

Difficulties being green?

Investigating Green IT in IT consultant companies

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Abstract

This study focuses on the topic of Green IT in the IT consultant industry. Green IT is currently a hot topic but while awareness and established policies has increased in the last years, studies show that few companies are actually following their procedures or have goals or ways of measuring the effects of their green initiatives. The research area of Green IT is limited in terms of empirically founded literature focusing on being green within specific industries, such as consultant companies. This study is a further contribution to this area. We investigated the reasons for poor enforcement and evaluation of Green IT initiatives and measured the maturity of the concept within the organisations using a Green IT Capability Maturity Model. The study used a qualitative approach including in-depth interviews with seven IT consultant companies in Sweden. Results indicated that poor enforcement and evaluation could be explained to some extent by difficulties such as measurement, lack of proper technology and Green IT projects wrongfully placed within the organisations. Other common reasons were the financial crisis and Green IT being such a recent phenomenon. The results also show an average maturity across levels in the Green IT Capability Maturity Model of 71, 4 percent.

Key words: Green IT, Green IT index, Capability Maturity Model, Consultant industry

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Liridona Ferizi & Lina Hellmo

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1. Introduction

This chapter introduces our research starting with a background and problem area. We will then present our study purpose and chosen research questions followed by delimitations. The chapter ends with an outline, which explains the thesis structure.

1.1 Background

Carbon dioxide, CO₂, the greenhouse gas that captures radiation from the sun in the lower atmosphere, is essential for maintaining a climate suitable for human life (Plan, 2007). When the concentration of this gas grows, heat is trapped in the atmosphere and this contributes to climate changes around the world. These greenhouse effects have been scientific fact for almost a century, but between 2000 and 2006, the climate change issue became public knowledge. Concurrently energy consumption from nondomestic Information and Communication Technologies ICT, increased by more than 70 percent (ibid).

In 1992, American EPA¹ presented the *Energy star*:

“A voluntary labelling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions” (Energystar.gov).

At the same time, TCO Development² launched TCO'92 a certification defining low emission standards for computer displays. In connection with these programs the term *Green computing*:

”the study and practise of using computer resources efficiently” (Wikipedia.com)

appeared. Governmental agencies worldwide continued with green computing regulations and in 2002, the European Union published 2002/95/EC, on the reduction of hazardous substances, and 2002/96/EC, on electronic waste. These two directives put the responsibilities of recycling old electronic equipment on the manufacturers.

Public awareness, governmental regulations and higher demands on the manufacturers together with the rising cost of energy sprawled the general interest of environmental issues in profit driven companies all over the world. In the World Economic Forum, held January 2007, climate change was voted to be the most important shift that would affect business, technology, society and the global economy (Mingay, 2007). Green computing boomed in the industry with a huge range of initiatives, projects and consortiums launched together with articles and blog entries in industry publications. The CSCI³, Green Electronics Council⁴ and the Green Grid⁵ are three large international projects. Gartner, EICTA⁶ and McKinsey & Company among others presented reports and the concept of green computing grew wider from just being concerned with

¹ United States Environmental Protection Agency, www.epa.gov

² The Swedish Confederation for Professional Employees, www.tco.se

³ Climate Savers Computing Initiative, www.climatesaverscomputing.org

⁴ The Green Electronics Council, www.greenelectronicscouncil.org

⁵ The Green Grid, www.thegreengrid.org

⁶European Industry Association for Information Systems, Communication Technologies and Consumer Electronics, www.eicta.org

computers to ICT and became commonly known as *Green IT*. In Sweden, MSR⁷, Energimyndigheten⁸, KTH⁹ and IT & Telekomföretagen¹⁰ launched projects on Green IT to increase awareness and present action plans for companies to use during implementation.

According to Gartner by 2010, 50 percent of the IT organizations in the world will declare an environmental imperative (Mingay, 2007) and half of all European organisations will have a strategy for Green IT established during 2008. One third will identify one or several environmental criteria when purchasing IT by 2009 (Exido, 2008). On an international level 35 percent of large European organisations have a Green IT strategy in place for the IT infrastructure, nine percent plans for it within the next 12 months, eight percent plans for it within 12 – 24 months but 48 percent do not have a strategy or plan to have one (Martinez & Bahloul, 2008). Germany is the leader with 51 percent in place followed by UK with 47 percent and Nordic countries with 36 percent (ibid).

Within Corporate Social Responsibility CSR Green IT's part has traditionally involved environmental issues such as saving power in computer centres and less travelling, but now there is increased interest in how IT can be used on a broader level to create effective working processes (Röhne, 2008). There are many reasons why CSR and Green IT are suddenly so important. Firstly, eco-minded consumers are putting pressure on companies and if not genuinely interested in the environment, with fear of declining profit, they are going green (Weinstein, 2008). Secondly, in a report published by the EU commission in May 2008, ICT was reported to have an important role to play in reducing the energy intensity and increasing the energy efficiency of the economy, reducing emissions and contributing to sustainable growth (EU Commission, 2008). Thirdly, Gartner says that ICT accounts for approximately two percent of global CO₂ emissions (the same amount as the aviation industry) but the good news is that it can significantly contribute to control and reduce the remaining 98 percent caused by other industries (Mingay, 2007). This due to its large influence cross sectional in the society. This represents only a small part of what has been done in the area since the topic almost exploded on the market seemingly simultaneously.

1.2 Problem area

The idea for this study and its topic started fall 2008 when one of the authors who read Computer Sweden with her breakfast every morning found an increased amount of advertising on Green IT in the magazine. This new concept seemed to help save the environment and a lot of money and we started wondering why this had not taken off sooner. Concurrently with our brainstorming of the topic, a rather unique situation happened in the world. The global financial crisis, referred to as the worst since the Great Depression almost seventy years ago struck the western world. The crisis, consequent to the mortgage situation in United States, led to a liquidity problem around the world. Manufacturing companies, real estate, commercial properties and the vehicle industry were severely affected. Sweden, largely influenced and depended on the United States, within a few months went into a weak economic climate. In connection with the situation in the world it seemed Green IT were still highly prioritised within companies, although, only if generating an immediate profit or cost saving at the same time (Röhne, 2008). According to a survey performed by the research company Forrester with over 1000 companies about their Green IT practices, a slowing economy has not yet affected the implementation of Green IT; on the contrary, it shows that the financial crisis is speeding up the plans because of the cost saving

⁷ The Swedish Environmental management Council, MSR, www.msr.se

⁸ Swedish Energy Agency, www.energimyndigheten.se

⁹ KTH, Royal Institute of Technology, www.kth.se

¹⁰ IT & Telekomföretagen, www.ittelekomforetagen.se

effects (Mines, 2008). Green IT has proved to be good business and can translate to bottom-line benefits. Managers can experience that utility bills, hardware costs and real-estate costs are decreasing, general turnover decreases and new revenue streams can be created (Smallwood, 2008). Too many companies though it seems that, Green IT is not only about saving the environment; it is about saving money by reducing energy costs (Johnson, 2008)

During the brainstorming process when searching for further information on Green IT in Sweden, we discovered that many sources indirectly or directly referred to the same project. Grön IT project by IT & Telekomföretagen (part of Almega¹¹). This project was launched in February 2008 as a response to the increasing demand of implementation strategies. Concurrently, they presented the Green IT index containing four parts, *insight, action plan, enforcement* and *evaluation* (will be explained in details in section 2.1.5) based on a survey conducted with around 1000 responsible IT persons in private and public companies (Exido, 2008). This attracted much attention and more than 30 leading companies in the IT and telecom industry was involved. On the projects webpage,¹² companies can test their organisation on a “Grön-o-meter”, a sort of barometer measuring the state of the company and receive help on how to start with Green IT projects using a green audit that has been widely used in the industry.

The topic of Green IT is hot but while awareness and established policies has increased in the last years, studies show that few companies are actually following their procedures or have goals or ways of measuring the effects of their green initiatives (ibid). In a Swedish report based on a survey with 555 companies, 77 percent had an action plan but only 49 percent enforced and 20 percent evaluated them (ibid). In the index for 2008, a similar pattern existed as insight of Green IT and established actions plans were rather high but enforcement and evaluation were very low in comparison. This could somewhat be explained with the concept being relatively new but we found it very interesting to investigate deeper if in fact, the low figures explained could be with Green IT being such a current phenomena or there actually were difficulties when enforcing or evaluating this concept.

Studies show that difficulties being green are that, while staying efficient, you also need to change your behaviour and work routines attuned with the company's overall business strategy (Weinstein, 2008). Being green is not “rocket science” but requires new ways of thinking (Kelly, 2008). Building a foundation for success on the implementation on Green IT, it needs to stretch further than the IT department and onto the managers table.

“Sustainability requires a cross-company perspective” (Martinez & Bahloul, 2008, p.16) and
“Sustainability requires a value-chain perspective” (ibid, p.16),

The quotes above refer to the importance of creating an overall understanding and collaborative initiatives with trading partners. Weaving together, a complete IT strategy aligned with the business will bring credibility to the use of Green IT (Mines, 2007). A struggle appears for the management to define how Green IT can add value to the business and a transformation of vision of the concept recognized being a key contributor to success or core value is needed (Curley, 2006)

This study will investigate Green IT and its implementation in IT consultant companies in Sweden. By IT consultant companies, we refer to companies that focus on advising, selling or marketing to businesses (customers or others) how to best use IT for their requirements. Some of the participants in this study are not solely consultant companies but large parts of their

¹¹ Almega forum for service companies, www.almega.se

¹² www.anvandgronit.se

organisations fall within these referrals. The reason for choosing the consultant business is that private companies seem less developed in the area than the public sector while the awareness and implementation readiness is higher (Jansson, 2008). Reports indicates that the insight of possibilities and marketing value of Green IT is further ahead in the private sector (Exido, 2008) and it appears that many consulting companies use environmental issues in marketing to attract new employees and customers (Lorusso, 2008). In addition, since these companies themselves have relatively little direct environmental impact and sell various services and products for other companies to use we wanted to investigate how well their own Green IT where followed and aligned within the organisations.

An academically established body of literature including empirical studies are lacking on Green IT but some theses have been conducted on the topic (Bergfeldt & Floss, 2008, Huynh, et al. 2008, Davidsson, et al. 2008, Lorusso, 2008) to name a few. This study should be seen as an additional contribution to the area but we take on a, to some extent, different approach. Most studies focus on how to become green and its advantages and disadvantages. We have decided to expand the perspective by focusing on being green rather than becoming green concentrating on a specific business and its implementation and maturity.

For the empirics, we have chosen to perform semi structured interviews and a framework created from two sources. Green IT Capability Maturity Framework (Curley & Donnellan, 2008) and IT Capability Maturity Framework (Curley, 2006) based on the IT transformation of Intel (see 3.3). The target group for this study are mainly persons with a certain degree of prior knowledge about Green IT and has an interest in participation and further contribution within this area. It can for example include IS researchers, consultants or environmentalists with a technical interest but also students and other researchers interested in the field.

1.3 Purpose and research questions

The purpose of this study is twofold. First, consequently to the lacking academic literature and empirical studies, this study should be seen as a knowledge contribution to the field of studies investigating Green IT. We aim to describe and explain how Green IT is handled in the consultant industry. We wish to investigate how the companies view their initiatives and policies and try to pin the reasons for the poor enforcement and evaluation found in the Green IT index (see 2.1.5). Research question one (RQ1) is posed to accomplish this purpose:

RQ1: What are the reasons for poor enforcement and evaluation of Green IT?

Secondly we will investigate how integrated and mature the concept is in the organisations. Addressing this part will be using the approach of analyzing Green IT in relation to a Green IT Capability Maturity Model. We chose the second research question (RQ2) for this purpose:

RQ2: How well are Green IT initiatives and policies in IT consulting companies integrated into the organisation?

The research question should steer the literature study and create a direction for the researchers to follow, prevent being sidetracked. In addition, if more than one question, they should be clearly connected or there might be difficulties when discussing the study (Bryman, 2001). We have chosen to present the questions separately and the interview questions are divided in the same way (see Appendix 2). It can be argued that we are conducting two independent studies but we claim that they are connected and should be considered part of the same problem area. The first question aims to investigate whether there are any difficulties with being green and to try to

pin the reasons for the poor enforcement and evaluation found in the Green IT index. The second question will further look into how aligned the initiatives and policies are with the organisation using the Capability Maturity Model.

Among the difficulties with Green IT was lacking integration with the overall business and top management abilities to define the value to the organisation. The connection between the questions, we believe is made when companies with established initiatives and policies answers the survey creating the index. The presented results demonstrate that there are still issues remaining in enforcement and evaluation and the issues we interpret as potential difficulties and these can be signs of the concept not being fully integrated in the companies. By measuring the degree of maturity with the Green IT Capability Maturity Model in part II, the highest level totally aligned. Depending on the results from the empirical study we hope to further investigate and possibly connect the maturity levels to the poor results and vice versa. See figure 1 presenting the connection between the research questions in the problem area.

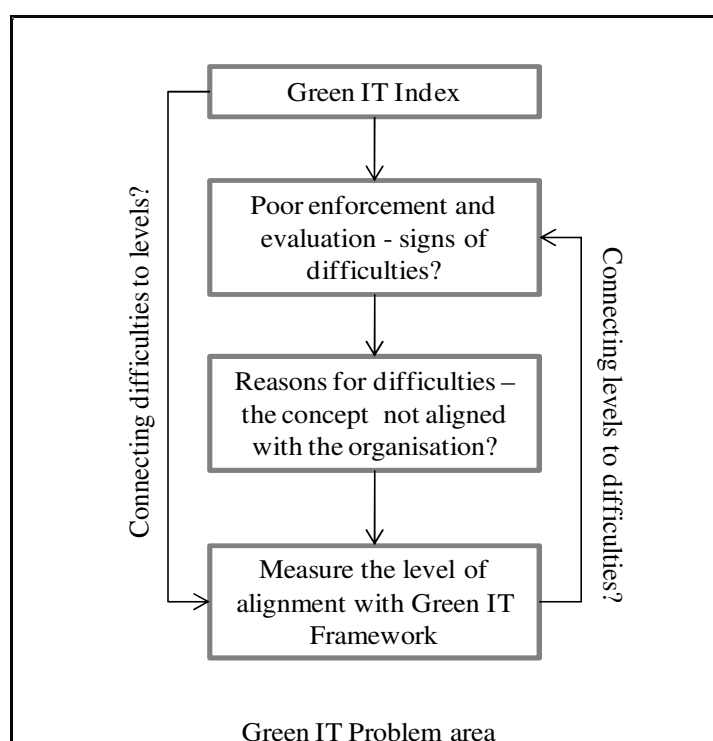


Figure 1: Research questions in problem area

1.4 Delimitations

This study is not going to deeper investigate or compare Green IT products available on the market but will focus on Green IT projects, work routines and use to decrease environmental impacts. The word “Green IT” will be mentioned for most parts in the study including the three above focus areas. Products are part of the definition we used in the empirical work but a further analysis concerning these is not included. For the sake of a narrower study, the research area is limited to consulting companies. We will discuss Green IT both nationally and internationally due to it being a global topic and some of the respondents are international. However, our empirical research has taken place in Sweden. The Green IT index contains four factors (see 2.1.5) each of them connected but for the purpose of this study, we apply and investigate only enforcement and evaluation, leaving out companies without action plans and insight.

1.5 Thesis outline

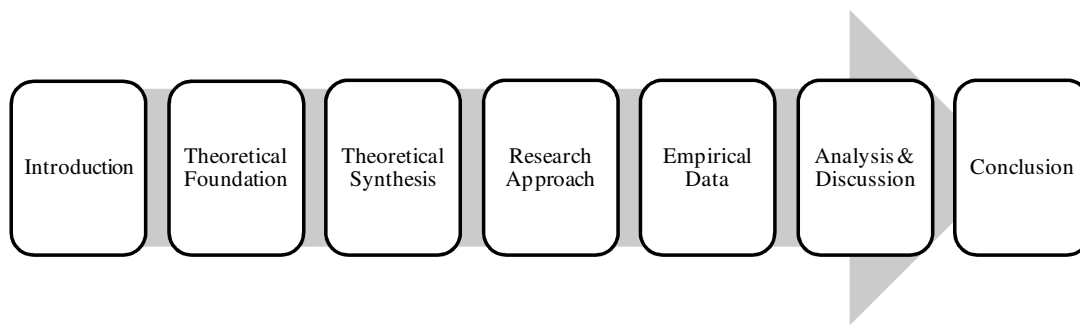


Figure 2: Outline of thesis

Chapter 1: Introduction

This chapter explains the background and problem area of the study. In addition, it presents the research question purpose as well as delimitations.

Key features: Background and problem area, purpose, research questions, delimitations.

Chapter 2: Theoretical Foundation

Present the theoretical background for the study. It includes prior research conducted within Green IT and an explanation of the Green IT index. The chapter also presents the definition and structure for the Capability Maturity Model CMM and previous research using this model.

Key features: Green IT, Green IT Index, Capability Maturity Model, examples, definition, structure and prior research.

Chapter 3: Theoretical Synthesis

Explains and motivates the development of our framework and our definition of Green IT, enforcement and evaluation. This chapter also includes the developments of questions derived from the theoretical framework.

Key features: Green IT definition, enforcement and evaluation, Green IT Capability Maturity Model, maturity levels, major strategies and goals, Interview questions.

Chapter 4: Research Approach

Explains how we performed the study. A description of the research strategy as well as a more detailed description of the steps taken in conducting the study is given. We provide an explanation regarding data collection techniques and data processing and analysis methods. The chapter also includes a discussion on how we reach ethical and scientific quality and some criticism on sources used.

Key features: Research strategy, data collection techniques, data processing and analysis method, bias, validity, respondent validation, ethics, sources.

Chapter 5: Empirical Data

Includes a description of participating companies and introduces the respondents from our interviews. It presents a summary of all relevant data from the empirical analysis divided in research questions first and in a table connecting the questions later.

Key features: Respondents, summary of interviews, connecting research questions.

Chapter 6: Analysis & Discussion

Contains a discussion about the results obtained related to our research questions. The chapter starts with a general discussion followed by more a specific analysis divided in two parts. Part I includes research question one and Part II research question two. In addition, shows the overall maturity measured in the framework and a discussion on connecting research questions. It also includes comments about the research method and approach used.

Key features: Results and implications, discussion, comments on research method.

Chapter 7: Conclusion

Provide a short summary of the study results and some key issues from the empirical analysis as well as answers to our research questions. The chapter also includes a short discussion on study contribution and some suggestions for future research.

Key features: Key issues, answers to research questions, contribution and future research.

2. Theoretical foundation

This second chapter is devoted to describing the concept of Green IT and Capability Maturity Model CMM using prior research on the subjects. We wish to outline our theoretical body and explain the somewhat fuzzy subject of Green IT. The literature review is centred on what is considered Green IT in the first part, presenting examples from projects and studies conducted by suppliers, academics or organisations. The second part will concern CMM. Since many companies use their own definition there is a lack of a recognized industry standard of Green IT, thus we will try to explain the content using several perspectives. In addition, we will demonstrate the Green IT index, one of the main features in the problem area and present what is considered enforcement and evaluation. We aim to investigate these parts of the index empirically. The chapter continues with CMM and the definition and structure of this approach are presented. This part will also include discussions on advantages and disadvantages and research conducted on CMM in the IS field. The third chapter ends with a short summary of contribution and key features from the chapter.

2.1 Green IT

Despite the international and national awareness and various projects and reports launched in recent years, there are still large amounts of companies that have not adopted Green IT policies or know how to enforce and evaluate the effects of the concept (Exido, 2008). We believe this is partly because Green IT is vaguely defined, meaning different things to different companies. Therefore, our first section will try to explain Green IT. Because it is, a relatively new concept there is very little academic literature available so most of the information comes from articles, conferences, suppliers and organisations. Comments on the choice of sources can be found in chapter four.

2.1.1 What is Green IT?

Green IT, sometimes described as green computing is the study and practice of using IT resources in an efficient way (Curley & Donnellan, 2008). The goal in the business sphere is to use IT to foster environmental sustainability and Green IT is sometimes referred to as sustainable IT. The term is used to describe the

“manufacture, management, use and disposal of information technology in a way that minimizes damage to the environment” (Walsh, 2008 p.1).

Another name is sustainable IT development, often used by manufacturers such as Dell, HP, Lenovo and Apple. Also use of IT referring to how companies organize their IT resources such as purchase of energy efficient computers, control of energy use, recycling or disposing of hazardous equipment (ibid). In the context of Green IT there is also the term Green IS referring to:

”the design and implementation of information systems that contribute to sustainable business processes” (Boudreau et al., 2008 p. 2).

To concretise the wide definition the next part will provide some examples of Green IT.

2.1.2 Examples

According to Exido (2008), Green IT is mainly concerned with three areas

- ✓ IT, Telecom business and their environmental impact on production and products.
- ✓ How these companies and organisations deal with IT to minimize environmental impacts.
- ✓ How IT can be used to decrease environmental impacts in other areas such as travelling and more effective use of resources.

Within the IT and Telecom business, responsibilities are to choose low energy hardware and material and recycle in a responsible matter. The industry uses large amounts of metals and minerals and can reduce and modernize the extraction of these materials. The areas included within Green IT are infrastructure and maintenance, hardware, recycling, IT in organizations and environmental friendly IT (ibid). Within infrastructure and maintenance Green IT concerns mainly less energy usage by optimizing networks and other resources, examples of this are higher server use, effective cooling systems, virtualisation and control of power use in computer centres. The manufacturers control the hardware development but the customers can influence the purchase by demanding eco labelled or environmental friendly certification such as Energy star, EPEAT or Swedish TCO Development and Svanen (ibid). Recycling policies are the responsibility of manufacturers and customers and all material, equipment, batteries and papers should be easily recycled (ibid). The use of IT to increase sustainability in organizations should be optimized and dealt with in projects and their effects added in calculations.

