. It will vary per employee and has room for their own interpretation. In the first onboarding workshop (which was given on the 16th of February) the participants were challenged to contribute in thinking of activities that will spark their interest, and added into the model in Chapter 09.

| | Awareness | Interest | Desire | Action |
|---|---|---|---|---|
| Timeframe | 2 weeks | 1 month | 6 months | 5 years |
| Target group | TSOM Employees | TSOM Employees | TSOM Employees | TSOM Employees<br>Clients' Employees |
| Goals | • Display the new adjustments<br>• Increase knowledge of Green IT<br>• Show the higher purpose of why this needs to be implemented<br>• Gain employees input on onboarding activities | • Display the value that can be created by Green IT<br>• Inspire employees with the positive impact<br>• Display what's in it for the employee | • Consultants mindset changes to a positive look at Green IT<br>• Consultants think green IT is implementable<br>• Competition element to make Green IT implementation enjoyable | • Employees apply the new framework<br>• Employee feels proud about the sustainable accomplishments of the team |
| Activities | 1. Informational (animation) video<br>2. Workshop/Co-creation session<br>3. Slide deck regarding the new adjustments | 1. Create Sustainability in IT team within TSOM<br>2. Present the new Capability Model<br>3. Adapt/prepare trainings | 1. Gamification<br>2. Create a healthy competition<br>3. Co-Create conversation starter deck | 1. Rewarding: TSOM Climate Champion<br>2. Certification<br>3. Set personal implementation goals: rewarding if you can convince the client to asses/improve sustainability<br>4. Share results at the sustainability café |
| Description | In this phase the aim is to make the TSOM colleagues aware of the new implementations which are coming, while co-creating the implementation strategy | In this phase the aim is to spark interest in sustainability in IT by showing the new framework and sharing knowledge | In this phase the aim is to create a desire to participate in the sustainable IT solutions. | In this phase the aim is to give the final push and create actionable activities to encourage implementing the new framework |

*Figure 16 - The developed AIDA model*

# Chapter 08
# THE SOLUTION

## 8.4 Adjusting documentation

After the Capability Model is adjusted and the onboarding roadmap was developed, other documentation is analyzed to see if they need to be updated.

***Offline Assessment form***
To start, the Offline Assessment sheet within the 02_TechnologyCapabilityMaturityAssessment Excel must be updated. To update this file, short descriptions of the capabilities in each stage are needed. This is currently in progress: the developed assessment form is not validated or cocreated in the way the capabilites or AIDA model are. Thus, the offline assessment form should be seen as a starting point for further iterations and will be shared with Deloitte TSOM.

## 8.5 The Green IT pitch

An attribute that needs to be made for the solution is the Green IT pitch slide deck. This slide deck will help the employees to show their clients why they need to choose Green IT. Without an easy go-to slide deck, it can be found difficult to pitch it to the client. Therefore, creating a deck with guidelines, simple facts, and possibilities will help implementing the solution.

To increase the possibility of usage of the slide deck, employees must feel like they contributed to the creation of the slide deck. Therefore, it it is included in the AIDA model as a co-creation activity.

## 8.6 The workshop

As shown in the AIDA model in step 4 on page 95, one of the onboarding activities is a workshop. This workshop aims to introduce the employees to incorporating sustainability into their everyday job. This goal will be achieved by co-creating with the participants. It is proven that co-creation enhances the chances of success. Providing the employees with the feeling that they contributed to developing the adjustments will create a feeling of ownership, and lead to better results. This workshop was given as a validation activity to the first TSOM team members.

During the Green Light meeting an interesting discussion took place. It was broad to the attention that there were various opinions on the developed implementation strategy. Thus, it was decided to be asked and validated with the team members as a key point of the agenda.

At the start of the workshop, knowledge will be shared in the form of a presentation, so that everyone is at a base level of knowledge on Green IT.

Afterward, the participants are asked to give points of feedback on the new capabilities. A fake scenario was be presented, and they could imagine how they would use the capabilities and be asked to express what is missing, or what could be better. This exercise was be done in small teams, and the participants will be asked to speak out loud, so the reasoning was taken into account.

(The Miro boards used during the workshop can be found in Appendix G)