Forrester research claims that Green IT services are tailored to customer's situations, budgets and goals but that they can be characterized in three overlapping phases, assessment, planning and implementation. (Mines, 2008) Assessment involves creating an overall Green IT plan and modelling the return of investment. Further examples are energy consumption and carbon emission baseline and targets, overall environmental analysis and regulatory compliance requirements (ibid). Planning contains more detailed initiatives such as greening IT procurement, recycling, improving data centre efficiency and positioning IT to support green business (ibid). You can find supply chain optimization, flexible work approaches, managed print services, alternative energy and designing new data centres. In implementation, the companies work to specify, purchase and install appropriate technology and software to make the implementation happen (ibid). Examples are virtualization, power management software, IT infrastructure management software and efficient desktop and PC systems.

According to Gartner, the concept of Green IT is wide and lacks structure and they present a series of reports on green strategy (Berg, 2008). These are divided in three levels; green technical solutions, services and sets of regulations to address within twenty- four months providing immediate effects, measures to take within two- five years and long-term investments five – twenty years ahead in time. Examples of Green IT issues within twenty-four months are new modernized techniques in data centres, effective cooling techniques, tools for modelling and monitor maintenance, virtualisation, and techniques for heat regulation of computers, energy efficient servers and integrated energy handling in the system development cycles. Within two – five years, the process and techniques for Green IT will mature and examples in this level are Green IT purchase, Tele-presence (next generation of videoconferencing) management of staff behaviour and new regulations and management programs for CSR. In the long-term level, Gartner presents using green design when building, energy efficient software, alternative energy sources and green legislation.

Murugesan (2008) talks about IT for environmental sustainability and how it can:

“support, assist and leverage other environmental initiatives by offering innovative modelling, simulation, and decision support tools” (ibid p. 32).

Included in this are software tools for analysing, platforms for eco-management, tools for reporting and auditing energy consumption, environmental knowledge management systems, urban environment planning tools and integrating and optimizing new easy plug in sensors. IT can also be used to create awareness of green issues (ibid).

Some approaches above are similar but we still wish to present them to demonstrate that there are differences in definitions but also to show the similarities within the field. Companies and organisations can talk about the same things but with other labels on them. Due to the multiple approaches on Green IT we will in the next chapter (see 3.1) explain the definition used when conducting the empirical analysis. The reason for using a predefined definition in the interviews were both to ease the understanding of our research for the respondents but also in order for us to be able to analyse the results in some comparable way. We included an additional question (number 13) in the interviews testing the accuracy of our predefined definition and inviting a discussion on our study (see 3.4).

2.1.3 Projects and studies

There are a range of reports and projects available on Green IT. We will in this part of the chapter introduce a selection of these related to our study, and briefly present other work we find relevant in a table (see table 1 p.20). The work found in table 1 is merely a small amount of what we have encountered during the study and the projects and studies are chosen to demonstrate work done by well-recognized companies and organisation. The many projects indicate that the business is serious in pursuing environmental work but also that the topic is on the agenda now and has received an established name. In addition many companies' wishes to market themselves as conscious of the planet in order to satisfy customers, legislation and various stakeholders (Lorusso, 2008) Having environmental initiatives is not a new phenomena but the concept of Green IT is, or has recently rather been pushed higher up on the scale of important issues to address in the business sphere.

Our main sources come from IT & Telekomföretagen and they, as mentioned before, started in beginning of 2008 the project Grön IT. This is a Nordic project, with almost forty companies participating. Conducted as a way to demonstrate how IT is an environmental technique and how the business can be influential in a positive way. The analysis company Exido has released several reports on the concept of Green IT and their work is included as the basis for the Grön IT project. The report *Grön IT – från insikt till handling* (Exido, 2008) includes the Exido/IT – barometer based on a survey with 900 IT professionals among large companies in Sweden. Among the result from this report, is that the total cost of ownership should include energy consumption to get an overall picture. There is also an increase from 54 percent in 2007 to 79 percent in 2008 on organisational attitude towards the importance of energy consumption when investing in IT and an increase from 37 to 69 percent on the importance of recycling (Exido, 2008).

Enforcement and evaluation are cornerstones for change of behaviour and structure but only four percent of the companies' follow-up and account for the ICT environmental effect (ibid). Conclusions on enforcement within the scope of this study are that only 40 percent of companies claim they enforce their policies on Green IT. Energy consumption is important when

purchasing hardware but not equally important during maintenance which is regarded as included in follow-up or enforcement. 20 – 30 percent say they place demands on certified suppliers but that few suppliers actually are certified (Exido, 2008). Virtualisation and the handling of documents are the most common ways of enforcement. Conclusions on evaluation are that only 25 percent of the Green IT policies have goals and barely 10 percent measure and presents the environmental effects.

In September 2008, IDC¹³ released a white paper named the *Green IT Barometer* (Martinez & Bahloul, 2008). The objective of this barometer where to address the green and sustainable challenges European companies face today and in the future. The research contained an end user survey with 495 European IT directors and in depth qualitative interviews with organisations that had adopted Green IT initiatives. Results from this report show that 52 percent of organisations with data centres in Europe, with more than 1000 employees, have established strategies for environmental and efficient energy use (ibid). They include reducing power consumption, sustainable products, equipment recovery and recycling. 35 percent of the companies are using IT to promote green issues in their organisation due to macroeconomic changes, competitiveness in the industry and inefficiency in current IT infrastructures (ibid). The report says that Green IT should not be treated as an isolated issue but as part of the overall IT strategy, and should be embedded in other initiatives and projects such as consolidation and migration. (ibid)

The above sources are the ones we studied deeper when investigating Green IT but we reviewed other reports and projects during our literature study (see table 1). As mentioned in the introduction, there are other theses available discussing Green IT. We wanted to include some of these to show what others have done in order to try to position our study to the available literature. We will shortly present a selection followed by a minor comparison on the projects and reports to increase the knowledge contribution in this study.

Definition of Green IT - Is Green IT Good Business? A market analysis from an IT service provider's perspective (Lorusso, 2008) is a master thesis. It includes a multiple case study in four companies (IBM, Accenture, Sun Microsystems and Volvo IT) and aims to answer how the concept of Green IT is defined by the market. The author investigated what forces exist for the industry to enter this market and which steps IT service providers has to take in order to include the concept in their environmental strategy. He also studies how companies measure their environmental impacts and what and how they measure it compared to guidelines in the Greenhouse Gases protocol. This was then analysed on how these results communicated to the public and stakeholders.

Huynh, et al. (2008) presented *Grön IT - IT med miljöbänsyn* a bachelor thesis in Informatics at Jönköping International Business School. This thesis aimed to describe advantages and disadvantages with Green IT and established a list of suggestions for further implementations. The authors conducted interviews with companies working within the area and identified six advantages and three disadvantages of Green IT. The results also presented proposals to simplify the work on Green IT.

Davidsson, et al. (2008) has also written a thesis on Green IT 2008, *Grönare IT med hjälp av balanserat styrkort* at the IT University of Göteborg. This study uses a literature study, survey and interviews and their investigations show that IT usage can never be completely green, meaning zero environmental impact, but greener. They created a balanced scorecard containing financial, process and teaching perspectives. The forth, customers perspective, were not necessary to make

¹³ IDC, a subsidiary of IDG, www.idc.com

greener IT and other main conclusions were that the responsibilities for the implementation of Green IT and the Balanced Scorecard needed to be established at CEO level.

Similarities and differences

The most striking similarities in the information we have studied are that they all propose stepwise action plans. It is very common to see surveys conducted to create a framework and ways of trying to define and present the concept. Most of the reports stress the importance of creating a strategy and measuring it. In the definitions for Green IT, it often mentioned that ICT is responsible for as much CO₂ emission as the aviation industry (two percent). This might seem like a relatively small percentage but the aviation industry has always been considered an environmental villain so many are surprised when the ICT received the same figures. Different scales, indexes and barometers are presented as ways of coping with the difficulties of measuring mainly CO₂ and energy efficiency. There are also similarities in the three theses we have read, they all want to answer how to become green and then propose plans or ways to use this in a specific organisation. Lorusso (2008) studied different cases and then wanted to see how the last case (Volvo IT) could implement the concept. Huynh, et al. (2008) focused on advantages and disadvantages to suggest proposals on how to use Green IT and Davidsson, et al. (2008) created a Green IT Balanced Scorecard.

Differences that we have found is that in Sweden there are much focus on insight and the launch of various projects and internationally they seem beyond that and talk more about practical tips on how to start acting instead of just talking. There are some wording differences since some talk about ICT and CSR in connection to Green IT when others just say it is about computers and hardware. The concept can be large, covering an entire organisation or small, concerning only energy consumption. Differences in the theses are that Lorusso (2008) has conducted case studies and attempts to more objectively analyse how Green IT is used in the industry and the other two use literature reviews, interviews and surveys presenting theories that are more subjective.

International projects and studies	
Accenture	Conducted surveys with more than 500 business leaders in China, Germany, India, Japan, UK and US on what specific steps businesses can take to respond to the threats and opportunities of climate change. They also conducted quantitative surveys internationally with more than 7500 individuals concerning climate change and the results demonstrate that individuals are taking the lead but they need guidance on how to change their behaviours. Individuals in emerging countries are the most concerned and ready to act and overall the individuals, in their decision to choose providers, value actions taken by energy providers to address climate change. (Accenture, 2007)
Brown Wilson Group	An outsourcing advisory company providing best selling reports and books presented in 2007, <i>The Black Book of Outsourcing 2007 Green Outsourcers Report</i> , ranking 50 global outsourcing vendors based on environmental criteria's. Part of the criteria when selecting outsourcing vendors, companies demand for example that their suppliers are reducing the carbon footprint, mandate environmental legal compliance and develop new green technologies, products and services reducing waste and increasing the efficiency of resources.(Brown - Wilson, 2007) The criteria of evaluating their green success factors in the organisations were scored on a zero to ten scale and then they present a 12 steps plan developing initiatives for green outsourcing.
Cap Gemini	Has released several reports on environmental issues and includes the environment in their "six strategic pillars" within the Corporate Social Responsibility plans. They are striving to reduce the negative impacts in the areas most relevant to their business and present a group environmental policy including energy consumption, business travel, waste management including IT assets and paper management (Cap Gemini, 2008). Also available are the <i>Sustainable Desktop Strategy</i> with green solutions helping costumers reduce costs and improve CSR and the <i>Green IT report</i> a full report including surveys with six major Cap Gemini partners. The result of the surveys developed a sustainability scale ranging from A –G (more efficient to less efficient) concerning manufacturing, transport & logistics, ownership and operation, disposal and CSR. Based on the findings they present ten recommendations and also a ten step guide to formulating a Green IT strategy. (Cap Gemini, 2008).
Climate Action Network Europé	A leading European network dedicated to climate and energy issues. It has over 100 members, (Swedish Society for nature conservation is a member) and it works to prevent climate change and promote sustainable energy and environmental policies in Europe
Climate Savers Computing Initiative	A global cooperation within the IT and Telecom industry, manufacturers, governments and organisations. The board members include Dell, Google, HP, Intel, and Lenovo, Microsoft and WWF and a large number of sponsors, associates and affiliates. The organisation commits to purchasing energy efficient PCs and servers and to broadly deploy power management. Their mission is to reduce computer power consumption with 50 percent by 2010
Gartner	Released the report <i>Green IT: The new Industry Shockwave</i> (Mingay, 2007). This contains the now famous words that ICT accounts for approximately 2 percent of global CO ₂ emissions equivalent to aviation, a statement widely used by companies when presenting the concept to the public. This report presents 12 actions to take regarding Green IT. Among the actions are to define a policy and strategy for first and second order effects, start measuring and analyzing, educate the staff, switch off when not using techniques, consider energy at every decision level, know green legislation, take a holistic approach to reducing IT, cooling and power loads and greening of printers and printing. The message is to reduce, reuse and recycle.
Global Action Plan	The UK environmental charity organisation (founded in 1993) released a research report in 2007 called <i>the Inefficient Truth</i> (partly used by Davidsson et al, 2008). This report produced behalf of the Environmental IT Leadership team, a group of major ICT users from different sectors committed to taking practical measures to cut CO ₂ emissions. The report illustrate the environmental impact of ICT and the energy and supply issues associated with the huge growth within the sector and provide some practical examples on how a wide range of organisations start to make a difference in addressing the issue.
Global Reporting Initiative	A large network of international experts that has developed a widely used sustainability reporting framework containing principles and guidelines for organisations to use in measuring and reporting their economic, environmental and social performance.
Green Grid	A global consortium including APS, Dell, HP, IBM, Intel, Microsoft and Sun Microsystems as board members and over 150 contributing members. Their mission is to develop and promote energy efficiency for data centres and information service delivery by for example creating standard measurements and processes to improve performance and promote the adoption of energy efficient technologies.
ITPS	Released <i>IT och Miljö</i> (Göthenberg et al, 2008) a report investigating Green initiatives in Japan and USA. This study was conducted for Vinnova and studies trends and strategies for environmental IT and to establish the driving forces, goals and concrete measures within the area. Environmental issues are high on the agendas in Japan and USA and the American Council refers to the "ICT energy paradox" where IT products are often pointed out as the most important forces for economical productivity at the same time as their positive effects on the energy efficiency gets little or no attention. The report divides the measures taken in two categories; "greening of IT" – reducing the ICTs environmental impacts and "greening by IT" – focusing on the environmental benefits of IT.
McKinsey&Company	Released in 2008 the <i>Smart 2020</i> report (GeSI, 2008). This analysis quantified the direct emissions from ICT products and services based on expected growth and investigated where ICT could enable reductions of emissions in other industries in terms of CO ₂ and cost savings. (Climate Group, 2008). It presents actions summarized as Smart Transformation, (S) – standardize, (M) – monitor, (A) – allow accountability, (R) – rethink how we should live and (T) – transformation of the economy will occur.

Table 1. International projects and studies on Green IT and sustainability

2.1.4 Green IT Index

The Green IT index mentioned in the introduction and part of our problem area derives from IT&Telkomföretagen and Exido. This is presented several times a year and in 2008, a summit was published three times. Purpose of the index is to measure how companies and organisations work with environmental IT and enable them to measure their work against each other. By answering ten questions on the projects website¹⁴, companies can compare their results to others. Green IT Index is built on the Exido/IT Barometer; a continuous survey with 555 participating companies. These reference companies' answers on progress with their Green IT are calculated and create the foundation for the measurement tool. We were unable to obtain the actual calculations creating the numbers in the index but the questions companies answer on the webpage to compare their status against the index can be found in Appendix 4. The index contains four parts and this study is primarily focused on the last two:

- ✓ **Insight**– Demonstrates whether the organisation account for environmental effects in connections with IT investments.
- ✓ **Action plan**– Demonstrates whether the organisation has a policy or strategy for Green IT
- ✓ **Enforcement**– Demonstrates to what extent the organisation acts upon determined strategies and whether the organisation is following the established policies.
- ✓ **Evaluation** – Demonstrates whether the organisation has any goals in the policy or strategy for Green IT work. It also demonstrates to what extent the organisation evaluates and measures the actions and goals.
(Adopted from Exido, 2008)

The latest index (to our knowledge at the time of conducting this study) was presented in November 2008¹⁵. This demonstrates that insight is relatively established as well as action plans. Enforcement and evaluation is still low and the interest for this is not demonstrating any major changes when comparing the numbers from spring, summer and fall of 2008. In the press release commenting on the work on Green IT in relation to the financial crisis, says that the “hype” is slowing down and claims on economy and investments are increasing. The desire to invest “green” regardless of higher costs has rapidly declined and this is a sign of Green IT not being firmly established at top management (Exido, 2008).

2.1.5 Enforcing and Evaluating Green IT

As partly the purpose of this study is to investigate the reasons for the poor enforcement and evaluation demonstrated in the Green IT index above, we want to show what we mean by this and provide some examples on how it is handled in the business. We also wanted something to measure against in the analysis of empirical data.

¹⁴ www.anvandgronit.se

¹⁵Can be found at <http://www.anvandgronit.se/website2/1.0.2.0/10/Pressmeddelande%20081128.pdf>

Enforcement

Enforcement or observance means following up and implementing the actions plans or green policies in the organisation. When the plans are developed with key issues identified to measure, you need ongoing projects to sustain the progress of your work and keep the organisation on the right track towards established goals. Educating the staff and make, them aware of the companies' strategies as a first step after the policies are established. Then create further commitment by placing Green IT on the agenda of internal planning and in discussions with partners. (Exido, 2008) Placing demands and informing the supply chain of the policy is important to cover all parts of the organisation and when everyone is onboard in the projects, it is easier to enforce the changes made (ibid). National and international legislations can change and new recommendations are published frequently so in order to be aligned with these you continuously need to follow the development in the area. Choose a person responsible for looking after new rules, recommendations and legislation and for the communication of these (ibid). Basis for the success of enforcement is a well-established policy with a clear roadmap to measurable goals (ibid).

There are some major issues to overcome when being green such as alignment constraint, where the Green IT strategies are not compatible with corporate missions and resource constraints with lack of skills and expertise, time and absence of clear management responsibility (Martinez & Bahloul, 2008). The latter is although demonstrating a slight change as companies are appointing responsible executives to implement the strategies.

IT & Telekomföretagen propose in their analysis different challenges in the green work but also solutions divided in six areas where Green IT can be beneficial. Concerning products and services it is important to continuously map and document whole product life cycles from production to recycling as well as related development and competence. In the supply chain you need to enforce mandatory controls of the suppliers environmental policies and work and concerning employees the keys are clear guidelines on how to work, access to information and rewards for "good initiatives" concerning the environment. In the IT department, you need to evaluate the possibilities of increasing the use of virtualisation and place demands and rely on the responsibilities of manufacturers for recyclable products. Regarding property, you have to constantly evaluate and use renewable energy sources. Within information and communication, you need to communicate and present your results both internally and externally and follow-up and measure your ongoing projects, both failures and success in small or larger projects in order to maintain any progress.

There appears to be an overall willingness to engage in Green IT and sustainability debates both nationally and internationally but obstacles such as time pressure, cost and full corporate commitments need be dealt with when implementing the initiatives. In the UK when asked what would be the most important support to enforce improvements, demands for recognised industry standards and incentives such as tax allowances for Green IT practices were the most common (Plan, 2007).

Evaluation

Evaluating or measuring your Green IT work is essential and when conducting the action plan or policy, measurable goals need to be in place to have something to measure against in order to review any progress. Gartner (2007) talks about taking control of the electricity bills and measuring power consumption and ICT related waste and dispositions in the organisations (Mingay, 2007). By for example fewer printers and servers with virtualisation, turning equipment

off and printing less you can measure the cost saving on energy consumption, paper, equipment and environmental benefits with reduced CO₂ emissions. Also by starting to measure the electronic or hazardous waste and recycled equipment, you can save the environment and money. The Life Cycle Assessment (LCA) tool is widely used to calculating specific products and services environmental performance Lorusso (2008). This is used mainly in the manufacturing sector and in the service sector; Ecological Footprint (EF) and Carbon Footprint (CF) are more common (ibid).

“Ecological Footprint measures the biological capacity (in terms of land) required to sustain human life” (ibid p. 11).

Carbon Footprint measures the sum of gaseous emissions from an activity or group of activities or product that have a negative impact for climate change (Eccm, 2007).

Almost all human activities generate greenhouse gases, indirectly or directly and the most important gases produced are carbon dioxide, CO₂. A widely used method for calculating the emissions of these are the Greenhouse Gases Protocol (GHG Protocol 2008) from WBCSD/WRI¹⁶. This includes a model dividing emissions in three categories depending on grades of responsibility and it is voluntary to report indirect sources such as emissions from waste or suppliers activities. International standard ISO 14064¹⁷ and the Carbon Neutral model are based on the Greenhouse gas, GHG-model. There are no published standards for calculating carbon footprints on products but ISO 14044 and ISO 14040 concerns life-cycle analysis. Basic steps in calculating a products CF is analysing the material and manufacturing processes followed by creating a map of the product flow chart. The next step is to define system barriers and collecting data concluded by calculating the emissions, using appropriate factors (Eccm, 2007). In addition, standards such as the environmental management systems, ISO 14001¹⁸ can help organisations minimize negative effects on the environment.

There are also cost saving measurement concerning energy and power consumption, reduced travel costs, fewer storage spaces due to less printout, decreased waste and recycling, and less equipment. Cost reductions or savings can be measured by optimizing resources, substitution and compliance to legislation to avoid penalties (Lorusso, 2008). There is money to be saved in virtualisation that generates reduction in material intensity, office space and energy used for managing the IT facility. More difficult to measure but equally important are the social aspects for employees when i.e. providing travel costs for public transportation instead of using cars and distance work a few times a week from home. There are also other factors to consider when analysing these changes and we have been told during the study that Green IT can simplify family life, decrease costs and increase efficiency.