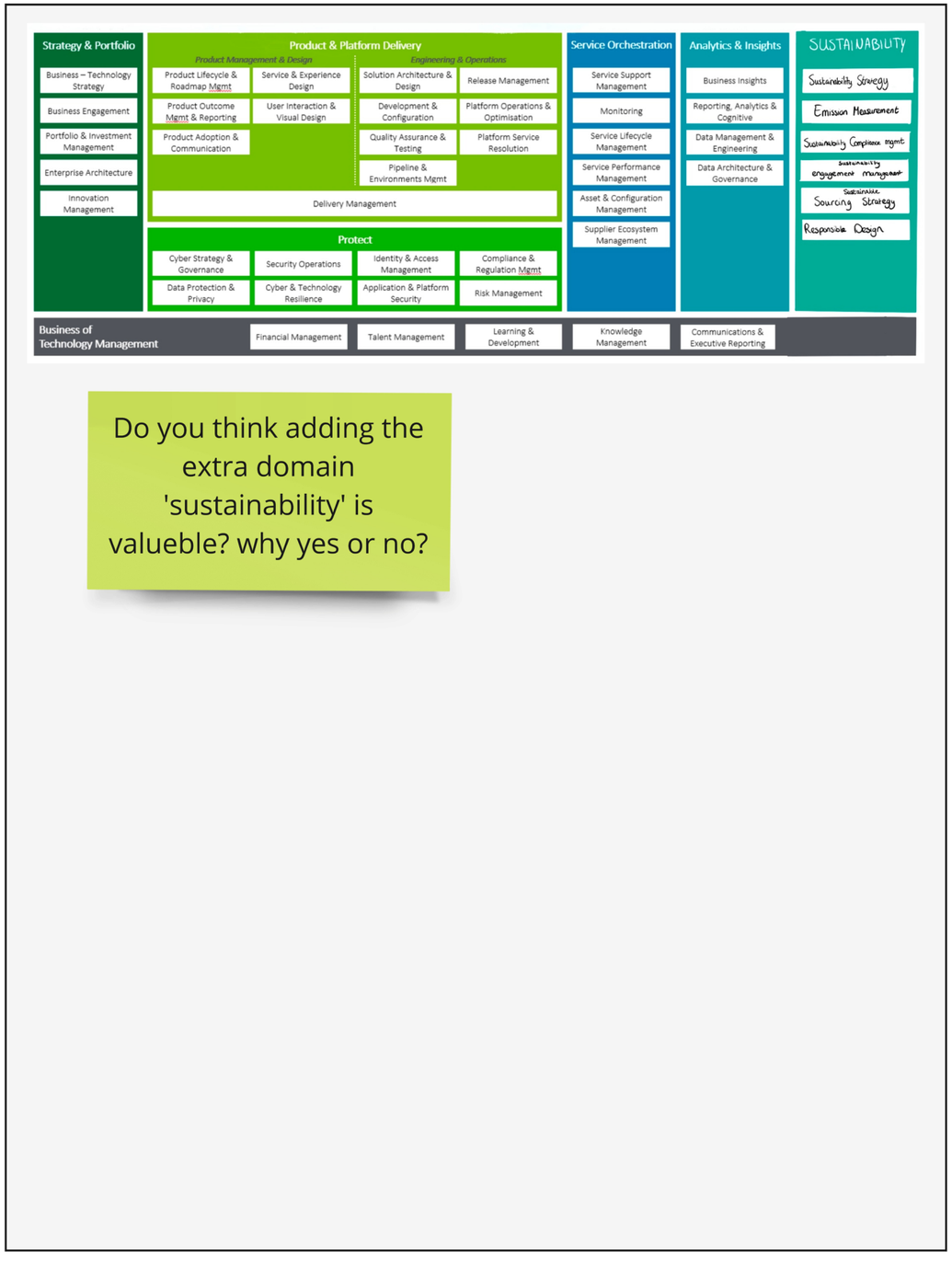



*Figure 17 - Image of Green IT workshop Miro board*

# Chapter 08
# THE SOLUTION

Next, the participants were asked to share their opi-on on how they thought the implementation strate-gy should be.

Third, the participants were asked what they think is needed to implement this solution. The first ten minutes was without showing the developed AIDA implementation model to see if they come up with different ideas. After five minutes, the implementa-tion model will be shown, and their ideas will be im-plemented where needed. Results can be found in the next chapter.

After the workshop had ended every participant was sent an invitation to fill in a Miro board.
On this miro board, participants are asked to put a sticky note with their opinion (tips and tops) on feasibility, viability, and desirability.

This workshop will took place on the 16th of Fe-bruary with six participating members of the TSOM team.

## 8.7 Resources needed to implement the solution

To drive create change simply a plan is not enough. What is needed is a vision, skills, motivation, re-sour-ces, and an action plan. The vision was created in chapter 6. Skills are something Deloitte is known for, and TSOM contains all skills needed for IT assess-ments. Motivation is Top-Down, Deloitte Global is motivated to implement the solution. However, the resources needed to adopt the capabilities are still undefined. Lastly, an action plan is provided with the AIDA model.
To ensure TSOM contains all resources needed to adopt the new capabilities, an overview was made.

- Time of the consultants
- Expert knowledge of sustainability (in IT)
- Money
- Training
- Adjusted documentation
- Rewarding model
- Certifications

The time of the consultants is something that could be a struggle at the start but is most likely to resol-ve with time when importance from higher up grows. For expert knowledge, the contribution of other de-partments within Deloitte will be needed. Money to create the trainings, and pay for the training hours of the consultants can come from the training budget. Some documents are already adjusted to the new capabilities. However, some still need change or fu-rther iterations. This is taken into account in the AIDA model, and if it is carried out correctly. Will form no problem. Lastly, a rewarding model and certifications will most likely be developed outside of Deloitte and applied company-wide.



# 08
# The solution

## KEY TAKEWAYS

The current framework is updated, based on results from the research, using the nine design prin-ciples as a foundation. Sustainability has successfully been implemented into the capability model and an implementation strategy is delivered. The AIDA model enabled a structured approach to adoption of the modified framework.

# 09

# Validation, evaluation & recommendations

This chapter presents the validation, evaluation of the solution. Additionally, the limitations of the project, and recommendations for future research are discussed.

# Chapter 09
# Validation, evaluation & recommendations

## 9.1 The approach

Chapter 9 consists of three main elements: validation, evaluation of the solution, and finally recommendations for future research. The validation consists of three activities, a workshop with TSOM team members, a session with a professional change consultant, and critical input of a strategic design student. The evaluation combines an attempt to capture the value of the solution and an assessment of feasibility, viability, and desirability. Finally, the limitations of the project are discussed and recommendations for future research are defined.

## 9.2 The validation

### 9.2.1 The workshop

As shown in the AIDA model in step 4 on page 95, one of the onboarding activities is the workshop. This workshop aimed to validate the results and introduce the employees to incorporating sustainability into their everyday job. These goals were achieved by co-creating with the participants. It is proven that co-creation enhances the chances of success. Providing the employees with the feeling that they contributed to developing the adjustments will create a feeling of ownership, and lead to better results.

During the development of the new capabilities, multiple implementation strategies were considered. Variating opinions made it challenging to find one implementation strategy which was the best option. Therefore, it was decided to validate the implementation strategy with the team members in the workshop.