In summary, despite the large global awareness many companies have yet to adopt the concept of Green IT, nor ways of enforcing and evaluating the supposed initiatives. We believe this has somewhat to do with the concepts lack of uniformed definition and this part of the chapter has presented different views on what is considered Green IT in order to grasp a clearer understanding. Within ICT, it is very common with new concepts emerging and abbreviations with fuzzy definitions and Green IT is no exception. We present that Green IT is mainly concerned with three areas: the IT and Telecom business and their environmental impact on production and products. How these companies and organisations deal with IT to minimize environmental impacts and how IT can be used to decrease environmental impacts in other areas

¹⁶ The Greenhouse Gas Protocol Initiative. www.ghgprotocol.org

¹⁷ Greenhouse Gases ISO 14064-1:2006. www.iso.org

¹⁸ Environmental management systems ISO 14001:2004. www.iso.org

such as travelling and more effective use of resources. Enforcement and evaluation are cornerstones for change but studies show a lack of these two and this is also evident in the poor figures of these two parts in the Green IT Index. Insight and action plan, the remaining parts of the index are relatively high in comparison, indicating the trend in Sweden that companies are aware of the concept and has started working towards change but that there are still issues with follow-up and measurements.

2.2 Capability Maturity Model, CMM

In order to have an academic foundation when conducting the study we needed a frame that was suitable for investigating our problem area and the choice fell on using a unique combination of the Green IT Capability Maturity Framework (Curley & Donnellan, 2008) (see 3.3) and the IT Capability Maturity Framework (Curley, 2006) based on the IT transformation of Intel (see 2.2.3). These two sources are the foundation pillar for our Green IT Maturity Model measuring alignment of Green IT (see 3.3) and they ground in CMM theory. A CMM can be an efficient roadmap for IT organizations to use during transformational periods and increasing in maturity the company moves from an unmanaged chaotic state to high performance processes with better outcomes (Curley, 2006). The IT Capability Maturity Framework (Curley, 2006) focuses both on process and outcome maturity and is based on the original CMM for software version 1.1.

In the literature review, we found several alternative frameworks. Solely using the Green IT Index could have been an option. The Green IT Barometer (Martinez & Bahloul, 2008) could also have provided us with interesting investigations as well as the “Grön-o-meter” by IT&Telekomföretagen. Davidsson et al. (2008) used a Balanced Scorecard, Huynh et al. (2008) risk identification and a seven-step maturity process and Lorusso (2008) created a Green IT Matrix. Our choice of using the theory of CMM was motivated by A) the model is established (it has been around for almost thirty years and therefore well known and relevant to the IS research field) B) we wanted a rather straightforward tool for measuring how integrated Green IT were in organizations. New concepts not fully established on management levels tend to fail in delivering successful output and CMM seemed appropriate in displaying the current levels of adoption C) the Green IT Maturity Framework we encountered as part of a recent project on Green IT was built on this theory.

For this study we have decided to use CMM solely in the empirical analysis to investigate what levels the respondents are currently on and our intentions are not to provide the reader with a plan on how to mature within the framework. We will in this part of the chapter initially present a short background to CMM and then continue with describing the definition and structure of CMM version 1.1. The reasons for presenting this early version (there are several revisions made) are that the main sources we have used for the framework (Curley & Donnellan, 2008, Curley, 2006) are based on CMM version 1.1. In addition, due to the fact that our study is not primarily focusing on the outcome or maturity advancement we will present this model instead of the current CMMI. Some of the references on CMM are outdated but since there are so many revisions on the model we wanted to provide information consistent with the version of the framework used in our sources. The chapter also presents advantages and disadvantages of the CMM and research available on the model in relation to our purpose.

2.2.1 A short background

The Capability Maturity Model was developed and promoted by the SEI¹⁹, a federally funded research and development center founded in 1984. The original purpose of the model was to advance software engineering due to the increasing recognition that software was problematic in terms of its delivery, escalating costs, and customer dissatisfaction (Avison and Fitzgerald, 2006). Since the eighties several revisions have been made and it was renamed in the nineties to SW-CMM (Software Engineering Capability Maturity Model). CMM describes essential attributes that are expected to characterize an organization at a maturity level (Paulk, et al., 1993). Thus, it is a descriptive model and not prescriptive; meaning that it describes an organization at each maturity level without explaining how to improve. Applying the model and investigating how to move for example from level one to two, achieving all goals and actions in the levels usually takes years (Fitzgerald et al., 2002). Today, the CMM has been replaced with the CMMI (Capability Maturity Model Integration) in order to address some of the criticism it received. The old CMM was rather successful but proved difficult when using multiple models in software engineering which the CMMI corrected. Since 2007 SEI no longer maintains the CMM or SW-CMM.

2.2.2 Definition and structure

The CMM describes key elements of an effective software process. There is a path moving from an ad hoc, immature company to a mature and disciplined one. It contains five levels, each affecting different parts of the organization. Advancing in levels in the model, the process is expected to change; *mature*. When you go from level one to two, the process is disciplined, from level two to three consistent and level three to four predictable. Between four and five continuous process improvement should prevail (Paulk, et al. 1993). Figure 3 demonstrate the five levels of software process maturity.

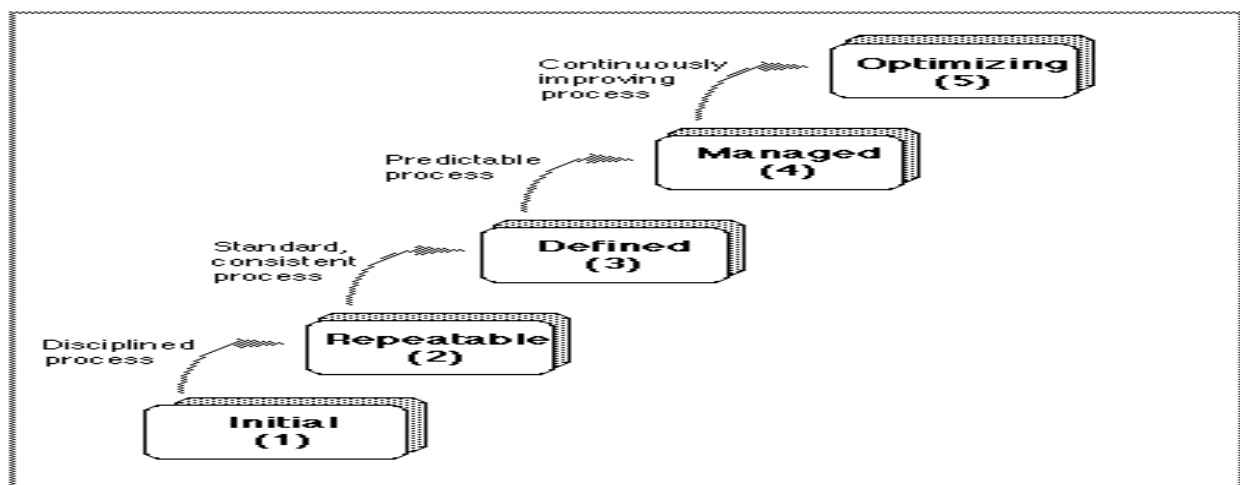


Figure 3: The Five Levels of Software Process Maturity (Paulk, et al., 1993 p.13)

The Model contains five maturity levels that provide the top-level structure of the CMM.

1. Initial level

In the initial level, the software development is characterized as ad hoc or sometimes chaotic. The organization operates without formalised procedures, cost estimates and project plans. (Paulk, et al., 1993). It is a level that companies try to escape from to continue towards more mature processes (Avison & Fitzgerald, 2006).

¹⁹ Software Engineering Institute, www.sei.cmu.edu

2. Repeatable level

Policies for managing software projects and implementation procedures for these are established in this level (Paulk, et al., 1993). When it comes to planning and managing new projects, it is usually based on experience with similar projects and this level allows organisations to repeat successful implementation.

3. Defined level

Level three includes documented standard processes for developing and maintaining software across the organization (Paulk, et al., 1993). Recommendations are that it should be a group in charge of maintaining and improving these standard processes (Fitzgerald, et al., 2002).

4. Managed level

The fourth level collects detailed measures of the software process and set quantitative goals for software products and processes (Paulk, et al., 1993). Examples of measures are productivity and quality of all software processes and their supporting activities. To increase progress of the process quality and productivity analysis, the company should create a process database (Fitzgerald et al., 2002).

5. Optimizing

Level five is the highest level and the organization identifies weaknesses and strengths in the process continuously (Fitzgerald et al., 2002). Data is used to perform cost benefits analysis on new technology and innovations are identified (Paulk, et al., 1993).

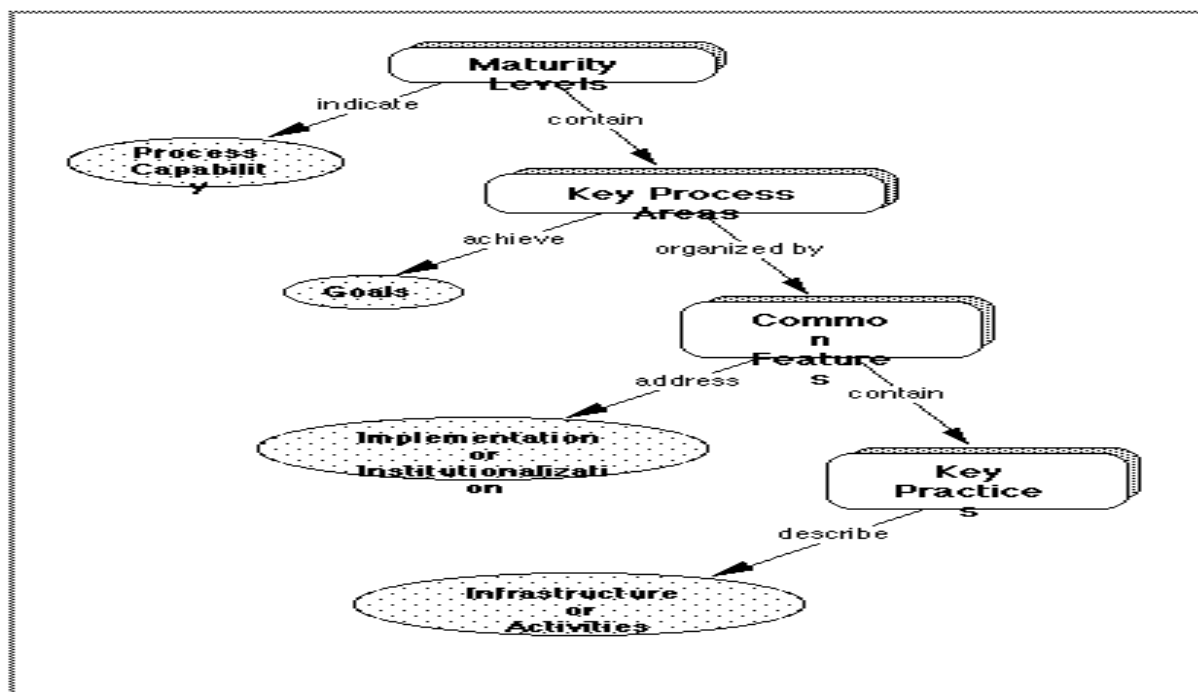


Figure 4: The Structure of the Capability Maturity Model (Paulk, et al. 1993 p.25)

Figure 4 presents the overall structure of the CMM. The maturity levels (except for level one) have key process-areas, KPA. These are organized by common features that when acting together accomplish a set of goals. The common features contain key practices that describe either the activities to undertake or the infrastructure (Paulk, et al., 1993). It is recommended to follow the model in sequence avoiding skipping levels until accomplished and there are possibilities of using key practices or key process areas from a higher level. Process capability is the expected results that can be obtained following the process and are used to predict most common outcomes. The

goals include scope, limitations and purpose of each KPA. The key practices are divided into five Common Features sections:

”Commitment to perform, Ability to perform, Activities performed, Measurement and analysis, and Verifying implementation, indicating if the implementations are effective, repeatable and lasting”(ibid p. 25).

These describe the most contributing activities to effective implementation of the key process area (ibid).

2.2.3 Advantages and disadvantages

Although the model is considered overall successful, it also received some criticism and in this part of the chapter, we will present both some advantages and disadvantages with the model.

Advantages

Sochacki,(2002)indicated that those engaged with software process assessments report an increase in staff morale, ability to meet budgets, ability to meet schedules, productivity and product quality when changing between levels. Advantages of improvement activities and processes increased largely moving from one maturity level to the next because the improvements explained different sets of problems (ibid). Improvement programs guided by CMM reportedly gained in:

“productivity, quality, time to delivery, accuracy of cost and schedule estimates as well as product quality” (Gartner, 2001 p. 9).

Disadvantages

Among the disadvantages with CMM is the size and complexity of the implementation process (Sochacki 2002). Many companies could only afford implementing parts of the model and advancing between levels was time consuming as it took years. It also proved difficult and very costly to use multiple models hence the replaced CMMI. In addition the CMM contains best practices from successful projects and does not act as a quality guarantee. According to Bach (1994) the biggest problems with CMM were its lack of empirical support, it contains very little information on process dynamics and sometimes it created "level envy" thus it had the effect of blinding an organization to the most effective use of its resources.

2.2.4 Research available on CMM in the IS field

This last part of chapter 2 will provide some available research on CMM from the IS field in relation to our purpose. The first source is the original technical report from the SEI that acts as the foundation for most other research available on version 1.1. The second is the article including the IT Capability Maturity Framework (Curley, 2006). There are many other articles and books available with research conducted on and using CMM. (Manzoni & Price, 2003, Marshall & Mitchell, 2002, Debreceeny, 2006, Sochacki 2002, Bach, 1994, Herbsleb et al., 1997, Fitzgerald et al., 2002, Avison & Fitzgerald, 2006, Lockamy, 2004, Santanen et al., 2006, Fraser et al., 2002) to name a few. The following two sources are the most frequently used in this study.

Paulk, et al. (1993) provides a technical overview of the Capability Maturity Model for Software Version 1.1. This technical report from SEI describes the process maturity framework of five maturity levels, the structural components that include the CMM, how the CMM is used in practice, and future directions of the CMM. This paper serves as one of the most commonly used sources for understanding the model.

In *IT Transformation at Intel* (Curley, 2006), containing the IT Capability Framework we partly base our model on, the author refers to prior academic research on CMM such as Paulk, et al. The framework was created as a response to the CIO²⁰'s vision to create a new IT mission aligned with Intel's corporate visions. This project was run in four strategies:

“Managing the IT budget, Managing the IT assets and value chain, Managing IT for business value and Managing IT like a business” (ibid p. 156).

The transformational work took place during six years and each strategy had specific goals and key process areas within the five maturity levels. The framework proved successful in the integration of IT in Intel and offers a tool for other companies to use when trying to achieve greater value from IT. Results show that IT management needs to synchronize all changes across the levels for all strategies (ibid) and maturing in levels in separate strategies will require changes in the same levels in other strategies since the best outcome is achieved when all parts are connected. IT management needs a mapped out plan with current standings and desired goals as well as key actions and required investments clearly identified not unlike the action plans proposed on Green IT. A critical point in the success of the transformation was that the plans needed to be:

“Living documents” (Curley, 2006, p. 167)

including making revisions to adopt changes and incorporate new technologies. Figure 5 shows the IT Capability Maturity Framework. Our adoption from merging the framework below and the Green IT capability Framework can be found in the next chapter (see 3.3, figure 7).

Figure 9: IT Capability Maturity Framework, copyright: Martin Curley, Intel/National University of Ireland, 2006.

Maturity Levels	Major Strategies			
	Managing the IT Budget	Managing the IT Assets and Value Chain	Managing IT for Business Value	Managing IT like a Business
5. Optimizing	Sustainable Economic Model	Corporate Core Competency	Optimized Value	Value Centre
4. Advanced	Expanded Funding Options	Strategic Business Partner	Options and Portfolio Management	Customer/ Service Focus
3. Intermediate	Systemic Cost Reduction	Technology Expert	ROI & Business Case	Customer/ Service Orientation
2. Basic	Predictable Performance	Technology Supplier	TCO	Tech/Product Focus, Cost Centre
1. Initial		← Beginning →		

Figure 5: IT Capability Maturity Framework (Curley, 2006, p. 165)

²⁰ CIO –Chief Information Officer

2.3 Summary and key features of chapter 2

This second chapter's purpose was to describe the recent concept of Green IT and the well-established Capability Maturity Model using prior research. We presented in the first part several definitions of what Green IT is and tried to clarify this rather fuzzy concept using examples from projects and studies (see 2.1). This part of the chapter also introduced and explained the Green IT index as well as the two important parts of this index we aim to investigate empirically; enforcement and evaluation (see 2.1.4-2.1.5). The second part of the chapter presented CMM and a short motivation to the choice of this model and its background (see 2.2 – 2.2.1). We also explain the definition and structure of CMM version 1.1, the base for the Green IT Maturity Framework (Curley & Donnellan, 2008) and IT Capability Maturity Framework (Curley, 2006) (see 2.2.2). The final part of the chapter includes advantages and disadvantages of using CMM and a shorter presentation of research available on CMM in the IS field related to our study (see 2.2.3 – 2.2.4). The following chapter 3 will provide an explanation of how we adopted the CMM model into a framework used in the empirical analysis investigating Green IT, thus merging together the two concepts described in this chapter.

3. Theoretical synthesis

In this chapter, we will present the way we interpret and use the data gathered in the literature study. Outlining our definitions of Green IT, enforcing and evaluation and the CMM framework used in the empirical study. As previously mentioned in chapter one we decided to use a predefined definition in the interactions with the respondents, therefore our first section of this chapter is devoted to explaining how we used the term Green IT during the empirical study. This is followed by a description of our interpretation and use of enforcement and evaluation in connection with the Green IT index. Chapter three continues with the presentation of the Green IT Maturity Model, our framework used to test the alignment and maturity of Green IT in the participating companies. A detailed description of maturity levels, major strategies, key process areas and goals in the model are included. To provide a clearer link between theory and empirical study we decided to include the interview questions and their purpose in this chapter as well as a list dividing them in research questions and parts of the framework. The chapter concludes with a short summary of contribution and key features consistent with previous chapter.

3.1 Our definition of Green IT

Since there is no uniform definition regarding Green IT, we find it appropriate to be clear with our interpretation. In the literature review in the previous chapter, we presented more than one views of the concept but for the empirical study, we decided to specify the definition. Reasons for doing this instead of relying solely on the respondent's interpretation were that we feared the results would be too difficult to compare in the analysis if they perceived the concept differently. We included a final question (nr 13) testing the accuracy of our definition but also for the respondents to elaborate on theirs. Our interpretation of Green IT is partly based on the work from Exido (2008). We chose this because it acts as a foundation in the Green IT project by IT & Telekomföretagen and this project has more than thirty participants from various industries and referred to frequently in the media so it was the widest adopted definition we could find. In this study, Green IT is concerned with ICT and their environmental impact on production and products, how these companies and organisations deals with IT to minimize environmental impacts and how IT are used to decrease environmental impacts in other areas such as travelling and more effective use of resources.

When we refer to Green IT, we mean the study and use of IT resources in an efficient way causing minimal impact on the environment. In the interviews this was translated to the following definition “*any initiative, technique, product or policy (established or not) concerning sustainable or environmental-friendly use of IT*” (see Appendix 2). Referring to initiatives, we mean services or projects, internal or external towards customers and stakeholders. Policies are included in action plans of the index. Action plan is the translation of the Swedish word “*handlingsplan*”, referring to a plan of action adopted by the organisation to control in this case Green IT.

3.2 Our definition on enforcing and evaluating Green IT

To be consistent in our work and provide a complete picture of the empirical work we also find it appropriate to clarify our definitions of enforcing and evaluating Green IT. The words themselves are translations from Swedish “*efterlevnad*” and “*utvärdering*” included in the Green IT Index from IT & Telekomföretagen (see 2.1.4). The definition for enforcement and evaluation are based on the index. Enforcement meaning: demonstrates to what extent the organisation acts upon determined strategies and whether the organisation is following the established policies. It

refers to continually following up the green initiatives in the organisation against predefined goals. The definition of evaluation is as follows: demonstrates whether the organisation has any goals in the policy or strategy for Green IT and to what extent the organisation evaluates and measures the actions and goals.

3.3 Our Green IT Capability Maturity Model

For this study, we have merged parts of two frameworks, the IT Capability Maturity Framework (see 2.2.4, figure 5) and the Green IT Capability Framework (figure 6). Mr Brian Donnellan from National University of Ireland created the latter together with the director of IT Innovation at Intel Corp. Mr Martin Curley. The Green IT Capability Framework is a systematic approach to Green IT based on the IT Capability Maturity Framework (Curley, 2006).

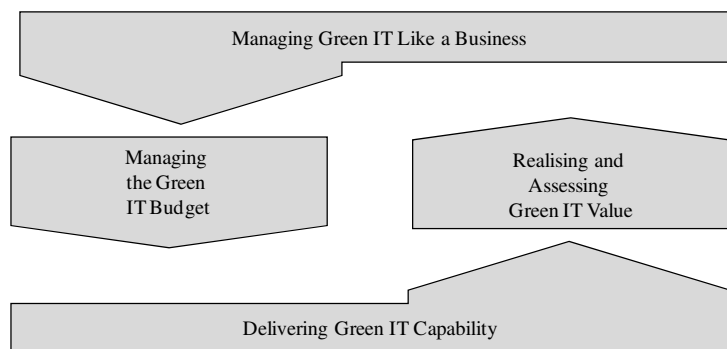


Figure 6: Green IT Capability Framework (Curley & Donnellan, 2008)

The Green IT Capability Framework above is created to address the practical problems on how IT managers can develop a Green IT strategy by providing them a tool to help diagnose their current situation and plan a continuous improvement plan for the future (Curley & Donnellan, 2008). Unfortunately, the Green IT Capability Framework was not yet published or tested academically (we corresponded with Mr Donnellan on several occasions but were unable to acquire the framework) so a modification was needed, thus the creation of a suitable model for this study. Our adopted version, the Green IT Capability Maturity Model is presented in figure 7.

Maturity Levels	Major strategies			
	Managing Green IT like a business	Managing the Green IT budget	Realising and assessing Green IT value	Delivering Green IT capability
5. Optimizing	Value centre	Sustainable economic model	Optimized value	Core competency
4. Managed	Investment centre	Expanded funding options	Advanced techniques	Strategic business partner
3. Defined	Service centre	Cost reduction techniques	Business value	Quality service
2. Repetable	Cost centre	Defined budget	Total Cost of Ownership	Little or no strategic input
1. Initial	Technology & Products Focus	Ad hoc spending	No defined processes	No formal precense

Figure 7: Green IT Capability Maturity Model

3.3.1 Maturity Levels:

The different maturity levels in our model range from initial to optimizing according to Paulk, et al. (1993). In the original framework from Intel corp. (see 2.2.4) levels are defined as initial, basic, intermediate, advanced and optimizing (Curley, 2006) Level one is named *Initial* or *Ad hoc* where the companies operate without defined processes, cost estimates or project plans. Level two *Repeatable*, the policies, and their procedures for operations are established. Level three, *Defined* and the standard processes and techniques for developing and maintaining the projects across the organization are documented. Level four, *Managed* and the organisation set goals and starts using detailed measures and product quality to quantitatively understand and control the process and procedure. Level five *Optimizing* and includes ongoing process improvement techniques enabled by quantitative feedback from the process and from innovative changes. This study only aims to test and initially place the companies investigated on a maturity level and not present or measure ways of advancing from one level to another. We will therefore not describe the process capability or the range of expected results that can be achieved by following the process to the next level. We will also not further analyze common features and key practices as previously described (see 2.2.2) since these also focus on advancing from different levels.

3.3.2 Major Strategies, key process areas and goals:

We have chosen to keep the names of the major strategies from the framework we received by Curley & Donnellan (2008). The four strategies together we believe should cover the Green IT concept and provide a framework for diagnosing the companies' current situations. The key process areas are selected and modified from the original Intel framework by Curley (2006). The reason for this was that these were already tested and proved successful in an IS article. Providing entirely our own key process areas would have created a unique model but was not realistic in our allocated time frame. For future studies, this can be taken into consideration. Important to mention is that we decided to include key process areas in level one against the recommendations from Paulk, et al. (1993). This due to that the respondents were not previously familiar with the framework and writing just "beginning" (see Curley, 2006 p. 165) or initial level without further explanations we believed could create confusion. Since we wanted to test the level of maturity on alignment with the organisation without too many preconceptions, the first level was also eligible for the respondents.

Managing Green IT like a business

This strategy refers to using a businesslike approach. Issues to overcome when being green are alignment constraint, where the concept is not compatible with corporate missions (Martinez & Bahloul, 2008). Managing Green IT like a business can avoid creating separate projects that are never enforced or evaluated. It involves applying professional business practices onto the concept to ensure that the initiatives or policies deliver outputs aligned with the companies' goals (Curley, 2006). Key process areas in this strategy are:

Level 5	Value centre
Level 4	Investment centres
Level 3	Service centre
Level 2	Cost entre
Level 1	Technology and product focus

Table 2: Maturity levels for strategy Managing Green IT like a business

On the initial level, the companies refer to their Green IT merely as technology or product focused with few or no business systems being in place. In level two, the organization has started aligning the concept with the business and basic cost management systems are in place. Level three considers Green IT as a service centre focusing on delivering services meeting current needs and value from current investments (Curley, 2006). In the fourth level, the companies have implemented systems to support efficient operations and it is thought of as an investment centre. When optimized in level five, Green IT is viewed as a value centre guiding the creation of new products or services with innovative use of technology (ibid). The goals for this strategy are to manage Green IT like a market-driven service organization and running it as efficiently and effectively as possible in support of the companies' goals (ibid).

Managing the Green IT budget

The budget is crucial for maintaining and measure spent resources against gained profits. Companies with Green IT strategies reported that the green initiatives represented an average 7, 6 percent of the current IT budget and there are expectations for this number to grow to at least 10 percent in the next two years (Martinez & Bahloul, 2008). Key process areas in this strategy are:

Level 5	Sustainable economic model
Level 4	Expended funding options
Level 3	Cost reductions techniques
Level 2	Defined budgets
Level 1	Ad hoc spending

Table 3: Maturity levels for strategy managing the Green IT budget

At level one the spending are improvised and only a few budget controls exists. Level two contains defined controls and accomplishments are monitored. At level three the organisation has included cost reductions techniques for reducing total and unit costs (Curley, 2006) and level four introduces budgeting flexibility with other parts of the business in expended funding options (ibid). A sustainable economic model meeting current situations fully aligned with the organisation is the key process areas for level five. The goals for this strategy are managing the Green IT budgets to create a sustainable economic model by cost management (ibid).

Realising and assessing Green IT value

Since the Green IT index from 2008 demonstrates that evaluating Green IT is poor, this makes us presume that there are some issues in determining business value. Realising and assessing Green IT value focuses on measuring and managing the contribution from the initiatives and policies. It concerns decisions on expected benefits and tools for verifying their achievement. Modelling the return of investment are examples helping the organisations check whether the benefits are fully delivered (ibid). Key process areas in this strategy are:

Level 5	Optimized value
Level 4	Advanced techniques
Level 3	Business value
Level 2	Total Cost of Ownership
Level 1	No defined processes

Table 4: Maturity levels for strategy Realising and assessing Green IT value

Level one includes no defined processes for assessing Green IT value, the concept is considered valuable but not monitored. The next level includes Total-Cost-of-Ownership, identifying, and managing total indirect and direct cost of Green IT in the organisation (ibid). Level three focus on business value and to create solutions that create additional value without increased spending. At level four, advanced techniques such as portfolio management are used to optimize investments against goals. Level five, is reached when the organisation is demonstrating optimal return of investments. The overall goal for this strategy is to optimize the value of Green IT in accordance with overall business value.

Delivering Green IT capability

This strategy is concerned with assets, value chain and what Green IT can do for the business. The organisation should be able to understand the potential benefits of pursuing Green IT and this demonstrates by managing the assets, value chain and core competencies. It includes the knowledge, skills and tools used to perform green business activities (ibid). Key process areas in this strategy are:

Level 5	Core competency
Level 4	Strategic business partners
Level 3	Quality service
Level 2	Little or no strategic input
Level 1	No formal presence

Table 5: Maturity levels for strategy Delivering Green IT capability

At level one no formal presence of Green IT exist as the users themselves manage assets and skills individually and at level two the concept is more integrated but it still offers little or no strategic input to the organisation (Curley, 2006). The key process area in level three is focused on quality service and at this level; the company has established a reputation as Green IT experts. Intel reached this level for example by measuring customer satisfaction (ibid). Optimized level in this strategy is reached when Green IT is considered a business core competency and can help the company gain strategic superiority over competitors (ibid). The overall goal for this strategy is to develop Green IT as a corporate core competency.

3.4 Preparing for the empirical work - Development of questions

From our theoretical framework and literature review, we created the interview questions. To avoid losing the connection between theory and empirics by directly presenting the results we decided to include a separate section explaining the questions as well as their purpose. (A similar approach can be found in Bondesson & Stahl 2008). We used the same questions in both face-to-face interviews and those sent by email (see interview guide and questionnaire in Appendix 1 & 2). When conducting the face-to-face interviews the respondents answered the questions directly. Sending them out by email, the respondents answered initially and then we performed interviews reviewing the questions by telephone. We divided the questions in two parts. Part I include questions concerning what kind of policies and initiatives that exist in the companies and reasons for any difficulties in enforcement and evaluation of these as found in the Green IT index. Part II contains more narrow questions in line with the Green IT framework. Depending on the responses in the initial email contacts, we revised the questions slightly in the follow-up conversations to elaborate on the respondents answers.

Interview questions divided in research questions and parts of the framework:

To provide a clearer connection with the purpose of this study, we have divided the interview questions in research questions and part of the framework. The number on the question(s) displayed in parentheses. *Italic* represents a weaker connection to the research question but is required for a fuller picture of the problem area. In the interview transcript sent to the respondents and during the actual conversations, we asked question thirteen last as a way of reflecting upon the interview. However, regardless of its position in the interview, from the point of view of content it belongs to the first part and RQ1.

Part I – Research question one (RQ1)²¹

- ✓ *Green IT initiatives and company policies (1)*
- ✓ Tools and techniques for measuring Green IT (2)
- ✓ Evaluation and presentation of measured results (3)
- ✓ Difficulties in enforcing or evaluating initiatives and policies (4)
- ✓ *Definition of Green IT (13)*

Part II – Research question 2 (RQ2)²²

- ✓ Strategy 1.Managing Green IT like a business (5,6)
- ✓ Strategy 2.Managing the Green IT budget (7,8)
- ✓ Strategy 3.Realising and assessing Green IT value (9,10)
- ✓ Strategy 4.Delivering Green IT Capability (11,12)

Interview questions and purpose:

1. **Could you describe in as much detail as possible what Green IT initiatives are available in your company and what kind of policies you have and what they contain?**

We start with an open, introductory question according to Kvale (1996). The purpose of this question is to see how far the companies have come in their Green IT work and to familiarise ourselves with available initiatives. We also want to know details in the policies that exist. The companies informed us in one way or another that they have some kind of Green IT initiatives or policies in the email stating that they wanted to participate. Therefore the question seeks to make them elaborate on these policies.

²¹ What are the reasons for poor enforcement and evaluation of Green IT?

²² How well are Green IT initiatives and policies in IT consulting companies integrated into the organisation?

- 2. What do you measure in your Green IT initiatives? How do you measure this, what tools or techniques are used? If not, what do you believe are the reasons for not measuring your results?**

In this question, we want to know more specifically what the companies measure in their Green IT policies or initiatives as a first step towards investigating if there are any difficulties in evaluation. A quote from the literature review says

“If you can’t measure it, you can’t manage it” (Martinez & Bahloul, 2008, p.15)

Meaning it is important to measure in order to manage the results. The purpose of the question is also to investigate reasons if any for not measuring the effects. What kind of tools and techniques do they use? CO₂ emissions and cost savings are the most common we encountered in the literature study but we want to confirm this and investigate whether there are other aspects that the companies use.

- 3. Please describe how you evaluate and present your measured results and if so, to whom do you present them? If not, what are the reasons for not doing this?**

The purpose of the question is to find out if and how the measured results are presented and to whom. Do they publish them externally as part of their marketing or internally for productivity and results? Maybe they do not present them at all besides to the Green IT management or CIO. In this question, we also want to pin and understand the reasons for not presenting achieved results. We found in the literature review, that Green IT policies and initiatives generally are poorly enforced and evaluated and we wanted to investigate the reasons for this and if we could find any empirical truth in the consulting companies.

- 4. Are there any difficulties enforcing and evaluating your Green IT? If so, please describe these difficulties and what you believe are the reasons? If not, please elaborate how your company deals with this successfully.**

The purpose of this question is to find any empirical evidence supporting the poor results in enforcement and evaluation found in the Green IT index and to answer research question one. By asking the companies to elaborate both if they perceive any difficulties and underlying reasons for these as well as how they manage difficulties, we hope to receive a fuller picture of how the companies handle their policies and initiatives.

- 5. Do you believe your Green IT policies or initiatives are aligned with your overall business goals? If so, please explain how they are integrated. If not, what do you think are the reasons for this?**

This question is the first in part II related to the major strategies in the Green IT framework, Managing Green IT like a business. The purpose is to find out if the policies are dealt with individually or aligned with the overall business policies and goals and more detailed descriptions of this as well as the reasons behind not aligning the two.

- 6. Which of the following does best describe your organisation?**
- 1. Green IT is focused on technology and has few or no cost management systems in place**
 - 2. Green IT is seen as a cost centre and has basic cost management practices in place**
 - 3. Green IT is viewed as a service centre delivering needs and generates value from current investments and infrastructure**
 - 4. Green IT is viewed as an investment centre driven more by business strategy than by external benchmarks or targets.**
 - 5. Green IT is operating as an entrepreneurial value centre.**

Since part of our purpose is to try to place the companies on a maturity level in the Green IT framework, we chose key process areas in each level (see 3.3.2) and then the companies chose

which alternative best suits them. As an alternative to these rather closed multiple-choice questions, we could chose open questions and then try to analyse the answers looking for key features but we thought this would be too difficult to analyse because the companies can answer the questions very differently. This way we use a more strict approach leading the respondents to answer in ways suited for our purpose. The alternatives represent the different key process areas in each level as previously explained. To ease the understanding for the respondents since they did not receive neither our framework or the key process areas and maturity levels, we added text to the alternatives to create questions that are more readable.

- 7. Do you have a Green IT budget? If so, is it part of your overall company budget or handled separately? Please describe in as much detail as possible what the budget contains and how it is managed. If not, what do you believe is the reason for not having a Green IT budget?**

The purpose of question seven is to investigate how integrated the budget is with the overall organisation and what it contains. In the literature study, we found evidence that aligning the budget would strengthen the initiatives (Curley, 2006, Martinez & Bahloul, 2008) and a shared approach is necessary to ensure mutual benefits for both Green IT and business objectives. If the respondents handle the budget separately, we want to pin the reasons and benefits or limitations of this. In addition, what are the reasons for not having a Green IT budget? Are their answers consistent with the literature review or does consultant companies perceive it differently?

- 8. Which of the following does best describe your organisation?**
- 1. Green IT spending is ad hoc with few budget controls**
 - 2. Green IT budget is defined and monitored**
 - 3. Green IT management is using systematic cost reduction techniques**
 - 4. Green IT management expands funding options and introduces budgeting flexibility**
 - 5. Green IT achieves a sustainable economic mode**

Number eight is similar to question six. The purpose is to place the companies' budget in a maturity level according to chosen key process areas (see 3.3.2) regarding the Green IT budget. Level five would indicate that the budget is included in the overall budget or separate but completely aligned with the organisation.

- 9. Please describe if your Green IT policy or initiative include expected benefits and verifying tools for achieving these? If so, what kind of tools and techniques do you use? If not, what do you believe are the reasons for not including expected benefits?**

Question nines purpose is to investigate deeper how efficient the policies are in their design. It is the initial question in the major strategy Realising and Assessing Green IT value. Return of investment measures are the most common verifying tools used to calculate expected benefits (Curley, 2006) and this question is the initial step finding out how mature the companies are in taking such a benefits realization approach. If not including expected benefits we want to pin the reasons for this.

- 10. Which of the following does best describe your organisation?**
- 1. There are no defined processes for managing Green IT value**
 - 2. The Green IT management focuses on Total Cost of Ownership solutions**
 - 3. Green IT management focus on the business value the solutions deliver**
 - 4. Green IT management uses advances techniques such as portfolio management to optimize Green IT investments**
 - 5. Green IT management demonstrate optimal return using sophisticated investment analysis techniques**

Question ten makes the companies evaluate to what extent they manage the Green IT value.

11. **Please describe what you think Green IT can do for the IT industry and what it delivers to your organisation. Do your policies or initiative include descriptions of the assets, value chain, core competencies and complete workflow in the value chain to support or perform business activities? If so, please explain the details of these descriptions and if not, what do you believe are the reasons for not including this?**

Question 11 is part of the fourth section, Delivering Green IT Capability and the reason is to find out what the companies consider Green IT can do for the overall business. Managing assets, value chain and core competencies in the complete workflow can together result in sustainable competitive advantages (ibid). If not including these we wanted to investigate the reasons for this.

12. **Which of the following does best describe your organisation?**
 1. **There is no formal Green IT presence, users themselves create policies or try to maintain them**
 2. **Green IT offers little or no strategic input to the business**
 3. **Green IT is established as a quality service**
 4. **Green IT is discussed and used when setting strategic directions**
 5. **Green IT is considered a core competency for the company**

This question places the companies on different maturity levels depending on how well the Green IT capability is understood by the organisation and how woven the initiatives are into the overall organisational business strategies. If choosing alternative five, the company perceives Green IT to be a core competency and this can provide both operational and information superiority (Curley, 2006).

13. **Our definition of Green IT for this study is “any initiative, technique, product or policy (established or not) concerning sustainable or environmental-friendly use of IT”. Do you agree with this definition or do you define and use it differently?**

Since there is no academically established definition on Green IT, we want to investigate how the participating companies understand the concept and how accurate our definition is. We added this question also for the respondents to elaborate further on their own definitions and comment on our study.

3.5 Summary and key features of chapter 3

The purpose of this chapter was to provide our definitions and interpretations of Green IT, enforcement and evaluation used throughout the study and in the empirical work. We defined the word Green IT (see 3.1) as the study and use of IT resources in an efficient way causing minimal impact on the environment. The definition for enforcement and evaluation are based on the Green IT index (see 3.2). A second purpose of the chapter was to introduce and explain the framework we created and used during the interviews testing the maturity levels of Green IT and we presented the Green IT Capability Maturity Model (see 3.3). A detailed description of the maturity levels, major strategies, key process areas and goals (see 3.3.1-3.3.2) were also included. The last part of the chapter have provided a list of the interview questions used, divided in research questions and parts of the framework as well as the actual questions and their purpose (see 3.4). The next chapter will explain our methodology, or research approach, describing how we conducting the study starting with the research strategy.

4. Research Approach

Chapter 4 will present our research approach, thus describing the way we have conducted the study. Initially we will present the overall research strategy and a figure showing the outline of steps taken towards a finished report (see figure 9). The chapter continues with a more detailed description of the steps taken and this includes the prestudy, literature study, creating the theoretical framework, constructing interview questions, conducting interviews as well as data collection and data processing and analysis tools and techniques. We present a table on how we conducted the interviews and examples of the coding procedure during analysis. The chapter also includes discussions on how we reach scientific and ethical quality, addressing the issues of reliability, validity and respondent validation, bias and ethics. Chapter 4 concludes with some criticism on sources and a short summary of contribution and key features from the chapter.

4.1 Research strategy

All research should include an explicit and systematic approach to finding things out according to the research question (Bryman, 2001). Moreover, the twofold purpose in this study was concerned with how Green IT is handled in the IT consulting industry, focusing on enforcement and evaluation and how well the concept was aligned in the organisations. During our unstructured brainstorming process, we searched for an intriguing but also industry relevant angle on Green IT. We came across the Green IT index and Green IT project from IT & Telekomföretagen and we thought that was an interesting topic due to the large industry attention to the project. The low figures in enforcement and evaluation were evident, and when speaking to Exido (the creators of the index) they also believed the two parts, (enforcement and evaluation) would be interesting to investigating further as they were generally poor in the IT industry to their knowledge. Concurrently we came across the Green IT Capability Framework that was part of a recent Green IT seminar in Ireland attended by our supervisor and this provided us with an outline to ground the empirics on, and since international and built on well-known principles (as previously mentioned the framework is based on CMM) is considered relevant.

In November 2008, during the final stages of our prestudy, we participated at a Green IT seminar at Lund University. This followed by a literature study establishing questions, problem area and theoretical foundation. The subsequent empirical study included in-depth face-to-face interviews and email questionnaires combined with follow-up telephone calls. We investigated seven consultant companies, both international and local in varied sizes in relation to our framework. We made a minor comparison between the companies but the main purpose was to diagnose the current situation and investigate if there could be connections between the poor results and the maturity levels in the framework rather than comparing individual answers. The empirical results were analysed and we presented a summary of the interview questions (see 5.2) and further discussed the main points (see 6.1 – 6.5) leading to our conclusions (see 7.1).

The approach has influences from both positivist and interpretive parts. Can the poor results indicating difficulties be applicable to the consultant industry? Moreover, can the Green IT Capability Framework apply to the IT consultant industry diagnosing maturity? These questions points towards positivism since it attempts to somewhat test a theory (Seale, 2007). The study is also interpretive in the sense that our roles as researchers are also as interpreters of data from subjective opinions interpreting a phenomenon (Creswell, 2007). Signs of a phenomenological

approach can also be argued since values and notions of a concept are involved. In addition, hermeneutics, referring to an iterative data analysis manner and attempting to make sense of the organisation as a text-analogue (Bryman, 2001), thus analysing Green IT and the policies in relation to the organisation. However, positivist, interpretive, hermeneutics and phenomenology approaches and methods are much wider concepts, academically grounded with specific measures. It is therefore important to mention that we are not claiming that we have used any of these, merely stating that our study show signs of influences from the above. In literature, the classifications of strategies and approaches are usually obvious but in practise, these distinctions are not always clear.

When presenting a study in writing, the objective is to communicate your work suited for the intended audience (ibid). We found a thematic structure following a liner approach preferable for writing up this study, as the readers (both academics and industry professionals) should be able to follow the “red thread” throughout the chapters. Reading the chapters, a connection should be evident between different parts of the study to demonstrate how the study emerged and how conclusions about the findings were drawn. However, the actual process of conducting the study was iterative. We received new information continuously that were reviewed and added or placed aside and during the analysis, data was selected and categorized several rounds and removed/reinstated.