Validation goals:
- The new capabilities
- The implementation strategy
- The AIDA implementation model

At the start, a ten-minute presentation was given to introduce the participants to the topic and create a base-level knowledge on what green IT is. At the end of the presentation, the new capabilities were explained and there was room for questions and discussion. Only small changes were suggested during this stage of the validation.

*“Perhaps adding “IT” or “Tech” helps clarify this is not a business-led capability, but meant for IT”*

**To conclude: the capabilities are well defined, make sure to add Tech or IT in the names for clarification.**

After validating the capabilities, the implementation strategy developed in Chapter 8 was shown on Miro. Participants were asked to give their expert opinion on the extra domain ‘sustainability’, and if this was an added value for them.

*“Yes. This allows the client to address sustainability as a whole rather than touching on sustainability within each separate domain which may be too complex”*

*“Yes, It forces you to think about sustainability, however, it can also be included in other capabilities. Depending on what the client is asking”*

*“Having it as a separate block might be an “easy” way out for the client to say “we don’t have that so let’s not include it”*

What was learned from the participants was that they were merely positive in the beginning. However, once they were challenged to think how it would work for their project, more skeptical opinions were formed. The key learning was that they feared the whole block could be fairly easy be discarded by the client.

Second, the participants were asked to share their opinion and concerns on the second Implementation strategy: Should the new capabilities be implemented at once in their final domain? Why/ why not?

*“No. There is always prioritization going on. Some topics might be more mature than others. To address them as part of the model and maturity assessment. And afterward, determine priority based on gaps between as-is and to-be state.”*

*“This will help the client to understand where and how sustainability touches on IT capabilities, rather than taking a more general view.”*

*“Yes, I think it would be mutually reinforcing. In the sustainability strategy, you would lay down the baseline of for example desired reduction of emissions, which would then be measured by ‘Emission measurement’. If the desired reduction isn’t managed, then that could be input to finetune the strategy.”*

*“The second implementation strategy would have my preference. It is already part of a proven model that works.”*

What was learned from the participants was that they saw the second implementation strategy as less of a drastic move and easier to implement. When adding the capabilities in the existing model, it might already be part of the conversation. Additionally, looking at who would own the capabilities, it will probably be more natural to divide the ownership to the specific domain they were developed for.

**To conclude: in the validation, it was found a different approach to the implementation fits better compared to the developed approach in chapter 8.**

# Validation, evaluation & recommendations

Lastly, the participants were asked to explain which resources and training they would need to use the capabilities themselves.

- Tutorial/workshop on how to implement it in practice. A step-by-step implementation journey of each capability
- Knowledge sharing
- Real-life examples of clients who are already further in their journey

It was found that training, e-learnings, examples, and knowledge sharing were seen as valuable to the consultants. Afterward, the developed AIDA model from chapter 8 was shown and the participants were asked to add what they thought was needed. Additionally, KPIs were established for each phase, and rightful ownership of each phase was discussed.

**To conclude: The TSOM team members require more training and tutorials in the early stages of the AIDA model. Additionally, there is a need for a practice case before implementing the capabilities on client projects.**

An important finding of the workshop, in general, was the level of knowledge the team members have about sustainability. It was found that only recent graduates (+-2/3 years) were educated on the subject. Therefore, more knowledge needs to be shared early on.

### 9.2.1 The adjusted implementation strategy and AIDA Model

After the validation session, it was decided that the capabilities will be implemented once in their final domains. This will prevent confusion and transition phases. Additionally, the team members will not have to adjust several times to shifting capabilities.

From feedback was learned that it would be important to include ownership in the AIDA model to ensure execution of the phase, and measure the KPI. The KPIs were created with the team members, and additional learning opportunities were added to the activity list.

The timeframes of the phases were also revaluated and adjusted when needed. The last phase now has a timeframe of one year. This is based on earlier experiences of implementations in TSOM. It is not that after one year the team members will stop using the new capabilities, but that they will not need external encouragement to do so.

| | Awareness | Interest | Desire | Action |
|---|---|---|---|---|
| Timeframe | 2 weeks | 1 month | 6 months | 1 year |
| Target group | TSOM Employees | TSOM Employees | TSOM Employees | TSOM Employees |
| Phase owner | TSOM Employees | Team Lead / Sustainability in TSOM team | Sustainability in TSOM team | Sustainability in TSOM team |
| Goals | • Display the new adjustments<br>• Increase knowledge of Green IT<br>• Show the higher purpose of why this needs to be implemented<br>• Gain employees input on onboarding activities | • Display the value that can be created by Green IT<br>• Inspire employees with the positive impact<br>• Display what's in it for the employee | • Consultants mindset changes to a positive look at Green IT<br>• Consultants think green IT is implementable<br>• Competition element to make Green IT implementation enjoyable | • Employees apply the new framework<br>• Employee feels proud about the sustainable accomplishments of the team |
| Activities | 1. Informational (animation) video<br>2. Workshop/Co-creation session<br>3. Slide deck regarding the new adjustments<br>4. Knowledge sharing<br>5. Tutorials<br>6. Training | 1. Create Sustainability in IT team within TSOM<br>2. Present the new Capability Model<br>3. Adapt/prepare trainings<br>4. Best practice training<br>5. step-by-step implementation explanation of each capability | 1. Gamification of implementing the capabilites<br>2. Create a healthy competition<br>3. Co-Create conversation starter deck<br>4. Become an expert training | 1. Rewarding: TSOM Climate Champion<br>2. Certification<br>3. Set personal implementation goals: rewarding if you can convince the client to asses/improve sustainability<br>4. Share results at the sustainability café |
| Description | In this phase the aim is to make the TSOM colleagues aware of the new implementations which are coming, while co-creating the implementation strategy. First training are given and knowledge on the topic is shared. | In this phase the aim is to spark interest in sustainability in IT by showing the new framework, sharing knowledge and provide step-by-step examples of successful implementation. | In this phase the aim is to create a desire to participate in the sustainable IT solutions. Team members will be challenged to complete the capabilities in mock projects and are able to compete with their team members. | In this phase the aim is to give the final push and create actionable activities to encourage implementing the new framework for everyone who was not already using the new capabilities. |
| KPI | Phase succesful when 80% of the TSOM team members have completed the tutorials/trainings | Phase successful when the results of the survey show that 80% of the TSOM team members are confident in applying the new capabilities correct | Phase successful when 80% of the TSOM team members have successfully implemented the new capabilities in the mock project | Phase successful when 90% of the TSOM team members use the new capability model as the default capability model |