To facilitate reading, in each chapter, there is a short introduction in the beginning and a brief summary in the end. The structure (outline of thesis) for the study is set out at the beginning, as a list to present the different chapters and their content (see 1.5). The overall themes in each chapter are sections (headlines) with the contributing categories as sub sections (subheadings). In chapter 5, we presented strong “evidence”, supporting the empirical findings using quotations from respondents. We selected these to illustrate the interpretation of the data. Figure 8 displays the steps taken towards a finished report.

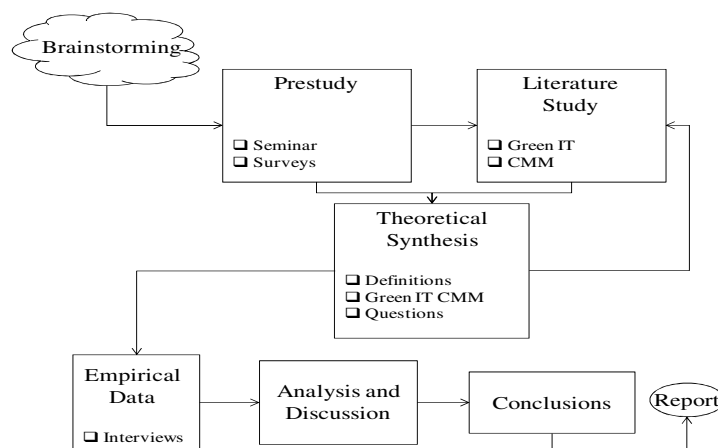


Figure 8: Outline of steps taken towards a finished report

4.2 Prestudy

We conducted a prestudy to deepen our knowledge of the concept of Green IT and to investigate previous studies in this specific area, thus searching the Internet and library services for already published work on the topic. We continued by contacting Exido, IT & Telekomföretagen and Mr Donnellan to receive further information concerning focus and problem area. We received reports containing surveys performed in Sweden and Europe on how established Green IT was in companies as well as problems and measures taken. By conducting this prestudy, we increased our knowledge of the current situation and what initiatives that was available and in need for further analysis that contributed to the choice of purpose for the study. We found in the Green IT index interesting results to investigate and the Green IT Capability Framework seemed applicable as a tool for the investigation.

At this stage, we discussed the idea of conducting both interviews and surveys in order to have the possibility of thoroughly testing the information. Using only surveys could exclude the possibilities of obtaining any deeper knowledge from the companies and usually requires a large amount of survey packages to gain a valid response rate. Qualitative interviews appeared a good addition supplying much material to analyse but if used solely, could risk losing the possibilities of obtaining a larger picture of the problem area. With this in mind, we started investigating the choice of including both quantitative and qualitative aspects in the study. Conducting a survey providing a large enough response rate to be useful and then doing follow-up interviews turned out to be difficult in our time frame so we needed other ways of viewing the concept, thus reading and using already conducted surveys (Exido 2008, Mines 2008, Martinez & Bahloul 2008 and Mingay 2007). Both nationally and internationally known analysis companies (Exido, Forrester, IDC and Gartner) wrote these reports and we chose these to provide a global spread of the concept.

4.2.1 Seminar

As part of the prestudy to further grasp Green IT and gather updated information on the debates within the industry and research community, we got the opportunity to participate, at “Stora IT dagen” on Green IT²³ – a seminar and supplier exhibition in Lund, Sweden. The knowledge we received during this day supported some of the information in the reports we had read and added valuable insights on progress within the University as well as the industry. It also gave us an opportunity to interact with people interested and involved in different Green IT projects as well as potential respondents for our interviews.

4.3 Literature study

In connection with the prestudy widening our theoretical foundation for the problem area, we conducted a literature review (Creswell, 2007) based on Green IT and Capability Maturity Model CMM. The interest for Green IT and amount of projects and initiatives present could relate to as hyped. However, it is a relatively new term and there is little academic literature available. Consequently, most of the information came from articles, conferences, suppliers and organizations. CMM have been around since the eighties and several revisions published. This model is academically established and a large amount of information existed as well as different versions but we chose to focus on one specific when explaining the parts of the model but also included other research conducted using the approach. The selection of material for both areas

²³ Stora IT dagen 20 November, 2008 at Lund University. www ldc.lu.se

were primarily grounded in articles found on ELIN²⁴ and the Internet as well as reports received from both respondents and contacts throughout the study process. We received new data continually that was analysed and added or removed to the theory chapter in the final report. The data not directly applicable to our research questions but still relevant for the problem area, was added as additional information in tables (see table1). Data regarding methodology came from available and well-recognized reference literature.

4.4 Theoretical synthesis

The literature study provided us with many definitions and large amount of material concerning Green IT and CMM. In our theoretical framework, we needed to clarify our interpretation and presented a definition we found appropriate together with our Green IT Capability Maturity Model. A detailed description of the key process areas and goals of the model were included, which functioned as the foundation for interview questions in part II, aimed for RQ2 on alignment. Derived from the theoretical framework was the semi-structured interview guide (see Appendix 1) that we used before finishing the actual interview scripts sent to respondents (see Appendix 2). The theoretical framework created structure, limited our study to the research question, and helped with keeping us on track towards a finished report.

4.5 Constructing Interview questions

We chose to carry out semi-structured interviews containing a number of questions based on the topic we wanted to cover. Open-ended questions provided opportunities to discuss some questions in more details, thus having the freedom to probe the respondent to elaborate on original responses (Bryman, 2001). An interview guide derived from the literature review was prepared before and followed as much as possible in the interaction with the respondents to receive comparable results.

The interview questions (see 3.4) consisted of nine open ended and four multiple-choice questions. We divided them into two parts, the first dedicated to RQ1, creating a better overview of the problem area and investigating reasons for any difficulties in enforcement and evaluation. The second part we designed for RQ2 and each part of the major strategies in the framework as well as a concluding open question (analysed based on content included in part I) used to check the truth-value of our theoretical understanding of the concept. We chose multiple-choice questions referring to key process areas of each strategy for part II to avoid “too widespread” results and as a guide for the respondents. We presented all questions summarized in a list divided in research questions and parts of the framework for a clearer illustration and overarching view of the foundation for our empirical work.

4.6 Interviewees

The respondents (informants being a better word to describe them since they informed us rather than defended their positions) that we interviewed were selected upon availability to participate our chosen weeks for empirical work. We wanted to investigate consultant companies dealing with IT in Sweden regardless of size with prior insight and established initiatives on Green IT, which limited the amount of companies to approach. We started the search on IT&Telekomföretagens website presenting participants and selected consultant companies. A search criterion was that the participants needed preferably be from different parts of the country in order to avoid reflecting a local phenomena resulting in a too narrow sample. Following this

²⁴ ELIN@Lund, an electronic database at Lund University, www.lub.lu.se

we visited the companies own websites to find out if they advertised anything related to our problem area and what persons to contact.

We sent an email containing a short description of us, the purpose of the study and a request for interested participants in influential positions and prior knowledge of Green IT to a number (16) of consultant companies. Determining the magnitude of the study, considerations had to be taken on available time resources (ten weeks). Fifty respondents would have created a larger sample, and a more accurate results but this were not a realistic goal. The reason for informants in influential positions was that these would have a greater knowledge of how Green IT was handled in the organisations.

In order to cover all the interview questions the respondents needed to be able to participate for at least an hour-long interview. More time could have generated a richer data collection but we also needed to respect the respondents' busy schedules. The second requirement was that they needed to be able to participate in our chosen timeframe for the empirical work (the total assigned amount of time for a master thesis is ten weeks). Week 49-50 in 2008 were decided and we received answers from almost all the companies we contacted and seven agreed to participate that had established Green initiatives. Two companies without deeper knowledge on Green IT agreed to participate. However, we chose not to include them in the analysis due to the large amount of information we received from the initial seven but also due to our time constraints. Preferably, we wanted some companies in southern Sweden to conduct face-to face interviews with but since a large amount of the participating companies did not have offices in the Øresund region, we settled for both direct and combined email and telephone interviews with participants on other locations. For a presentation of the participating respondents, see 5.1.

4.7 Data collection and techniques

4.7.1 Data collection techniques

During our data collection in the empirics, we used mainly two techniques; note taking and audio recording. Note taking during all stages in order to capture the researcher's thoughts, reflections, and we used audio recording using digital equipments during the interviews with respondents. Both authors were present in all interviews, although one asked the questions and the other took notes. We chose the approach with one interviewer to avoid confusion during the conversations and ease the transliteration but also to create a less formal environment emphasizing on a two-way conversation rather than interrogation. We recorded all interviews, and transferred the audio files directly after each interview onto a computer to ensure safekeeping.

All data was stored in a database in order to make referencing, cross checking of data and track keeping more efficient. Documentation such as articles, web pages and reports were copied and added to the database. In addition, the material we used from printed reference literature were summarized and kept digitally. Part of the intended audit trail (Seale, 2007), all process notes, milestone-plans, brainstorming documents and materials relating to intentions or reactions were kept in the database. Also new revisions of documents sent to the supervisor were saved separate in order to keep track of the working progress.

4.7.2 Interviews

After establishing contact with available informants we booked dates and times for our face-to-face interviews and dates for telephone calls with some of the others participating on distant locations(Initially we booked two face-to-face interviews but we had to reschedule due to

respondent availability). We sent the interview questions in advance to everyone, partly as a way of increasing respondent validity but also because we wanted to conduct a richer data collection. We asked the companies we were going to contact by telephone to answer initially and then we would conduct a follow-up interview a few days later in order to prevent spontaneous phone calls not providing usable results. To protect the rights of the interviewees we included a simple informed consent form as an addition to our questions. This consisted of a front-page with a short description of our study, the choice for the respondent to be anonymous, validate their transcribed recordings, and contact information (see Appendix 2). None wanted to be anonymous but some wanted to review their answers before we included them in the final report and for those we sent the transcripts by email. We were also persistent in shortly briefing and debriefing the interviewees as well as trying to maintain an as neutral and objective relationship as possible in order to minimize potential bias effects. All interviews were recorded and performed in Swedish.

Interviews					
Nr	Date	Respondent	Type	Location	Duration
1	2/12 2008	Cecilia Pfannenstill - Logica	Face-to-face	Closed office onsite at Logica in Malmo	43.66 min
2	5/12 2008	Andreas Lundgren - IBM	Telephone	Closed room at one of the author's home	59.32 min
3	10/12 2008	Jim Rönnlund - CoreIT	Same as above	Same as above	54.21 min
4	10/12 2008	Joakim Lindbom - Cap Gemini			46.22min
5	11/12 2008	Ulf Blomqvist - Atea			01.20.35 min
6	12/12 2008	Lennart Wiseen - CSC			41.35 min
7	12/12 2008	Pär Abrahamsson - Infobyte			42.58 min

Table 6: Interviews

4.8 Data processing and analysis method

The data processing techniques we used were pattern matching, counting, minor calculations and open coding. Yin (2003) argues that pattern matching is the activity of linking data to the questions made and included trying to pin data in the transcribed interviews to related questions as an initial step of the analysis. As a second step, we identified key words (similarities in wording or implicit meaning of sentences) in each question, highlighting them and summarised the answers to identify patterns. We then used counting in the responses related to the framework in part II. A smaller amount of counting was also done when we analysed the open questions to quantify similarities in for examples describing the concept in part I. Open coding chosen was to categorize the data according to the questions (Bryman, 2001, Creswell, 2007) .

Initially we conducted the coding separately on each interview and later compiled the data onto a joint document where a second analysis based on questions rather than individual answers took place. The results to each question were summarized and acted as the foundation for further discussion (see 5.2). A third round of analysis aimed at connecting the research questions and in this part we discussed the participants individually again as an initial step and together in the concluding discussions. This part of the analysis also included minor calculations, as we wanted to display maturity levels in the framework in an easy to understand manner. Since there are five levels of maturity, level five being optimized, thus fully aligned, we decided to calculate how large a percentage each company had compared to 100 percent maturity. The figures and examples of

calculations can be found in 5.2.3. We performed all parts of the analysis in an iterative manner. Figure 9 is an example of the coding where the left column represents the number of the question and bold texts are key words. A and B refer to respondent companies. The letters were chosen randomly without order of priority.

Q2	A	utskriftskonceptet med passerkort och liknande , den mäter vi också, hur mycket skriver vi ut, vad är det för något vi skriver ut och varför skriver vi ut det
	B	alltså det vi i första hand skulle vara intresserade av att mäta om man konkret skulle mäta något är energiförbrukning men då skulle jag vilja mäta det på maskinnivå eller funktionsnivå rättare sagt skulle jag vilja mäta att här var vi en funktion för eposthantering till våra kunder vad drar den för ström och vad innebär det om vi gör si eller så åtgärder, konsolidera den dit eller dit så skulle jag vilja mäta den men alla sådana initiativ att mäta kostar mer än jag kan tjäna på det så det är långt ifrån lönsamt och till och med svindyrt. För att tjäna ström för 50 kronor måste jag lägga 1000 spänn på att mäta det

Figure 9: Example of coding procedure during analysis

During the analysing steps, various tables and lists were used in order to keep track of the data and assuring the audit trail. Respondent identity was kept at this stage to assist the researchers but then later changed to fictitious names due to ethical considerations. None of the participants chose to be anonymous so we did not need to remove any names from the presentations but we wanted to protect their integrity by not displaying individual answers from the interviews. The results are compared and discussed on company levels rather than focused on individual opinions. Since two researchers conducted the study, this provided the possibilities to capture greater richness of data but also put more demands on structure and record keeping, capturing all the data for analysis. Clear chain of evidence and stepwise reasoning was kept in ways enabling both researchers to understand the analysing steps and follow the paths easily.

Transcribing, the procedure for producing a written version of an interview or conversation (Bryman, 2001) is often time consuming and produces a lot of written text. The researchers themselves conducted this transliteration and although it provided less usable data than the actual time spent, it was worth it for the validity and true nature of the study. In interviews, only a small proportion of the message communicates by actual words, thus consideration given was to whether and how these feelings and meanings could be communicated on paper, using for example punctuation marks (full stops or commas) and adding pauses. The transcribed interviews were kept in Swedish during analysis; minimising the distortion of original meanings expressed by participants. A translation would have reflected the authors' values instead of the respondents.

4.9 Discussion on how we reach scientific and ethical quality

To facilitate ethical and scientific quality of research, several techniques and tools can be used. Total quality control is impossible but some issues to address are reliability, validity, ethics and bias. It is also important to remain critical towards your own research so in this part we will also discuss some criticism towards sources used.

4.9.1 Reliability

When addressing reliability in qualitative studies you need to show the reader that the methods used are reproducible and consistent (Seale, 2007). In this study, the description of all approaches and procedures in data collection and analysis phases acts as a way of ensuring reliability.

Documenting and storing the processes of establishing themes, concepts and theories to ensure the audit trail is another example. The use of multiple researchers and recording of data mechanically in this study are also ways of ensuring internal reliability as described by Seale (*ibid*).

4.9.2 Validity and respondent validation

Validity judged is by the extent to which an account seems accurately representing the data collected (*ibid*). It is a measure of truth representing the studied population or case. To avoid any misunderstandings we included a short description with study purpose and our definition of Green IT in advance to the respondents. We also included a voluntary request for the interviewees to validate their transliterated interviews before including them in our analysis as previously mentioned. Those that chose to do so received an email with the recording and the text to read and comment if needed. External validity, the measure of how well the result generalized can be to other social contexts and situations (Bryman, 2001) is difficult to achieve in this study due to the small sample of respondents obtained from a single geographic location and no comparable context.

4.9.3 Bias

We believe that bias is rarely completely avoided and that it sometimes can be considered assets rather than errors needed to be eliminated as described in (Hammersley et al., 1997). It is very difficult to predict and know how this study would be and was affected by bias from the researchers. The only way to limit this is to address possible effects early in the research and bring them to the surface by writing them in text and we have tried to state whenever necessary our presumptions. We believe that by using as an objective and critical approach as possible towards the research topic and ourselves, we will minimize the effect but hardly eliminate them fully.

4.9.4 Ethics

Since this study concerns company policies in competitive exposed consultant companies, one critical question needed addressing. How do we handle evidence of confidential data if collected, intentionally or unintentionally? To prevent any confidential data from appearing and to avoid any harm against individuals we decided in consensus with the respondents to present quotes or interview transcripts anonymous. This due to the fact that individuals answered the questions subjectively on behalf of their employers but we were mainly interested in organisations as whole and not only personal opinions. As previously mentioned the respondents were given the choice to appear in a short presentation with their own and their companies name or to be anonymous and all chose to appear with names as participants. Vulnerable areas in terms of ethics in this study are company vulnerability. On a more personal level, there might be risks of collecting data possibly revealing how people are not following the policies recommending others or marketing to the public.

Informed consent (Israel & Hay, 2006) was continuously handled and in cases where respondents wanted to terminate their participation, all data and material were removed or deleted. This is also the case when it came to interviews. Ethical situations were handled balancing costs, risks, benefits and opportunities (*ibid*). Avoiding harm and doing good was the approach and there were no physical risks involved in this study for either researchers or participants. Ethical situations involved were more of a psychological, economical or social nature.

4.9.5 Some criticism on sources

Due to the limited academic literature on Green IT, we used the internet and sources from suppliers and organisations. We are aware that these tend to enhance the concept rather than present it objectively in their marketing. We also like to point out that the selection of sources might be slightly one sided since many sources refer to each other. The choice of using Exido and IT&Telekomföretagen, Curley and Martinez & Bahloul as main sources might be considered a small amount of research to build a problem area on and we are aware of this fact. Throughout the study, we reviewed a large amount of data and this is included as an addition instead (see table 1).

In addition, we received information from the respondents throughout the study and we tried to balance the information equally not to favour any participating companies. According to Yin (2003), documents can be biased and the handling of these was explicit and detailed in terms of origin, interpretation and possible objectives. Other studies on Green IT also demonstrate this shortage on academic literature and most of the work we have read has used sources from other topics such as organisational theory or IS in general to grasp the concept. In this study, we have included as many available “Green IT sources” as possible. The sources on describing CMM are somewhat out of date but the model founding the frameworks we used as outlines for our Green IT Capability Maturity Model was based on the earlier version and not the current CMMI, hence for example using mainly Paulk, et al. from 1993.

4.10 Summary and key features of chapter 4

This chapter demonstrated our research strategy and the steps taken towards a finished thesis. We started by presenting our overall research strategy (see 4.1), some points on the influences found in the approach and a presentation on how we decided to write the study for the readers to understand. The chapter continued with a detailed description of the parts in the study process including the prestudy (see 4.2), literature study (see 4.3), development of the theoretical synthesis (see 4.4) construction of research questions (see 4.5) description of interviewees (see 4.6) tools and techniques in the data collection (see 4.7) and data processing and analysis methods (see 4.8). In addition the chapter includes discussions on how we reach scientific and ethical quality (see 4.9) in terms of reliability, ethics, bias and respondent validation. Chapter 4 concludes with some criticism on sources used and this brief summary of key features. The following chapter initially features a description of the participants in this study and later we will present the results from our empirical study, thus the summary of the interview questions.

5. Empirical data

Chapter 5 includes the presentation of the results from our empirical work, thus a summary of the empirical data. We will begin the chapter with a presentation of the respondents in this study. The companies are shortly introduced in alphabetical order with the respondents' name and positions included as well as comments on the interview procedure. For a more detailed description on the interviews, (see 4.7.2). The chapter continues with the summary of interviews "demonstrating" the second and third round of analysis (see 4.8 for description on procedure) acting as a foundation for the discussion in chapter 6. The results are divided in research questions and parts of the framework. Part I include interview answers for RQ1, Q1-4 and 13 and part II, interview answers for RQ2 Q5-12 (see 3.4). We also present a table with results for RQ1 and RQ2, focus and average percentage maturity per company as a way of connecting the research questions. Chapter 5 concludes with a short summary of contribution and key features from the chapter.

5.1 Presentation of the respondents

Here follows a short presentation of the companies and the respondents participating in our study in alphabetical order.

Atea - Ulf Blomqvist:

Atea are specialists on IT infrastructure and they help customers increase IT usefulness by delivering products and services that simplify the management, operation and development of IT infrastructure. In January 2007 Atea Sweden was formed by merging Atea, Topnordic and Ementor, creating the largest provider of IT infrastructure in Sweden. (www.atea.se). Ulf Blomqvist is Quality and Environmental Manager. The respondent had not answered our questions in advance so the interview was performed according to the interview guide.

Cap Gemini - Joakim Lindbom:

Cap Gemini is a global leader developing business strategies and technologies tailored for customers unique requirements. Their headquarter is in Paris, France and they operate in more than 36 countries. In Sweden there are approximately 1300 employees (www.capgemini.com). Joakim Lindbom is CTO²⁵ for Cap Gemini Sweden. As the respondent was unable to read and answer the questions before the interview and not at his office during the conversation, we decided that he would send the responses to the framework afterwards and we received all materials later the same day. Joakim answered all questions except number 6, 8, 10 and 12 in the telephone interview.

CoreIT - Jim Rönnlund:

CoreIT is a consult company that is specialized in services and product supply within operation, infrastructure, system development and service desk. They have currently 25 co-workers at the head office in Örnsköldsvik and office in Kramfors and Härnösand. Their business concept is to offer services and solutions within IT to make more effective customer core activities. It is a locally owned company with a focus on customers in Västernorrland in Sweden (www.coreit.se). Jim Rönnlund is a sales manager at CoreIT and the interview was a follow-up conversation as he had previously sent his replies to us by email.

²⁵ CTO – Chief Technical Officer

CSC - Lennart Wiseen:

CSC is a leading global consulting, systems integration and outsourcing company. Their mission is to be a global leader in providing technology-enabled business solutions and services, to provide customers with solutions crafted to meet their strategic goals and enable them to profit from the advanced use of technology. In Sweden, CSC has been active since 1994 and is currently around 700 employees of the Global 90 000 (www.csc.com/se). Lennart Wiseen is a Procurement & Administration Manager. He prior to our phone call had answered the questions so the interview was a follow-up conversation with a shorter review of the questions and some elaborations.

IBM - Andreas Lundgren:

IBM is a leading company in information-processing. With more than 350 000 co-workers and thousands technique- and business partners all over the world, IBM is a global integrated company that works across boundaries to give their customers access to the total competence in their world-wide organization (www.ibm.se). Andreas Lundgren is the Marketing Manager, IBM Systems & Technology Group located in Stockholm. The respondent had prior to the interview sent us his answers and elaborated on some of the responses and answered additional questions during the interview.

Infobyte - Pär Abrahamsson:

Infobyte is an IT consulting company involved in the development of web-and Windows-based applications, technical and strategic advice, training and operation. They build and maintain everything from sophisticated Web sites to the administrative system, care for small and medium sized companies and complete IT environments, and they are partners with many of the industry's leading players. Infobyte is located in Södertälje, but the customers are spread across all of Europe (www.infobyte.se). Pär Abrahamsson is the CEO²⁶ of Swedish Infobyte. The respondent had prior to the interview sent his answers. Consistent with the other follow-up interviews we briefly performed a shorter review and asked additional questions.

Logica - Cecilia Pfannenstill:

Logica is a leading IT and business services company, employing 39,000 people across 36 countries. In Sweden the company offers business specific solutions and competence within utilities, transport, travel & logistics, telecoms, financial services and many more. They provide services such as enterprise solutions, application management and infrastructure management (www.logica.se). Cecilia Pfannenstill is the Director of Quality, Environment and Delivery processes. The respondent received our questions in advance to be able to prepare for the interview but had not been asked to answer them due to the nature of the interview. She was given the opportunity to review the questions electronically coherent with the interviewer.

5.2 Summary of interviews

To connect the empirics with the analysis to prepare for the discussion, this part will present a short summary of the interview answers divided into research questions and parts of the framework (see 3.4). Part I will include the answers from interview questions 1-4 and 13 aimed for RQ1. Part II includes the remaining questions for RQ2. The results demonstrate the final steps of the analysis added to provide a clearer picture of our study. Strong “evidence” supporting the findings is presented using quotations from respondents to illustrate the meaning of the data and to show the reader our interpretation. The respondents had the choice of answering the email questions in Swedish or English. Since the interviews were performed solely

²⁶ CEO – Chief Executive Officer

in Swedish, we decided for the truth-value to include the quotations in original language. For the Swedish responses, a footnote with actual wording is included. Due to ethical consideration, we will not present individual responses, thus the respondents names have been given a letter from A – G. These are chosen randomly and presented without order of priority. All indicators possibly revealing the respondents identities have been removed.

5.2.1 Part I – Research question one (RQ1)

- What are the reasons for poor enforcement and evaluation of Green IT?

Q1 – Green IT initiatives and company policies

The answers to this question supplied us with an extensive amount of data and to grasp all the information we decided to split the question in, initiatives and policies and then in the analysis look for similarities that grouped together. In the second step of the coding procedure when looking for keywords, we created categories when referring to initiatives. We created following categories with recurring examples in parentheses. A discussion about the categories can be found in the next chapter, (see 6.2). No further discussions regarding the examples are included. The reason for this is that these are outside of the scope of RQ1. We included them to display the content of the problem area and due to the extensive amount of data received from the respondents. It is also a way of presenting empirical examples of Green IT. The words in *italic* refer to weak examples not solely including IT directly but included in the Green IT concept.

- ✓ **Green IT products** (“virtualised servers”, “thin clients”, “environmental friendly mobile phones”, “Energy star, Svanen and EPEAT certified PCs”, “*environmental friendly cars*”, “*recycling bins*”,)
- ✓ **Green IT systems** (“power save mode”, “pc shutdown when not in use”, “duplex printing”, “light systems for parking places”, “traffic systems to avoid traffic stocking”, “printer pass”, “energy and power consumption systems”, “green calculators and barometers”)
- ✓ **Green IT Information** (“*books on green it*”, “internal web portals for environmental discussions”, “*members of Green IT projects to inform the public and business*”, “*customer information in presales*”, “*customer recommendations during support or new investments*”, “*evaluating and publishing studies on suppliers*”)
- ✓ **Green IT work routines** (“consolidated and virtualised equipment i.e. servers, optimized production flow”, “material and equipment recycling”, “*green vendors and optimized supply chain*”, “decreased energy and power consumption”, “*global Green IT teams*”, “*ISO certification, i.e. 14001*”, “green printer installations”, “*paper recycling and less paper consumption*”, “less applications”, “increased data capacity”, “less IT managers due to consolidation”, “*promote public transportation*”, “measure environmental KPI”, “*green services from security companies*”, “optimized logistics flow”, “*services for customer recycling*”, “IT use to enable distance work and prevent access travelling”²⁷)
- ✓ **Green IT development** (“alternative and new energy”, “renewable energy”, “green electricity”, “new traffic systems”, “recyclable heat from data centres”, “advanced water management” and “carbon management”)

²⁷ mobile workplaces, webinars on the internet during education, *work from home*, teleconferencing, Tele - presence, videoconferencing, networking

None of the respondents has a separate Green IT policy but rather environmental policies including IT or policies with parts of the concept in the overall company strategies. Some have policies for products or networks but none says they have a special part for Green IT.

The policies include the following examples:

Networks (power saving)
Products (purchase)
Corporate Social Responsibility, CSR (including environment)
Travelling
Distance work and mobile workplace
Costs for environmental goals
Environment
Recycling and hazardous waste

Table 7: Examples from policies

Q2 –Tools and techniques for measuring Green IT

Question 2 purpose was to investigate deeper what the companies' measure, how and why and reasons if any for not doing this as an initial step towards finding any difficulties in enforcement and evaluation of Green IT. The question was broken down in three parts, what they measure, how they measure and reasons for not measuring.

The most common measurements are CO₂ emissions, cost savings in general and energy consumption. Many mention amount of travelling and the cost savings related to flight alternative such as public transport. Below is a quote by respondent E referring to what they measure. **Bold** text refers to key words (see 4.8).

...“but what we are talking about is **emissions** of course then, we are talking about **the amount of travel**, we have a brand new travel portal, where when we go in and order our travels and see **how the trip affects the environment in the form of carbon dioxide emissions**. If we choose to go by train or we select and hire a car instead of perhaps the private car, if we choose to fly or whatever we are doing”...²⁸

CO₂ measures also related to travelling and kilowatt-hours of electricity used in for example server parks translated into emissions is measured. Some companies have advanced techniques and measure PFC²⁹ emissions, amount of recyclable plastics, amount of hazardous waste and water consumption while others measure performance of servers and amount of physical servers virtualized. Legislation compliance, petrol consumption and various other green key performance indicators, KPI are also among the answers. The answers on why they measure, the reasons are to present cost saving figures and then indirectly receive knowledge on saved CO₂ emissions when calculating the money saved on various activities.

Advanced techniques are management and data warehouse systems using calculation methods on metric tons, percentage by weight or quantities but there are only a few that have reached this far in the development. Most companies use web portals or services from travelling agencies or purchase services from other companies. Some also use informal systems questioning employees and calculating benefits in simple programs. Overall, we received very little examples on tools and techniques in the answers provided.

²⁸ ... ”men det vi pratar om då är det är ju **emissions** naturligtvis då, vi pratar om **mängd resor**, vi har en alldeles ny reseportal, där när vi går in och beställer våra resor så kan vi alltså se på **vilket sätt resan påverkar miljön i form utav koldioxidutsläpp**. Om vi väljer att åka tåg eller vi väljer och hyra bil istället för den kanske privata bilen, om vi väljer att flyga eller vad vi nu gör”

²⁹ PFC - Perfluorocompound

Reasons for not measuring the results are difficulties knowing what to measure, they perceive them as time consuming and expensive saying the cost was greater than the actual gain. Some say that they didn't have any good figures to measure against, there was no before just after since they started with Green IT from the beginning in the company and others that there are no point in measuring due to company structure and no customer requirements. One of the respondents says that they measure rigorously on a global level but not on a national level due to lack of standards in Sweden. Others says they would start to measure if their customers required it and for those companies that declared that they would ISO 14001 certify the company or start projects during 2009 would conduct more advanced measuring within the near future.

Q3 – Evaluation and presentation of measured results

The third question related to how they evaluated and presented their measured results. This question was also broken down into three parts, how they evaluated and presented their results, who they presented them to and reasons for not presenting results. Among the ways of evaluation, they evaluated decreased consumption in relation to cost savings, value and cost saving of installed solutions and new techniques and follow-up procedures. One respondent say they evaluate goal fulfilment and improvement on a yearly basis, whether there are any company news or if something happened in the world as well as in cases such as changes in structure. Among ways of presenting their results were yearly in reviews or environmental reports. Internally on corporate levels or whenever there was interesting projects available.

The responses for, “to whom” they present the results, spread almost equally on internally in different departments, globally within the organisation, publicly on web pages and in annual report to customers and stakeholders. The main reason for not presenting the results is that there are no customer requirements or interests for the results. Some say this is due to no general definition of Green IT and that it is a new concept on the market. The following quote by respondent C refers to the concept being new on the market.

...“there is no one who has this because **everyone knows that this is very vague and very new so far and there is no one yet who has asked the question** that yeah, what does this mean concretely for you and how far have you come? And how much paper do you save and how many this things are there, but it may well be that we get the issue within a year when it begins to mature and the concept is less vague, then you can very well imagine that something like this comes up”³⁰...

Other reasons are the concept not yet fully established in the company due to resources and priority. One say they do not see any point in telling customers what could have been done differently in a project since they use the mandatory techniques within the company. One says they conduct projects on Green IT but that many of them are too small for evaluation and presentation. If they are interesting and large enough, they present them. The quote below by respondent B refers to the size of the project in relation to whether they present the results or not.

...“**if it is interesting enough it is made**, but the fact is that this has very many small projects, many small streams is the idea and then you don't beat the drum so much outside the company when you have saved a few tens here and there”³¹...

³⁰ ...”det är ingen som har det för att **alla vet att detta är väldigt luddigt och väldigt nytt än så länge och det är ingen ännu som har ställt frågan** att jaha, vad innebär det konkret för er och hur långt har ni kommit? Och hur mycket papper sparar ni och hur många såna här saker är det, men det kan ju vara så att vi får den frågan om något år när det börjar mogna och begreppet är mindre luddigt då kan man mycket väl tänka sig att något sådant dyker upp” ...

³¹ ...”**om det är intressant nog görs det**, men det är ju så med detta att det är väldigt många små projekt, många bäckar små är tanken och då slår det inte så mycket på trumman externt att man har sparat några tior här och där” ...

Q4 –Difficulties in enforcing or evaluating initiatives and policies

This question was trying to pin the reasons for difficulties (if any) in enforcement and evaluation of Green IT projects. We had seen indications of this in the literature review and drawn conclusions to it due to the poor figures in the Green IT index. We predicted there would be some difficulties but did not know what kind and if the companies we asked would perceive any, so the question also included how they dealt with difficulties in a successful manner. This way we hoped to gain richer answers. A question in the follow-up interviews were asked for the respondent to elaborate what they generally believed were the reasons for the poor results in the index and this provided interesting answers. We also asked questions on the effects of the current regression and financial crisis in the world. Presenting the difficulties and underlying reasons and later also how they dealt with them successfully could help the companies to identify weak points in their organisation. Also, receive input and inspiration from others on how to gain positive outcomes.

The question was divided in three parts; enforcement and evaluation difficulties and reasons for these and how they dealt with them. When reviewing the answers we discovered that the examples of difficulties in enforcement and evaluation could be organised in two major categories. We named these *Organisation & Culture, O&C* and *Measurements & Definition, M&D* (see table 8). The first include examples concerning company strategies and decisions as well as resistance of change and the later mainly lack of definitions and difficulties with measurement. For a discussion concerning the categories and their content, (see 6.2.1).

Organisation & Culture	Measurement & Definition
<ul style="list-style-type: none"> · New ways of working and change of culture · Users are protesting against changes · The concept is not established on corporate levels · No ownership of the question · Bad internal dialogue between different departments · Reaching decisions to adopt the concept · Deciding who should pay for the extra costs · Lack of control due to external ownership · Users are unwilling to adopt available techniques 	<ul style="list-style-type: none"> · Setting the correct parameters and start measuring · Lack of correct figures · Hype or Buzzword · No efficient measuring tools · Requires specialist to perform advanced measurements · Measuring hardware and IT equipment · Connect savings to certain projects and initiatives · No common value to measure · No standard definition of the concept · Measuring exact consumption · Calculating recycling · Lack of measurable goals · Deciding what is green and what to measure · Deciding what derives from what

Table 8. Difficulties with enforcement and evaluation

The underlying reasons for these difficulties according to our respondent were mainly that the focus of the question of Green IT is in the wrong place. It should be fully established at managerial level and not placed on the IT department solely. They say it is still an immature concept and changes made can have a long lead-time before you can review any results and this can explain the poor figures of enforcement and evaluation. One says that in their company it exists a fear and belief that you cause trouble for the users when implementing changes so you do not do it unless absolutely necessary. A pure cost fixation also exists causing environmental issues to be low priority areas and when asking their general opinion on the Green IT index, they said some use Green IT purely as a marketing tool so they do not have any real desire or intentions to follow-up or measure the results. The problem with creating new policies and starting initiatives

are that you make a “paper tiger” referring to creating policies that are just stored and never read. A lack of “live” documents continually updated is present.

We also wanted to include how the respondents deal with these difficulties focusing on positive aspects as well. Successful examples are measuring power consumption from IT equipment over time and evaluating small steps of improvement and decreased environmental continually. Start with identifying the organisations environmental impact (how and what are the cause) decide on a null value and then create a roadmap towards easy to understand and measurable goals. During this, you should place demands on suppliers and third parties to supply information to gain control and include specialist and competence from other areas to help with difficult measurements. Some say it also helps to try to understand the technology and trust the employee’s capability to install and maintain systems and solutions. Common among the respondents that have reach far in the area of Green IT are that the directives must come from management level and be motivated with clear instructions and key persons identified. The person in charge can then involve competent staff and encourage creative solutions. The quote on the next page by respondent G refers to a statement on successful projects.

...“We have examples of customers who have done well also, there are many that have come far indeed in this, **which is usually when someone is told, now you are responsible for our overall picture, you should take with those with all the facts behind things and who can find creative solutions, and then something tends to happen**”³²...

In connection with question four, we asked some of the respondents to answer whether they believe the concept of Green IT will suffer from the large regression and financial crisis in the world. Almost all answer that they believe it will affect decisions and actions somehow but still have not seen a difference yet. Others replied they did not think the problems with Green IT had anything to do with this but rather other issues such as reluctance to change equipment. One claim it would absolutely affect the industry since most companies’ priorities survival and the ability to demonstrate a strong economy towards stakeholders, placing these types of questions on the bottom of the agenda.

Q13 – Definition of Green IT

We included this last question mainly to check the “truth-value” of our definition but also for the respondents to give their opinion on how they perceive the concept and the questions. We deliberately, for this study, chose a broad definition in order to include as much as possible and our definition received critique but most somewhat agreed with us. Summarizing what they answered regarding if they agree with our definition or not most of them agree with our definition and say that this is how the business in general understand and use the concept. Those that do not fully agree or use the concept differently say that you should not use Green IT when discussing internal policies, to others the definition is to use IT to become smarter and one says it is about decreasing environmental effects and trying to find creative solutions where IT can be beneficial for other parts of the organisation. Below quote by respondent F refers to our definition being somewhat accurate and consistent with how the industry perceives it.

...“Your definition is quite OK. I think most companies are making their own definition that fits into the company's vision, goals and organization, which in turn is based on the products or services it produces”...³³

³² ...”vi har ju exempel på kunder som har gjort rätt också, alltså det är många som har kommit långt faktiskt på det här, **då är ju oftast någon som blir tillsagd, nu är du ansvarig för våran helhetsbild, du ska ta med dem som sitter med fakta bakom saker och som kan hitta kreativa lösningar, och då brukar det hända någonting...**”

³³ ...”Er definition är helt OK. Jag tror att de flesta företag tar fram en egen definition som passar in i företagets vision, mål, organisation vilka i sin tur baseras på de produkter eller tjänster som företaget producerar...”

Although most agree with our definition, some say it is too vague and does not explain what the companies are actually doing or provide a status, only that they are striving against improvements and trying to become greener. The definition is too wide, includes too many things, and too easy to achieve. As formulated, almost every company can claim that they deal with Green IT. Below quote by respondent A refers to our definition being too wide.

...“for example, if you take your definition, you say that **everything is green IT even if you have it or not**, it’s sort of everything, then you can say like this, are you working with Green IT for all municipalities in Sweden? And on that definition, so perhaps you can answer yes then”...³⁴

We asked a follow-up question in connection to the fact that there is no uniform definition as to whether they thought the concept of Green IT should be standardised or not and reasons for this. Almost all respondents answered saying, it probably will limit the concept of Green IT if standardised elements are included but that in order for the concept to establish fully and provide something meaningful to the business, you need to include independent measurements and forms of quality marking. The requirements on being green and having the label Green IT needs controls in different ways than it presently is or all can say that they are dealing with Green IT and has a policy or initiative for this but are actually doing nothing at all. Others say that it is better to keep the concept as it is with different definitions to keep an open-mind rather than adding more bureaucracy that will create stagnation. A standard definition will lose many small projects that cannot fit. Below quote by respondent B refers to the concept being limited with standard definitions.

...“it would probably limit, I think, for most of the operators or wrong, the players who have made themselves known through the green IT is very much hardware companies and our stakeholders as primarily take energy perspective, or possibly carbon footprint but there are **other factors you measure**, which we have done in our study, and there are **other issues which have nothing at all to do with hardware. It would limit very much**”...³⁵

We also asked if the name in itself should be changed but the answer to this was no unanimous since doing this would send the message to the industry that this was just another hype or buzzword that didn’t mean anything and now they should start something new. The name is established and companies are becoming aware of the content, although it should be concretized further to be a certification of quality. Below quote by respondent G refers to the term and if it should remain as it is.

...”no, I think it can remain, it **is quite recognized**, many are beginning to understand what it means when talking about green it, so if you would change now, it would be more of, ahh well, this **bunkum is spent and now there will be with a new buzzword that you should sell**”...³⁶

³⁴ ...”om man till exempel tar er definition så säger ni liksom **att allt är grön IT även om man har infört eller inte** så blir liksom allting, då kan man säga liksom, om man vill säga så här, jobbar ni med grön IT för alla kommuner i Sverige? Och på den definitionen så kanske man kan svara ja då...”

³⁵ ...”det skulle nog begränsa, tycker jag, för att dem flesta aktörerna eller fel, de aktörer som har gjort sig kända genom grön IT är väldigt mycket hårdvara företag och våra aktörer som vi tar framförallt på energikonsumtion perspektiv eller möjligen carbon footprint men **det finns andra faktorer som man mäter**, vilket vi har gjort i vår studie, och det finns helt andra saker **som inte har överhuvudtaget med hårdvara att göra. Det skulle begränsa väldigt kraftigt**”...

³⁶ ...”nej, jag tycker **det kan vara kvar, det är ganska vedertaget**, många börjar förstå vad man menar när man pratar om grön it så skulle man byta nu skulle det handla mer om att jaha **nu är de flosklerna utbrända och nu kommer man med ett nytt modeord som man ska sälja**”...

5.2.2 Part II – Research question two (RQ2)

- How well are Green IT initiatives and policies in IT consulting companies integrated into the organisation?

Q5 and Q6 – Strategy 1. Managing Green IT like a business

Question 5 was the first question in the second part of the interview and provided unanimous results. We wanted to know, was Green IT initiatives and policies align with the overall business goals and all answered yes. The initiatives and policies were part of the companies CSR or part of business models and integrated in business development i.e. considered a high growth area. Some respondents with less bureaucratic structured organisations said they unofficially thought of it in every aspect and integrated it in decisions. Due to the unanimous answers, the part of the question asking reasons for not aligned provided only one answered saying, although the concept is relatively aligned, it is at times disconnected from economic goals considered individual projects.

Question 6 was the first of four multiple-choice questions and part II of managing Green IT like a business. Out of the seven respondents three answered, number four, two said number three and one each answered level one and five (see figure 10). The chosen letters for the respondents are randomly and letter A for example does not necessary indicate the first presented participating company in 5.1. The allocated letters are consequently used in all the analyses, thus company A demonstrated below is the same company whenever referred to for the continuation of the study.

Maturity Levels	Major strategies			
	Managing Green IT like a business	Managing the Green IT budget	Realising and assessing Green IT value	Delivering Green IT capability
5. Optimizing	D			
4. Managed	AE, F			
3. Defined	B, G			
2. Repeatable				
1. Initial	C			

Figure 10: Question 6 - Managing Green IT like a business part II

Q7 and Q8 – Strategy 2. Managing the Green IT budget

In this first part of strategy 2 managing the Green IT budget, we wanted to find out if the companies had any specific money allocated to this concept or integrated in the overall budget. None answered that they had a separate Green IT budget but allocated money and resources for environmental work and various projects. It was also unanimous among the respondent that they handled the budget together with the overall budget. We asked some follow-up questions on reasons for having or not having a Green IT budget and they answered that it is better to have it integrated in the overall budget because otherwise you risk creating separate projects never reviewed or evaluated. Other motivated not having a separate budget saying green investments

usually provide cost savings and including them in overall budget can reduce other costs in the budget. Below quote by respondent C refers to reasons for not having a separate Green IT budget.