*Figure 18 - The adjusted AIDA model*

# Chapter 09
# Validation, evaluation & recommendations

## 9.3 Evaluation of the solution

### 9.3.1 Evaluation of value

An empirical research framework, developed by Calabretta, is used to structure, and give an overview of the value the final solution provides. This empirical framework entails four pillars: value proposition, value creation, value deliver and value capture. An attempt is done to answer various questions in every pillar to create a structured overview of the value the final solution will bring TSOM. In order to display this in a brief way, the questions are answered sharp and concise.

**Value proposition**

**What solution does the concept offer?**
The solution offers TSOM consultants entry points to discuss sustainability with their clients, implementable assessment of capabilities, and a step by step roadmap towards the end goal.

**Who will use and buy the solution?**
The solution will be directly used by members of the TSOM team. When clients decide to include sustainability capabilities they will also make use of the solution in an indirect way.

**Why would users be interested in the solution?**
Direct users: the solution gives guidance and structured approach to assessing sustainability in IT.
Indirect users: would be interested in the solution because they want to know their current IT sustainability state, or know where they can improve to meet their sustainability goals.

**Why is the solution sustainable?**
The solution itself can not be called sustainable, but can be used as a tool for companies to assess whether they are doing well in their IT sustainability.

**How is sustainability measured?**
An Excel file is created with various standers for levels to score the company on.

**Value creation**

**Which stakeholders are involved?**
- Deloitte TSOM
- Deloitte Consulting
- TSOM Clients

**Value delivery**

**How does the solution reach its users and clients?**
The solution will reach its users through the implementation roadmap. This roadmap is made, but needs efforts from the team to be executed.

**Value capture**

**What are the solutions costs?**
For Deloitte TSOM: training hours. Employees need to spend time in workshops and trainings to build their knowledge.

**What are the solutions revenues?**
After training the TSOM consultants, they are able to charge the clients for the time they work on using the new adjustments to the Tech TOM in a box framework.



### 9.3.2 Feasibility, Viability, Desirability

To assess the feasibility, viability, and desirability of the solution, the participants of the Green IT workshop and the thesis supervisors were asked to give their opinion on the topic.

**Feasibility:**

To assess the feasibility of the solution the question: Can TSOM implement this? was asked.
The question: 'Does TSOM has the required recourses to implement the solution' emerged. The answer is no, however, when looking at Deloitte (Global) the answer is yes. Thus, when implementing the solution recourses will be needed from outside TSOM. This is not unexpected or unsurmountable. TSOM often works together with other departments within the company, and one of the strengths of Deloitte is the many areas of expertise. The most valuable resource (Deloitte) TSOM will need to invest in implementing the solution is the dedication and time of its team members.
Nonetheless, the feasibility of the solution also depends on its clients. As discussed earlier, TSOM is dependent on its clients to decide to assess the new sustainability capabilities. If they don not, TSOM will not be able to implement the new solution. However, looking at the literature and trend research conducted at the beginning of this research, combined with the increase in demand for sustainable IT noticed by Deloitte partners, it is not likely clients will show zero interest.

**Viability:**

To assess the viability of the final solution the question: Does it add to the TSOM offerings? Was asked.
The answer is yes, the solution adds to the TSOM offerings. The new capabilities could provide TSOM clients a broader, and more holistic view of the state of their IT after the assessment. The new offering provides insights into the sustainability state of their IT processes, which will grow in importance in the future (chapter 03). Additionally, the new insights do not change or diminish the current way of assessments, but only add new business opportunities for Deloitte.

**Desirability:**

To assess the desirability of the final solution the question: Does TSOM want this? Was asked.
From attending multiple sustainability initiatives within Deloitte and Deloitte Consulting was learned that Deloitte wants to implement sustainability throughout the whole business. The aim is to not only start a sustainability department but to implement it in every service line. With this solution, TSOM will be one of the front runners and can be seen as an example for other teams.
Although Deloitte Global and the team leaders want this solution, the team members are most likely not all enthusiastic from the start. From the validation workshop was learned that some employees are rather skeptical if sustainability is that important in their everyday job and they do not see the need for the new capabilities.

To conclude, the solution is feasible, viable, and desirable for Deloitte TSOM. However, to implement the solution TSOM will need recourses from other departments of Deloitte. The solution brings new value and opportunity to the work TSOM delivers and will set an example for other departments at Deloitte on how to implement sustainability in their everyday work.

# Validation, evaluation & recommendations



## Not achieved

**Be transparent**
The aim of increasing transparency is to accelerate the transition we are currently in. However, the solution does not yet encourage clients to share their results and data with others.

**State (data) limitations**
The solution does not have control over the data which will be provided by the client. Therefore the solution cannot guarantee if all data limitations were stated.

## Partially achieved

**Increase customer engagement**
The solution does aim to increase the engagement of the clients of Deloitte to implement sustainable capabilities into the assessment. However, it is still not mandatory and up to the clients if they do so.

**Be measurable**
The solution does aim to measure the possible reduction of carbon emission. However, this aspect is depending on technological advancements. Software is currently under development and when it can be properly used this principle can be categorized as fully achieved.