...“to us it would not be easier only more job and especially given that the **green IT investments that you make are often those who most often are cost saving so to have them in the regular budget, you have everything in a cost-hunt, which seeks to bring down the price of both short and long term.** And then, of course, you will do your best to find a solution and then the purchases usually become green also”...³⁷

Among the motivations for having a specific Green IT budget were that in larger organisations you can get control, ownership and easier measure benefits. A separate budget helps priorities and demonstrates payback and return of investments. The companies planning for ISO 14001 certification projects in the near future said that this would probably require separate budgets.

Question 8 is similar to number six and include the answers to managing the Green IT budget part II. All seven respondents answered the question and three answered that they had reached optimized level, one each answered number four and three and two considered their Green IT spending to be ad hoc with few budget controls, thus answering number one (see figure 11).

Maturity Levels	Major strategies			
	Managing Green IT like a business	Managing the Green IT budget	Realising and assessing Green IT value	Delivering Green IT capability
5. Optimizing		D,E,G		
4. Managed		A		
3. Defined		F		
2. Repeatable				
1. Initial		BC		

Figure 11: Question 8 - Managing the Green IT budget part II

Q9 and Q10 - Strategy 3. Realising and assessing Green IT value

Question 9 investigates if the companies were including expected benefits and verifying tools for calculating this. We wanted to know what tools they used in assessing the value of Green IT and the reasons if any for not including expected benefits. The answers on this question varied greatly. Some included expected benefits and used advanced tools, others were considering starting to use these when developing the concept further and some thought it was unnecessary. Examples of tools used where environmental management systems, EMS and return of investment tools. Reasons for not including these where one said that this focuses on to be green rather than being green. Another respondent answered that business value are not always measured in money. It is an important factor but not the only one and a third said that the reasons for not including these where strictly due to the organisational culture and structure.

³⁷ ...”för vår del så skulle det inte vara lättare utan det skulle vara mer jobb för oss och speciellt med tanke på att **de gröna IT investeringar som man gör är ofta såna som oftast är kostnadsbesparande så att har man de i den vanliga budgeten så har man allting i en kostnadsjakt, då vill man få ner priset på både kort och långt sikt.** Och då kommer man ju och göra sitt bästa för att hitta en lösning och då blir den på köpet oftast grön också”...

They had very little formal processes available for anything at all. The quote below by respondent B refers to that business use not only measured is in money.

...“this we will do to get our money back, then it's also so that business benefits are not only measured in money, it is a major factor but not the only factor. Our image, it may be that we do not get overall positive things for the money but it can be pieces and then we go anyway, it is an important factor but not the only one” ...³⁸

Question 10 is part II of realising and assessing Green IT value and a multiple choice question. None of the respondents answered level five but two and three answered managed and defined. One each answered level one and two (see figure 12).

Maturity Levels	Major strategies			
	Managing Green IT like a business	Managing the Green IT budget	Realising and assessing Green IT value	Delivering Green IT capability
5. Optimizing				
4. Managed			DE	
3. Defined			A,B,F	
2. Repeatable			G	
1. Initial			C	

Figure 12: Question 10 - Realising and assessing Green IT value part II

Q11 and Q12 – Strategy 4. Delivering Green IT Capability

Question 11 contained the first part of the last major strategy in our framework called delivering Green IT capability. In this question, we wanted to analyse what the respondents thought the concept does for the industry and what it delivers to their organisation. The question was twofold and after starting, the interviews and reviewing some of the responses sent back to us we found flaws in the question, that we addressed in previous chapters and will further discuss in the next. Due to the focus on the first part on value, we received very little responses to the second part concerning descriptions of assets, value chain, core competencies and complete workflow. Only one of the respondents actually answered this part whilst we received rigorous amount of data from the first part. The one respondent that actually answered said they did not include the descriptions we presented due to their structure. Below quote refers to reasons for not including assets, value chain, core competencies and complete workflow. Respondent G originally answered in English so no translation is included.

...“Our policies does not include descriptions of what you mention, this due to the fact that we are a small company that must have so little administrative load and bureaucracy as possible” ...

Concerning what Green IT can do for the business, we summarized it as follows. More focus on the problem area benefits the environment and helps create new sustainable solutions and techniques for the future. Some said it helps companies become more efficient and others state that it creates focus on TCO and IT use instead of the constant chase for cheap solutions. One

³⁸ ...”så kommer vi att göra för att få igen våra pengar, sen är det också så att **affärsnytta mäter man inte bara i pengar alltså det är en stor faktor men inte den enda faktorn**. Vår image, det kan vara att vi inte får övergripande positivt för pengarna men det kan vara bitar och då kör vi ändå, **det är en viktig faktor men inte den enda**...”

used examples where they actually kept employment in the country instead of outsourcing to third parties.

The quotes below by respondent B refer to the value of Green IT:

...“**value of green it right now is that the industry are becoming aware of this problem**, the fact is that if you look globally, you look at all the machine halls, all the computer centre’s in the world, carbon emissions, is the same as all the world’s emerged airlines”...³⁹

A common understanding among the respondents is that Green IT makes the company more attractive for current customers, potential new customers and employees. Already today having an established Green IT focus is a competitive advantage since some believe that in a few years this will be taken for granted.

They mention the importance of compliance with customers, staying aligned with legal issues and new regulations. Almost all point to the cost saving benefits, use of resources or products more efficiently and less power consumption creating increased growth and new income. Some also refer to that it gives them better conscience and make them feel like better citizens. They think Green IT to a hype or buzzword now, saying it will probably lose as much focus within the coming years since it will be included everywhere. Below quote by respondent C refers to the concept currently perceived slightly exaggerated.

...“Right now, in my eyes there is a **"hype"** surrounding the name "Green IT", no one really knows what it means but it is a popular "buzz word." The IT industry will **simply not be able to "survive" without green considerations**”...⁴⁰

Question twelve, concerned Green IT value and represented the second part of Delivering Green IT Capability. We assumed that the companies would answer rather high numbers since they all seem to consider Green IT as giving high value to their organisation and the results from the empirics show the same. Four answered that they consider Green IT a core competency and two, answered level four. Only one respondent said their company was repeatable at level two (see figure 13).

Maturity Levels	Major strategies			
	Managing Green IT like a business	Managing the Green IT budget	Realising and assessing Green IT value	Delivering Green IT capability
5. Optimizing				A,D, E, G
4. Managed				BF
3. Defined				
2. Repeatable				C
1. Initial				

Figure 13: Question 12 – Delivering Green IT Capability part II

³⁹ ...”värde, av grön it just nu är att industrin får upp ögonen för problemställningen, det är ju så att om man tittar globalt sätt så tittar man på alla maskinhallar, alla datorhallar i världen, koldioxidutsläpp, samma som världens sammanslagna flyg”...

⁴⁰ ...”Just nu finns i mina ögon en ”hype” kring benämningen ”Grön IT”, ingen vet riktigt vad som avses men det är ett populärt ”buzzword”. IT-industrin kommer **helt enkelt inte att kunna ”överleva” utan att ta grön hänsyn**...”

5.2.3 Connecting research questions

This section will present the results of the interviews divided in participating companies and how they answered related to our research questions. Table 9 will also demonstrate a percentage level of maturity for each participant and their focus on Green IT. The column named *focus* refers to whether the company has answered that their Green IT work primarily has environmental focus with cost saving bonus (EFCSB) or cost saving focus with environmental bonus (CSFEB). The “optimal value” of maturity in the framework is level five, thus the concept fully aligned in the overall business. In order to display how the companies answered the questions in an easy to understand graphical manner we decided to perform minor calculations demonstrating the overall maturity level in percentage for each company. Since there are four strategies with five levels each, the optimized number representing 100 percent maturity is 20 ($5+5+5+5$) i.e. 80 percent maturity = $4+4+3+5 = 16/20 = 0.8$. The column *maturity level* displays this figure. Discussions on the results are presented in chapter 6.

Company identifier	Research question 1 (RQ1)	Research question 2 (RQ2)	Focus	Maturity level %
Company A	<ul style="list-style-type: none"> · Difficulties in measuring and finding what to measure. · Ad hoc initiatives cross functional in originations. · Focus on Co2 and energy consumption. · Increased costs for new equipment and time resources. · Standards and politics are difficult. 	<ul style="list-style-type: none"> · Green IT is integrated within the overall business. · Budget is integrated. · Good integration in top management. · Green IT part of total environmental profile. 	N/A	80 (4+4+3+5)
Company B	<ul style="list-style-type: none"> · Difficulties finding the Key Performance Indicators. · Measuring green parts of IT. · Specialist knowledge to calculate complex factors. · Cost savings are difficult due to no static organizations. · New concept can explain the poor figures in the index. 	<ul style="list-style-type: none"> · Green IT is integrated within the overall business. · Part of the business agenda. · No separate budget but global initiatives and projects are collected and run by units with budgets. · Projects and market-campaigns have ROI tools but business use is not always measured in money. 	EFCSB	60 (3+1+3+4)
Company C	<ul style="list-style-type: none"> · The costs for measures are larger than the benefits. · Difficulties in measuring and finding what to measure. · The word Green IT is fuzzy and hard to measure. · Policies are written and never read. · Lead-time on new projects and policies can explain low index figures. · Change of equipment to more environmental friendly options are a time and resource consuming effort. 	<ul style="list-style-type: none"> · All company activities are characterized by an environmental perspective. · No separate Green IT budget. · No separate processes for dealing with Green IT. · Green IT is considered an undefined buzzword valuable for marketing purposes. 	CSFEB	25 (1+1+1+2)
Company D	<ul style="list-style-type: none"> · Difficult in the beginning to set the right parameters and what to measure. · Difficulties finding standards on how to measure individual countries in global cooperation. · Lack of standards for environmental effects and analysis on start values in companies. · Poor figures can be partly explained with the financial crisis. 	<ul style="list-style-type: none"> · The budget is integrated in the ordinary operations. · The concept is considered a core value. · Green IT can optimize the supply chain, minimize traveling and change product development. · Has come a long way using advanced tools · Green IT is a strategic discussion. 	CSFEB	95 (5+5+4+5)
Company E	<ul style="list-style-type: none"> · Difficulties measuring the full energy consumption. · Parts of Green IT are outside of their control. · Measuring is difficult and not performed fully. · Progress is hard to follow-up. · Lack of proper technology. 	<ul style="list-style-type: none"> · Green IT budget is integrated in general budget · Environmental issues are part of management systems and considered a high growth area. · Establishing Green IT in their business development. · No tools for expected benefits yet but clear goals · Initiatives supported by top management. 	EFCSB	90 (4+5+4+5)

Company F	<ul style="list-style-type: none"> · Cost benefits are driving initiatives · Determining who should pay for the extra costs on investments such as green electricity is difficult. · Financial crisis has contributed to the low figures in the index. · Hard to define what should be included in Green IT. 	<ul style="list-style-type: none"> · No specific budget for Green IT · No monitoring tools and techniques for measuring · Green IT is so far a buzzword in the industry. · For Green IT to add value to the industry it needs to be defined and include quality markings. 	CSFEB	70 (4+3+3+4)
Company G	<ul style="list-style-type: none"> · Does not perform any measures. · Difficulties due to changed ways of working. · Difficulties since the concept are placed on IT department. · Green IT should be a strategic decision. · Bad internal dialogue between departments as costs for the projects is on operational levels. · No overall ownership of Green IT. 	<ul style="list-style-type: none"> · Green IT policies are aligned with their business goals · A goal to be presented as a “green company” having green initiatives every way possible. · The budget is integrated in the major budget. · Thinking green the company can reduce other costs in budgets. · Green IT has marketing value for the company. 	EFCSB	75 (3+5+2+5)

Table 9. Interview answers divided in research questions and companies

5.3 Summary and key features of chapter 5

The purpose of this chapter was to present the results from our empirical data and our participants in the study. The chapter began with a shorter introduction of the participating respondents. We interviewed seven IT consulting companies in varied size, some large global cooperation and some smaller national companies (see 5.1). We continued by presenting the results from our empirical work divided in research questions and part of the framework. Part I (RQ1) included a summary of answers for questions 1-4 and 13. Presenting green initiatives and company policies, tools and techniques for measuring Green IT, evaluation and presentation of measured results, any difficulties in enforcing or evaluating initiatives and policies and definition of Green IT (see 5.2.1). Part II (RQ2) included a summary of answers for the remaining questions 5-12. Presenting the four major strategies, Managing Green IT like a business, Managing the Green IT budget, Realising and assessing Green IT value and Delivering Green IT capability (see 5.2.2). The final part of the summarized results were presented in a table dividing R1 and R2, focus and average maturity level in percent by company as a way of connecting the research questions (see 5.2.3 and table 9). The next chapter 6 will contain our analysis and discussion starting with a background of the study, followed by a general discussion and some of our findings. The chapter will then continue with a more specific analysis based on the research questions and some reflections on our applied methods and approaches during the study.

6. Analysis and Discussion

This chapter contains the discussion based on our analysis. We decided to present this in sub parts starting with a general discussion followed by a more specific analysis of the results from the empirical work. The discussion starts with a short background, purpose of the study and brief discussion about the answers to our research questions. This is followed by a general discussion addressing some major issues and will then continue with further answering the research questions and a deeper analysis of these. Part I will consistently with previous chapter discuss answers to Q1-4 and 13 highlighting the identified difficulties in the two categories Organization & Culture and Measurement & Definition (see table 8, 5.2.1). Part II includes our framework and a discussion about the major strategies. A discussion on the measured overall maturity of the framework and points on connecting the research questions as mentioned in the introduction and presented in chapter 5 (see 1.3.1 and table 9, 5.2.3) is also included. Ending the chapter is a reflection on study limitations concerning chosen methods and approach as well as a short summary of contribution and key features of the chapter.

6.1 Background

The purpose of this study was to investigate any difficulties in evaluation and enforcement of Green IT and to measure the maturity of how well the concept was integrated in the overall business of IT consulting companies. We performed a prestudy, literature review and empirical investigating interviewing seven consultant companies in the IT industry. The questions we aimed to answer in our research were the following; *what are the reasons for poor enforcement and evaluation of Green IT?* In addition, *how well is Green IT initiatives and policies in consulting companies integrated into the organisation?* Our results show that the companies we interviewed have come rather far in their development of Green IT and the topic is considered a core value bringing valuable insights and new business. This is also evident in the rather high average maturity level across the strategies in the framework, 71, 4⁴¹ percent. The results also show several reasons for the poor enforcement and evaluation such as difficulties, a recent concept, lack of standards and the current economical situation in the world.

The high maturity we partly already assumed would be portrayed since the respondents market the concept rather aggressively and have voluntarily agreed to participate in Green IT project. Although we were a little surprised to see that some of the companies had reached further with the marketing and products they sell to customers than with their own internal policies and environmental work and that there were in fact some difficulties remaining. This can be explained to a degree depending on structure and allocated resources since there appears to be more profit involved in sales than internal revisions. Changing policies and way of thinking are seemingly associated with more costs rather than immediate profits

6.2 General discussion

We will start addressing the rather dramatic situation the in world that happened suddenly in fall of 2008, the global financial crisis. Some of our respondents are having international customers and are global organisations, and the crisis can lead to the loss of potential revenue and clients. One respondent stated that the current priority for many companies in Sweden and abroad is to survive and present their stakeholders with viable result and not start investing in new

⁴¹ $(80 + 75 + 75 + 90 + 95 + 25 + 60) = 500 / 7 = 71, 42$ percent

technology. Environmental focus without instant benefits risk being pushed further down the agenda and this is visible in the comparison of the indexes in 2008 and stated by IT&Telecomföretagen in their press releases.

Having seen in the interviews that, when changing to green products such as virtualisation software, starting ISO certification projects or exchanging old power draining equipment to new that is more efficient, this has a higher initial cost and requires more allocated resources. These projects and available resources might be kept for more necessary immediate measures making Green IT initiatives and policies less prioritized. Then again, when times of economic and financial crisis, there is a unique opportunity to review your situation and reports from end of 2008 suggests that Green IT so far has not been majorly affected by the crisis (Mines, 2008).

The concept has proven cost effective and can increase your net income so many initiatives are perhaps presently discussed behind closed doors in board meetings. We deliberated about this and asked the respondents as a follow-up question if they thought Green IT would be affected from the current situation and if the declining results in the last presentation of the index was a result of this and their answers were rather puzzling. We assumed they would say it most definitely was so as we experienced a decline in marketing aggressiveness in the duration of our study. Almost all answered that they thought it would create an impact on the business but few had actually experienced these impacts yet or explained the poor results with Green IT still being an immature concept. We believe that the effects of a major crisis like this are slow and will probably reveal themselves during the following years and those that claim it will not affect them, we assume are not involved in all parts of the decision-making within the organization, or perhaps this is one topic that will not be influenced by the crisis. We believe this is unlikely so but hope to be proven otherwise.

The consultant industry is a special line of business since they have very little direct environmental impact themselves and sell products or services dealing with these issues to others. The primarily environmental impact in the service sector is the effects of travelling, hardware use, CO₂ and other emissions from computer centers. In addition, the actual consultants' personal impact of the environment can be included as they are the tools for the services they provide but the industries impact cannot be compared with i.e. the manufacturing industry.

An interesting clash between the concept as a marketing device and used for internal development appeared. Some respondents separate these and say that Green IT are only concerning external IT use to decrease environmental effects and should not be referred to in internal policies. Others say it is necessary for the credibility towards the customers to start within their own organization. One respondent said they market this very widely and sell a variety of projects and services so they received a lot of criticism when it turned out they had not performed any of this on themselves. They have however currently started with this process. Our view is that you should, if not starting with, at least at some point evaluate your own organization before selling or informing the concept to others. A sort of learning by doing principle should prevail. Without this standpoint companies sell only empty words.

In addition the industry is quick at adapting new buzzwords and deals mostly with services rather than products so they can relatively easy change to new ways of working. This can also have a downside since the policies can be left behind. As, to whether they have adopted policies seems also to do with organizational structure and size of the company. Smaller companies appears to easier adopt new ways of doing things and then follow-up or establish these in all parts of the organization quicker than larger more bureaucratic companies that has established ways of

implementing new concepts. At the same time smaller companies don't seem to see the need to use them as much as the larger ones. They can go from thought to action within fifteen minutes.

A general discussion concerning the definition of Green IT is needed. There is a lack of a uniform definition for the concept, this contributing to both its strength and weakness. When trying to find theories explaining Green IT we were forced to use the same approach as most previous research and marketing suppliers, thus describing it by displaying a phenomenon through concrete examples. Most researchers and companies present their own definition and so do we. We didn't find one single complete definition that we thought covered all parts and explained Green IT efficiently enough. To show the origin of our definition and present what others perceive we included more than one perspective. This can be argued as adding more complexity to an already vague and complex concept but this was the approach we chose due to lack of applicability of the already presented definitions. By adding the final question in our interview (13) we wanted to test the "correctness" of our definition and invite the respondent into a discussion concerning their way of defining the concept. A further discussion on the results of this question can be found in 6.3.

Looking at the result from our analysis we can see that the companies can be divided in two groups. A question that we didn't include in the interview guide but that came up during the first interview and then was continually use was Green IT work primarily having environmental focus with cost saving bonus (EFCSB) or cost saving focus with environmental bonus (CSFEB). It was equally distributed (company A was not asked the question). Three of the seven companies said their focus was the first and three the second. One said although their major focus is environmental but concerning technical choices they are cost driven. This division was not due to size of the companies. Some large and some small had the first and second focus. Company B, E and G answered environmental work with cost saving bonus and company C, D and F answered cost saving with environmental bonus. Looking for patterns in the answers depending on focus we found no similar responses to research question two in the first focus.

Both high and low values were among the replies to the Green IT framework. The budget is integrated as well as the concept in the overall business but this is not unique for this focus. Overall the companies answered that they have a goal to be perceived as a "green company" and a positive attitude towards the concept. Concerning research question one we found little common features in the EFCSB focus amongst the companies. They all answer that enforcement is easier than evaluation and two out of the three companies does not have measurements in place and finds it difficult to find the values to include. The third company doesn't include measurements at all except for mandatory setting due to no customer demands. Again no particular pattern emerged when analyzing the three companies with cost saving focus.

Among the difficulties in question one, they mention that it is fairly easy to measure energy consumption, electricity and CO₂ emission but hard to find the right parameters to use and lift out the green initiatives. Cost benefits initiatives are prioritized. On the topic of financial crisis, for those companies that answered cost saving with environmental bonus will probably cut back on larger costs and pay less attention to the environment, an outcome we hope can be avoided. And for the rest they might think twice about long term investments and focus more on short term projects. A few of the participating companies planned ISO certification during 2009 and these projects cost extra money and resources and might be put on hold. One respondent said they have planned for this in the near future but a start date is still not set.