**Become a business priority**
For sustainability to make a difference in a company, it should become a high priority. However, this only applies when the client decides to make sustainability a business priority. The solution encourages the client, but it is not obligated to do so.

## Achieved

**Future vision**
The insights of the interviews combined with the desk research make it possible to define the future vision for IT and thus present the opportunity, which can be acted upon immediately.

**Increase employee engagement**
With the co-creation activities and gamification aspects integrated into the solution, qualitative employee engagement is encouraged and most likely to increase. However, the exact increase of employee engagement can only be measured when the solution is in place.

**Be of equal quality**
As a result of building on the existing framework, the quality of the outcome of the framework has not changed. The capability model is a proven strong and effective framework. The new capabilities do not change this. In fact, the new capabilities make the framework broader and provide the client with a more holistic overview of their IT status. Therefore, it could be argued that the new capabilities add quality to the current way of working.

**Include standards and definitions for when IT is sustainable**
The offline capability assessment excel sheet provides a detailed description of when the outcome of the assessed capabilities can be defined as sustainable.

**Include sustainable vendor selection**
The added capability ‘Sustainable Sourcing Strategy’ in the domain ‘Service Orchestration’ includes sustainable vendor selection into the capability mode. The capability assesses the current level of sustainable vendor selection when selecting parties involved in the delivery of products and services.

**Include outsourcing**
Since the solution applies to any company or type of IT assessment, outsourcing is included.

**Framework principles**
Finally, all principles regarding frameworks are achieved. The solution enhances communication between Deloitte and the client, provides a structured and efficient approach, and is multi-employable for all types of businesses or use cases.

# Chapter 09
# Validation, evaluation & recommendations

## 9.4 Limitations and recommendations

### 9.4.1. Limitations

It is important to acknowledge the project's limitations before formulating recommendations for future work. This section will explain the limitations of the literature research, expert interviews, design principles, the framework, and validation.

**Literature research**
Although sustainability is a big topic in existing literature, perfectly fitting articles on the topic of sustainability in IT, and especially in the domain of consumer goods companies were scarce. Especially articles on successful adopting sustainability in IT were not found. Additionally, technological advancements in the field of IT and sustainability are very rapid, which means that articles found before 2011 were (over 10 years old) could be argued as old dated and of less value.

**Expert interviews**
The expert interviews were intended to have a large variety of levels and expertise in the topic areas. However, including the exact right balance of people in the timeframe was more challenging than expected. Therefore, there was more entry, and mid-level experts compared to partners and managers. Additionally, IT experts within my team were also easier to reach and had more availability on short notice compared to sustainability experts. This could to some extent have influenced the results of the empirical research.

**Design principles**
The design principles form the foundation of the solution. However, the design principles are created by me. Although they are discussed various times with the Deloitte employees to reduce biases and interpreted the quotes from more perspectives, all biases can not be excluded. The Deloitte employees are stakeholders of the project, so they probably prefer one direction over the other, and unconsciously work towards the (in their eyes) desired solution.

**The solution**
The solution aims to help TSOM team members to include sustainability in their projects. However, the use of the new capabilities will still depend on the choice of the client. Even if the TSOM consultant pushes the usage of the capabilities, the client decides whether or not he finds assessing sustainability in IT valuable enough. Unfortunately, the solution does not provide a clear convincing element.

**Validation**
The solution was validated by organizing a workshop for TSOM team members, a change consultant, and design students. Although the various types of validation sharpened the solution it has yet to be validated in a practical context or directly applied to an ongoing project. New potential weaknesses are expected to be discovered and need to be anticipated. Thus, the next phase of validation and perhaps iterations rely on the engagement of the TSOM team members.



### 9.4.2. Recommendations

This project's purpose is to be implemented within the TSOM team and to be seen as an example of how technical focused teams could implement sustainability in a subtle and doable manner. Based on the project limitations, several recommendations for future work arise. It is strongly advised to take the recommendations into account when further developing the new framework and the implementation plan.

**Research - research into the adaptability of Green IT**
There are many existing articles on Green IT, however not many describe how Green IT was successfully implemented, or what convinced a company to shift to Green IT. More academic research and documentation is recommended.

**Solution – Add an element to convince the client they want Green IT**
The opportunity to dive into how the client can be convinced to shift to Green IT with the current solution arises from limitation 3. More research on onboarding and convincing the client will increase the likelihood of implementation of the solution and is therefore recommended.

**Solution – Define the business case**
The thesis defines and explores an opportunity for Deloitte TSOM to implement sustainability in their everyday work. However, the size of the business case is not discovered yet due to time limitations. To define the monetary value of the solution, financial analysis should be executed. The result of this analysis could result in a growth of interest of the TSOM team members and/or the clients.

**Validation – Further validate the implementation strategy**
In the solution section of the thesis, the initial implementation plan was discussed. However, during the validation, other implementation strategies were seen as better fitted. Therefore, the implementation strategy of the capabilities changed. Future research should validate the options further to ensure the best possible implementation strategy.

**Validation – Validate in a practical context or apply to an ongoing project**
In line with the previous recommendation and limitation 5, is to validate the capabilities and the capability models in a practical context or preferably in ongoing projects. This will give the best user insights, and points of improvement can easily be identified.

Chapter 09

# Validation, evaluation & recommendations



# 09

## Validation, evaluation & recommendations

## KEY TAKEWAYS

The validation showed a positive response to the new capabilities. During the validation, a new implementation strategy was preferred and well-argued for by the team members, a switch in implementation of the capabilities was made.  The AIDA model was extended with extra activities due to the found lack of knowledge about the sustainability of the consultants. Additionally, KPIs were added for each phase of the model.

Through the feedback session, validation, and process as a whole, the solution is found to be desirable, feasible, and viable. Most of the design principles are applied within the solution, and the others have the potential to be implemented in the future.

Recommendations for future research were based defined based on the limitations of this research.

# 10

# Concluding the project

This chapter describes the overall conclusion of the project, by discussing the assignment, process, findings, and finally with a personal reflection.

# Chapter 10
# CONCLUDING THE PROJECT

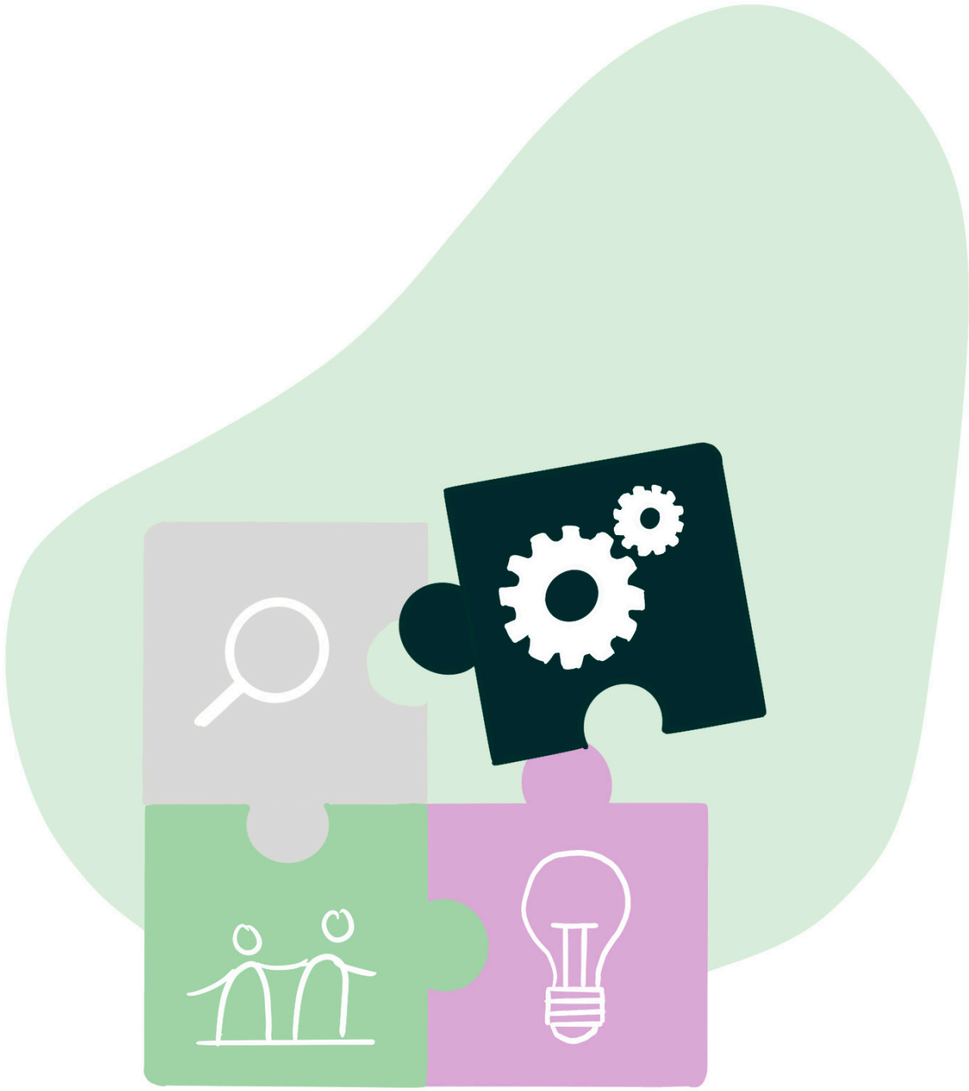
## 10.1 Conclusion

To conclude this project and report, a description and reflection of the output is given. The aim was to create a step-by-step approach for consumer goods clients of Deloitte TSOM to make their IT more sustainable. However, the results of my solution do not make the companies that implement it instantly more sustainable. The developed solution provides insights into where the company stands in terms of green IT, which is something most companies do not know. These insights will either lead to actions or create the possibility of taking action. From the literature study (chapter 3.6) was learned that one of the reasons companies do not green their IT, is due to the trouble of determining the best Green IT use case to invest in (Report Capgemini, 2021). Companies will now know where the opportunity lies to reduce their carbon emissions. Thus, the solution provides the potential for change. As discussed above, the purpose of the research changed during the project. This change resulted from the in-depth research which was conducted at the start. It was found that Deloitte was more interested in implementing sustainability in their everyday work. The shift in focus was necessary to create the most suitable outcome and the main results are listed below:

1. There is a business opportunity for Deloitte in Green IT
2. New capabilities were developed for the Tech TOM model to implement sustainability
3. An implementation strategy was developed and validated
4. An AIDA model was (co-)created to adapt the new capabilities
5. A workshop was given to introduce and validate the solution

At the start of the project, it was found that there is a growing market and increase in demand for sustainable IT strategies. Deloitte has the potential to become a frontrunner in this new business domain. New capabilities were developed for an existing framework to implement sustainability. How to implement the new capabilities was researched and iterated with multiple team members. The developed AIDA model will provide guidelines to TSOM and help them adopt the new capabilities of the framework. Although the AIDA model is now well defined with sufficient input of multiple team members, implementation will not be linear. After every phase new iterations must be done to smoothen the adaptation. See where the team members still struggle and adjust in such a way, all difficulties are seen as learning opportunities. To conclude, the AIDA implementation strategy is valuable as a guideline, the KPIs are defined to give the structure on when a phase was completed successfully.

To conclude, in the beginning, the scope was narrowed down to consumer goods companies to create a well-defined target group to design for. However, the developed solution can be implemented by TSOM for all sorts of companies. Which gives the solution a bigger impact and results in a solution which provides more value to Deloitte.



# Chapter 10
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## 10.2 Discussion

**Reflecting on the design process**
Looking back at the process I went through in the last months, I can remark that it was not a typical design project which is done at the faculty of Industrial Design Engineering. I would describe my project as not strictly a design project since it also has business transformation aspects. Therefore, in my project, I have mixed strategic design elements with business capabilities. This combination resulted in a reduction of the creative phase, which enabled me to deliver a framework that benefits my client the most. When I was at the stage of my project in which the design principles were translated into the solution, I did not instantly adapt to my final approach. In my first co-creation session with design students, I was still pursuing solutions that involve larger creative processes, such as platforms. However, in the second co-creation with Deloitte consultants, I realized I needed to let go of that idea to develop the most suited outcome for them. Shifting from something I knew from my studies to a new and more business approach for the final solution provided me with a new perspective on what you can do with strategic design.

When developing the AIDA model to implement the solution and executing the first workshop, it felt like I had obtained a change consultant role. Providing TSOM with not only the solution but also an implementation strategy I believe I have delivered the total package with a good chance of successful implementation.

What I have learned from this process is the many roles I can transform into, and I think that represents the quality of a strategic designer. This process taught me that I can enter a complex problem with a structured and analytic approach, synthesize data into meaningful insights, translate the insights into a valuable and fitting solution, and develop a strategy to implement the solution in the current contexts.

**Reflecting on the design statement**
*"Develop a framework for Deloitte TSOM employees (TSOM employees of all levels), that stimulates them to incorporate sustainability in their IT projects, and includes actionable capabilities to measure or reduce IT's carbon footprint and gives the employee the possibility to engage meaningfully while being a proactive consultant who enables their client's IT to be future-proof."*

Instead of developing the framework for Deloitte TSOM employees, I have adjusted the framework they currently use. The decision to use a current framework is to make the implementation smoother, and because the higher chance of succssful adaptation. The new version of the framework and implementation strategy I delivered does stimulate TSOM employees to incorporate sustainability in their IT projects. Actionable capabilities are developed to (at least) start the conversation with the client. However, my solution does not instantly reduce the carbon footprint of the client. It sparks a conversation and assesses the current state. Awareness is step one, but the action to reduce the carbon footprint will have to come from the client.

**Relevance for Deloitte TSOM**
Sustainability in IT is a growing market and an undiscovered opportunity for Deloitte TSOM. Multiple team members see the relevance and its growing importance, they believe that now is the time to start doing research into this topic. They notice a growing interest of their clients in sustainability and want to be able to answer all of their questions. Therefore, the research and the outcome are relevant for TSOM. The capabilities added to their current framework will create a more holistic approach to assessing IT maturity and are relevant in the near future. However, not all capabilities will be as relevant from day one. Some of the new sustainability capabilities will need some time to increase in importance to the client due to for example technological advancements or costs.



Additionally, Deloitte Global wants sustainability embedded in every department and service line of the organization and is showing great efforts in reaching this goal. My research contributes not only to TSOM NL (+- 35 employees) but has the potential to be implemented in all the TSOM teams around the world (+-1000 employees).

**Relevance for the field of design**
This thesis shows the relevance of design in business. It proves that even in a field as IT applying design methodologies and using a design approach can benefit when adapting to become more resilient or future-proof. It demonstrates that as a designer you can take up a wide range of challenges and still be able to create successful outcomes. My project is also relevant in the field of design because it shows how creative solutions can inspire employees to become more sustainable.

**Generalizability of the findings**
Although the outcome of my research was tailor-made for Deloitte TSOM, multiple findings can be generalized. In this section, three findings are discussed which are most applicable in other fields.

***Importance of measuring (in sustainability) and standards.***
To start, it was found that most business decisions are made grounded by statistics. Research showed one of the main reasons not to shift towards Green IT is measurability. However, this applies to most sustainable business decisions. Additionally, sustainability is a rather abstract concept. There are no clear definitions of when IT is sustainable or what goals can be reached to be labeled sustainable. Unfortunately, this can result in misconceptions and accusations of greenwashing. Again, this is not only applicable for sustainability in IT, but also in other fields.

***Try to adjust (or add) to the current way of working instead of reinventing how to work to increase implantability.***
What was learned during the project was that most team members valued the current frameworks. Using a 'proven model' was often mentioned and cared for. It was also found that it was fairly doable to add sustainability into the current framework. This can be seen as an example for other departments, in or outside the field of IT.

***Engagement is key in implementation phases.***
It is generally known engaged workers are often the strongest performers. This leads to an increase in employee productivity and project success. If the implementation wants to be considered a success the employees need to be engaged. The enthusiasm for the prospect of implementing the solution during the workshop variated a lot between different team members. It is important to find out why some are less engaged and how to increase this. This finding is applicable to all kinds of areas.

Lastly, the findings of this research also confirm existing (sustainability) principles such as the growth in interest in sustainability, the increase of a companies' CSR when applying sustainability, and that co-creation is an effective tool to increase engagement.

# Chapter 10
# CONCLUDING THE PROJECT

## 10.3 Personal Reflection

When I started this project, I never thought this day would come so soon. Hearing the (horror) stories about endless graduation projects, and the dreadful process through which students have to go alone made me fear 6 months to come in August. But now that the moment of finalizing my thesis is here, I am somewhat sad it is already over. When I was searching for a graduation project, I looked for a challenge that combined technology with strategic design. Deloitte provided me with this opportunity in an environment in which I could get to know a large consulting firm. I have discovered new strengths and weaknesses, but most of all I have grown into a professional strategic designer over the last months. Now it is time to reflect on my journey and personal learnings.

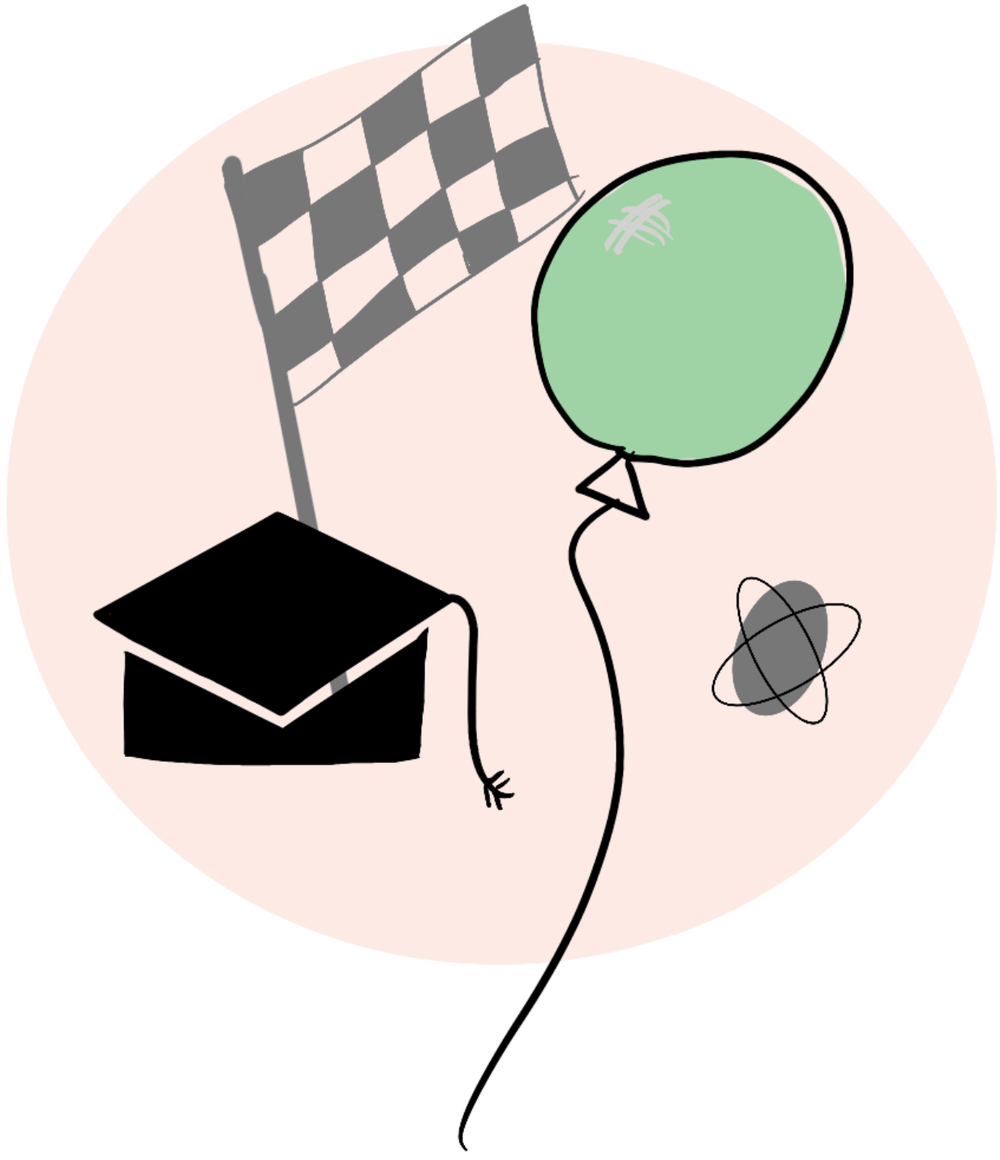
Looking back, I have had to overcome most difficulties at the start of my project. The freedom I felt when creating the project brief was new to me. At IDE I was used to being provided with a fixed problem to solve. Creating my own brief was challenging since many important decisions needed to be made which I thought would influence the rest of my project. I struggled with insecurities when making decisions of what direction I wanted to go in. Additionally, it felt like I was reading a lot without a clear purpose or focus, which I considered being inefficient. I know now that this is part of the process, and the project taught me that I am fully capable of making important decisions myself.

During the project, I noticed that I was good at managing my time. My systematic approach towards the end goal has helped me create smaller deliverables. The set deliverables were created in such a way that I had to show my work to either Deloitte or my TU Delft supervisory team. Creating the small deliverables felt challenging at first but enabled me to look at my large and overwhelming project feasibly. Creating structure made sure I stayed within my planning, and I am happy I stayed completely on track.

During this project, I learned about Information Technology and its large influence on business. IT is a topic I barely knew anything about at the start of my thesis. I am proud I was able to understand the complexity of the subject early on in the process. Additionally, it was the first time for me to work in a big4 firm. The corporate language, way of working, and its structure were all new to me. Covid-19 did not make the adaption easy at the start, however, I am grateful for this experience. I have learned that I want to stay in consulting, due to my experience I now have a good understanding of what motivates me, and what job I want to start in after graduation.

At the beginning of the project, I have set personal ambitions (chapter 1.3.2) to reach within this project. I want to conclude that I have successfully researched trends, synthesized large volumes of data to meaningful insights, managed different stakeholders, found a way to implement sustainability in the way of working at TSOM (creative problem solving), and gained experience in hosting co-creating sessions. Lastly, I can say that I am proud of my work and look back at a great time with colleagues and a steep learning curve.

To conclude, it was not easy but I learned a lot. I put my academic skills into practice and learned about myself in a corporate environment. I have learned to make impactful decisions and manage stakeholders. I proved my analytical abilities, time management skills and gained confidence in my creative facilitation skills. On top of that, I now know what I want to do next.



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