The concept of Green IT is a hot potato right now. When we started this study in the fall of 2008 there were many marketing campaigns and you could read blog entries in most of the IT

industry's publications. Due to Green IT being recent can also contribute to the poor figures in enforcement and evaluation. Not so many have started to see the effects of their work. The Green IT project by IT & Telekomföretagen is only a year old and can be considered slightly "too" current and in need of development for us to investigate all the possible difficulties involved being green. We can merely scratch the surface and display the current situation. This is also to some extent the case with the Green IT index. This is a way for companies to place themselves on a maturity curve similar to our work. The differences in the index between summer and fall of 2008 is interesting and we believe it can be explained partially due to the situation in the world but not all the respondents agree on this saying it has actually to do with the maturity of the concept rather than external factors.

The results in this study are not compared between participating companies as they are very different in structure and size. Some are also global organizations managed from outside of Sweden with other regulations. When we choose the participants for this study we did not know if size or structure were going to be a factor influencing the results. In order to compare the companies we should have consequently used similar companies. There are similarities in the handling of Green IT in all of them and six out of the seven are participants in the Green IT projects so that way they can be seen as innovators. However, the purpose of the study were to investigate IT consultant companies that had already established some work within the area and this excluded parts of the work on Green IT. Our respondents help other industries that should probably be considered the real environmental "villains" benefiting from investing in Green IT. In addition, to generalize the reasons for poor enforcement and evaluation on Green IT and measure the maturity levels across organizations a larger sample, more studies targeting different industries and comparisons between these are required.

6.3 Part I- research question 1(RQ1)

We will in this part discuss results found in the analysis concerning part I of the interview, question 1-4 and 13. In the first question we wanted the respondents to elaborate on what available initiatives and policies they had. The results of this provided large quantities of data and since most of the companies sell or market Green IT, much of the information on initiatives were services available for the customers. Almost all examples in Green IT systems and development were marketed to potential customers. The remaining contains internal ways of working. An interesting point is, in the interviews when asked what available initiatives they had on Green IT most respondents started naming and explaining the products or services and then continued talking about their own work. However this can be an effect of the way the questions were asked rather than how they rank initiatives. Not to forget is also the fact that the companies are profit driven and their business is to market and sell services and products.

Since many of the initiatives demonstrated similar characteristics we chose to create categories and then pattern matched examples to these. The purpose of the study is not to demonstrate what Green IT products or initiatives that is available. Therefore, all categories (see Q1, 5.2.1) included parts that are used both internally and marketed or sold to customers. It was rather difficult to categorize the different recurring examples (see Q1, 5.2.1) and some of them directly included IT such as the examples in Green IT systems, whilst others were mentioned frequently and could be included in how we defined Green IT in this study and therefore were included.

Most of the respondents used consolidated and virtualized equipment to some extent which we found in the literature to be a commonly used example of Green IT work. This appears to be a very good alternative for the environment since it uses less equipment very efficiently. It is space

saving, uses less energy and power and as a result of this less cooling systems. Virtualization could also be cost beneficial so we believe this has largely to do with it being well established.

All of our respondents used IT to enable distance work and prevent access travelling such as the possibility for mobile work places, distance work, video and teleconferencing. These techniques have been around for quite some time and are rather easy to adopt. They have been available long before the concept of Green IT emerged. One respondent said that they use only a fraction of available products and this has some to do with both the quality of the products on the market as well as a reluctant attitude towards change of behavior. There are many psychological aspects involved both in having a physical workplace and the personal meeting. A completely travel free and digital environment are not supported by anyone we have encountered. Question 1 was added mostly as a way for us to concretize the concept so no more explanation or discussion is included concerning the examples. However, we found it relevant enough to include as part of the results.

It is difficult to compare the results with any previous research regarding available policies since these are not usually marketed to the public. In the literature we found mainly external initiatives and few examples on what a policy actually contains. Because policies are created based on organizations individual goals and can include market sensitive information these are not always presented. Only one respondent market their policy on the webpage as they believe strongly in transparency but this is not common. The action plan in Green IT index only says “*demonstrates whether the organization has a policy or strategy for Green IT*” and not what it contains. Common elements we found were goals for reduced travelling, power consumption, purchase of environmental certified equipment such as Energy Star, green electricity or policies regulating days working from home. Similarities were that they contain some sort of goal but this was not specified further. It was interesting to see that none of the respondents had any separate Green IT policy, rather environmental policies including IT or policies with parts of the concept in the overall company strategies. We do not consider this as negative, since the optimized level in the framework is to align the concept with the overall business and creating separate policies would risk the opposite. A Green IT policy just for the sake of it is not the goal.

The results on what and why they measure Green IT was consistent with previous research. CO₂ emission, cost savings in general and energy consumption are the most common among our respondents as well as what we had seen in the literature. Cost savings in general translated into figures on reduced carbon dioxide are used more frequently than direct calculations on emissions. This we believe also has to do with the chosen line of business. The respondents are no pure environmental organizations but profit driven companies. There were no major differences in the two focuses, EFCSB or CSFEB. In the first focus on the importance of saving money and what they measure some answered that this is not the sole factor, important but not most important.

Concerning our definition and question thirteen the results are somewhat spread. Most but not all agreed with our definition which reflects how the business overall views the concept. There is no industry standard. This question provided interesting discussions with the respondents. Since we chose a wide definition to include many of the aspects we found in the literature we expected some criticism on our view of Green IT. Due to this we were a little surprise to see the large acceptance and agreement on our adoption. We actually thought there would be louder protests and more suggestions on definitions since the literature review showed that the concept is fuzzy and due to this many organizations provide their own views and implement the part that suits their structure. This united opinion however can to some degree be explained by the participants all being part of the Green IT project by IT&Telekomföretagen, thus being influenced by a similar viewpoint.

Among the criticism on our definition where that it was too wide and easy to achieve providing no means of quality control and to this we can agree. Green IT as it is used today does not demonstrate something being good or bad, only that you are striving towards change. This can be useful as an initial step when introducing a new concept as it create insight and awareness and also as our definition was intended, include many aspects. However, to move further and create successful implementation, looking at enforcement and evaluation, more concrete measures and perhaps standards needs to be established. Although we are indecisive whether to institute a business standard on Green IT.

We agree with the respondents that this will limit the concept. But this will not be all bad as in order to establish it fully independent measurements and forms of quality marking should be added and to maintain this, some sort of standard needs to prevail. The difficulties are to find a definition and standard that suits the industry and at the same time identify the proper measurements and also to agree on a quality stamp companies are willing to use. Not including any kind of standards or best practices runs the risk of a “toothless concept”. Everyone can say that they are dealing with Green IT and have a policy or initiative for this but are actually doing nothing at all.

Another problem with standards is that it can create stagnation due to added bureaucracy and those that disagree with the content can create resistance, losing important dedicated persons with a genuine interest in the environment. In addition, there are some discussions concerning politics with standards. We had a long discussion with one of the respondents regarding reluctance towards adopting EPEAT, the only current standard available that offers customers the opportunity to compare manufacturers and products displaying different levels. Other certifications such as Energy star, Svanen and TCO development to name some have their politics and marketing. A customer deciding to invest in Green IT products can have trouble orientating in the jungle of certifications that sometimes include each other and manufacturers has chosen different strategies and market this as most environmental friendly options. This adds confusing and more complications to an already messy field. Most certifications are also adapted to government legislations and these differ from country to country so no uniform global standard exist which we find odd since energy consumption and CO₂ emissions from example hardware, affect the environment in all countries equally. The purpose of this study is not to present any recommendations on how to deal with these issues, mainly to start a discussion to draw attention to the problem.

6.3.1 Difficulties

The difficulties in enforcing and evaluating Green IT were divided into two groups, Organization & Culture, O&C and Measurements & Definition, M&D (see 5.2.1, table 8). Some examples we had already encountered in the literature review, such as difficulties with a fuzzy definition and measuring exact consumption. In organization & culture, however the difficulties concerning *who should pay for the extra cost of Green IT, and lack of control due to external ownership* was new and we hadn't encountered this before. In consultant companies selling services and products, adding new features that are rather vague could be difficult selling to cost beneficial customers. Are they willing to pay the extra price to have environmental services, or should the consultants pay this with their service fee? Should there be governmental benefits supporting environmental friendly projects as requested in The Global Action Plan report from the UK? (Plan, 2007) Who should pay for the green electricity or the certification projects? These questions are left unanswered. At the same time as most new equipment and projects cost money, the concept is generally cost

saving which should help motivate the issue. Then again, due to no current industry standard it is up to the individual companies to set the goals and levels of adoption to address these issues.

Continuing on O&C, we can find aspects such as *resistance to change, new ways of thinking and change of culture and users unwilling to adopt available techniques*. These are not unique for implementing Green IT but rather common aspects when presenting new technology or ways of working. Weinstein (2008) talk about the lessons learned when addressing employee's behaviour is:

“The power of asking sceptical workers to try the requested change on a limited basis before dismissing it” (ibid p. 25)

This can help new concepts adopt easier. Educating staff in the effects of Green IT and introducing for example small scales of printer policies or video conferencing as well as travel portals can provide a soft introduction. Educate the employees on how to be green and demonstrate the benefits. Present the best practices techniques to encourage interest and share outcomes with other organizations (ibid) to help demonstrate how to overcome difficulties. The management could also inspire employees to go green with their home IT such as for example supplying with free power management software or offer computer equipment recycling, further contributing to less resistance to change.

The *lack of control due to external ownership and bad internal dialogue between departments* indicates a lack of overarching view of the effects of Green IT and lack of cooperation between all parts of the process chain within the organisations. At the seminar in the prestudy, some of the presenters talked about examples where different departments at Universities or division in companies kept to themselves and were reluctant to take any responsibilities for other departments “lack of environmental thinking”. They said that “I use double sided printing and turn of my computer so why should I be responsible for their large CO₂ emissions” and “this is not my concern, I am responsible for IT budgeting and not recycling so why should these issues involve me”. A lack of integration appears to be present. The lack of control due to external ownership also refers to companies that have problems with measures in the properties they do not own themselves, a common feature in the consulting industry. Examples on this are office buildings that are not company owned or the consultants stationed at customers or on one office floor. The company might have difficulties getting information on what proportion of total energy consumption is theirs. How do they relate and calculate the effects of these if they are not provided with all the figures? Also how much of the waste from the property is their causing? It is one of the major problems with measurement; they can never get true figures. They are depended on external ownership and the property owners or customers might not have the interest or knowledge on how to provide this information so the issue is beyond their control.

The *concept not established on corporate levels* is consistent with absence of clear management responsibility as Martinez & Bahloul (2008) found in the survey from European organisations. This and the example with *no ownership of the question* can be minimized removing Green IT from separate IT department and instead placed at top management level that can appoint important key persons managing the issues. Green IT should be a strategic discussion rather than the responsibility of single IT managers since these have other issues to address and tend to focus solely on technology and what benefits their department. In addition, a middle manager usually does not have all the input to maintain successful changes or the influence to make employees follow new procedures. People tend to adjust to changes more efficiently if the orders come from management.

The word *hype* or *buzzword* describing Green IT are frequently mentioned amongst the respondents but is also widely used in media. The difficulties with hypes are that they tend to send the signal to people that this is something exaggerated in importance not to be taken seriously as something new will soon come along. It is hot now but might be forgotten or changed in the near future. Gartner talks about the hype cycle (Gartner Inc) representing the adoption and application of specific technologies and on *The cycle for emerging technologies*, (2008), Green IT was at the peak and towards the end of 2008 experienced a rather steep drop due to the financial crisis. This is referred to as “Trough of Disillusionment” (ibid). We believe this can explain why the press no longer writes as frequently about it and the decrease in marketing campaigns from organisations.

We predict that the slope will continue for some time now when companies are trying to recuperate and review their strategies and then it will start climbing up the “slope of enlightenment” (ibid) again. The final phase of the hype curve called “plateau of productivity” (ibid) will mark the steps where Green IT is considered stable and broadly applicable; this given there will be some development in the field such as standard definitions or marks of quality providing value to organisations. Some respondents mentioned that within a few years time Green IT and sustainability would be something all companies use and take for granted and then those who market it now will have to find new ways of distinguishing themselves to use the concept as a strategic marketing advantage.

Most examples in M&D concerns measuring and the difficulties involved in *setting parameters, connecting savings to specific projects and initiatives*. We interpret this as part of evaluation rather than enforcement and the examples show that there are *difficulties in measuring and finding what to measure*. The biggest focus is on CO₂ emissions and energy consumption and these figures are rather straightforward to identify but measuring cost-savings are harder. Lifting the green initiatives and connecting savings directly to these and measure what occurred at certain times, *deciding what is green and deciding what derives from where*, are among the examples from our respondents. The organisation should identify and pinpoint as many affect as possible with using for example the green auditing services (Exido, 2008) or other means displaying the “current situation”.

In this model, covering a total view of the organisation, aligned green aspects with measurable goals should be added. In order to achieve this, the company also need to establish their definition of green and stick to this for the duration of the analysis. It is a common problem in the IT industry with measurements as IT has changed its position from just being considered a tool to being integrated in all parts of the organisations. Other departments such as accounting, HR or R&D has longer experiences in supplying benefits calculations and measurements and today we believe there are no other departments than IT that can be handed resources without careful planning and motivation. So why not also handle Green IT (and all other IT for that matter) as a business?

There are also *difficulties with hardware investments and knowing what level to use when measuring*. Shall they stop at consumption when exchanging hardware or take it as far as calculating benefits switching to other plastic cables? The fix for this problem appears again to be in setting the goals for the organisation and now the issues with the definition and its content comes along again. If Green IT will be standardised including for example how and what to measure, it will be difficult to set a level efficient enough for the industry. Shall there be one definition of Green IT for consulting companies and what they need to include and measure and a separate for other businesses including other aspects? The respondents disagree on this matter.

In summary, the purpose of RQ1 where to try and pin the reasons (if any) for the poor enforcement and evaluation of Green IT demonstrated in the Green IT index and the results show several reasons. We have in this section of the chapter discussed the economical situation in the world as one reason, the concept of Green IT being a recent hype and fuzzy with lack of standard definitions as another. The IT consultant industry itself can also be a reason as they are quick at adapting new buzzwords that are not always evaluated and measured. We also found a rather extensive amount of difficulties remaining that could explain the low figures. These were categorised as Organisation & Culture, Measurement & Evaluation (see 5.2.1 table 8), and we have discussed the examples in these two categories. The first part O&C contains decisions on costs and what is green, lack of control due to external ownership, resistance to change and the concept not being established on corporate levels. M&S includes difficulties in measurement i.e. setting parameters and finding what to measure and the lack of an industry standard.

6.4 Part II-research question 2 (RQ2)

We will start the discussions concerning part two divided into the four major strategies. Then the next part of the chapter will provide a discussion on overall maturity and the connection of the research questions. Initially though, we will present the complete figure demonstrating how the participants answered questions 6, 8, 10 and 12 used to calculate the maturity percentage (parts of this model has been presented in the separate strategies in 5.2.2). Figure 14 will graphically displays the spread of companies across the levels and strategies.

Maturity Levels	Major strategies			
	Managing Green IT like a business	Managing the Green IT budget	Realising and assessing Green IT value	Delivering Green IT capability
5. Optimizing	D	DE,G		A,D, E, G
4. Managed	AE, F	A	D,E	B,F
3. Defined	B,G	F	A,BF	
2. Repetable			G	C
1. Initial	C	BC	C	

Figure 14: Green IT Capability Maturity Model with results

Reviewing the results of the multiple choice questions for RQ2 (nr 6, 8, 10 and 12) that were added as a tool for measuring the maturity level we can find some issues to address. We chose the approach with combined open and multiple-choice questions on each strategy in order to receive a richer data collection. We figured that, only providing the alternative KPAs without the initial open text question would complicate the interviews and confuse the respondents as they were not exposed to our framework and background of this prior to the interviews. Picking one of the two we feared might have required a large amount of explanations and interpretations, which would have extended the time of the interviews. Corporate employees usually have busy schedules. In order to be efficient and not take up more than necessary of their time, we tried to be as clear as possible in the questionnaires sent and used in the interviews.

We aimed to measure the maturity of each strategy and the whole framework based on both the open and closed questions but we found some puzzling results when analyzing each strategy. Choosing one of two approaches, either only open questions or closed would probably have generated less ambiguous results. There are differences in the way they have answered the open question and the choices of levels they have picked.

Strategy 1. Managing Green IT like a business

Part two of the interview provided unanimous results on the open question (nr 5, see 3.4 and 5.2.2) whether their initiatives and projects were align with the overall business and we believe this is partly because the companies participating can be considered innovators in the field. Being part of the Green IT project has provided them with an advantage and they have as a participant in this nest of companies the opportunity to benefit from each other's success stories and failures.

As previously mentioned, there were unanimous results on whether the concepts were considered fully aligned in the overall business (nr 5, see 3.4 and 5.2.2) but looking at the following multiple-choice question (nr 6, see 3.4 and 5.2.2) only one company answered level five, optimized. Most answered level three and four and one answered level one, which is contradictory to the framework. There can be several explanations to why this is. First, the chosen alternatives on KPAs for each level could have been difficult to apply to their organisation, thus choosing the alternative they found most appropriate, not necessarily demonstrating the most suited level of maturity. One respondent criticised the alternatives and said none were fully applicable and that they were hard to understand. Although after reviewing them for a while, he still answered all the questions.

Another explanation can be that they interpret the alternatives differently than us and have another view on what is alignment. Company C, which answered fully aligned on the open and level one on the multiple-choice question in strategy one explained that they consider Green IT as primarily technology focused and did not have any written policies but still thought of the concept as integrated with the company's goals. Therefore, in this case they answered based on the wording of the alternatives rather than considering how mature their Green IT actually was in our framework. We were indecisive as to how to interpret this and in order for the framework to be a solely used diagnosing tool, future modifications such as the choice of only one way for the participants to answer the questions are needed. As presently used due to our initial intentions of including both open and closed answers, the participants can claim one thing in question five and another in number six, saying they are fully aligned but the framework demonstrates the opposite.

Strategy 2. Managing the Green IT budget

All respondent also answered in the open questions that they did not have a separate Green IT budget, all money and resources spent on Green IT were part of the overall budget. In the Green IT maturity model, this represents a high level of alignment but can also somewhat contribute to the following strategies lower value. If the budget is completely integrated maybe only a sum of money are dedicated to IT including Green IT and disappears in a "black hole", contributing to difficulties in realising and assessing value. No dedicated returns of investment or benefits expectations are performed on the specific projects. The subsequent question (nr 8, see 3.4 and 5.2.2), where the participants were to choose an appropriate level of maturity demonstrated as prior strategy a slight spread.

All said that they did not have a separate budget (fully aligned) and the majority did actually answer level five but there are still two respondents that answered due to the wording consistent with question 6. Company C has answered low levels in all the strategies and rather inconsistent with the open questions so this particular respondents replies can be somewhat explained with the fact that they interpret the questions differently from us. However, in this question company B also answered level 1 with the explanation that there is no separate budget but global initiatives and projects are collected and run in separate units with their own budgets, which can explain the low maturity.

Strategy 3. Realising and assessing Green IT value

Strategy 3 representing the value aspect of Green IT asking whether they use tools for expected benefits were also the only strategy with the highest reply rate on lower levels. None of the respondents was optimized and most answered level three. We connect this to difficulties in measuring as they mention lack of goals, figures and relations between savings and certain projects. If they do not include expected benefits or goals, how do they expect to realize the value contribution? Curley (2006) mentions the quote from Stephen Covey saying,

“Begin with the end in mind” (Curley, 2006 p.166)

The previous quote referring to modelling expectations and goals at an early state and then verifying the delivery of these. Among the respondents the answers were spread and some had come a long way using ROI tools and EMS systems, while others were starting to consider using these. A few respondents did not see the point in using tools at all and explained the reasons mainly due to organisational structure. One said that using these techniques focus on becoming green rather than being green and we disagree somewhat on this point. Yes, it focuses on becoming green in the aspects that you include future expectations on where you want to go but in order to maintain your efforts, thus being green, you need to verify where you are along the way towards pre-designed goals.

Strategy 4. Delivering Green IT Capability

Number 11 (see 3.4 and 5.2.2) the final open question in the interview could have been modified further before being sent to the respondents. The question was twofold and due to the focus on the first part on value, we received very little responses to the second part concerning descriptions of assets, value chain, core competencies and complete workflow. Although this did not turn out the way we expected and hoped, critically viewing the question after all the data was analysed, the second part was rather redundant in the context and we could have removed it in the first place. In order to gain more detailed answers on available tools and techniques we probably should have made it into a separate question that might have given us more information.

However, the value contribution and what Green IT can do for the business (see strategy 4 in 5.2.2) provided enough information for this question. All respondents said there were positive aspects with Green IT and that it has contributed to greater value for the business and their company. None answered that they perceived any negative aspects of engaging in Green IT activities. The final multiple-choice question (nr 12, see 3.4 and 5.2.2) demonstrate less ambiguous answers between the two interview questions for this strategy. A majority of the respondents said Green IT is considered a core competency and this is consistent with their answers on value contribution.

In summary, the purpose of RQ2 was to investigate how well integrated, *mature*, Green IT is in the overall business of IT consultant companies using our framework, the Green IT Maturity Model (see figure 7, 3.3). The model based on CMM with five maturity levels each containing KPAs, reaches across the four major strategies, Managing Green IT like a business, Managing the Green IT budget, Realising and assessing Green IT value and Delivering Green IT capability. In this section of the chapter we have discussed results found in each of the strategies and the answer to RQ2 based on the maturity levels from the framework is that Green IT is well aligned and rather mature in the organisation (see 6.5). However, the results from the open answers in the interviews demonstrate some differences mainly in strategy one, managing Green IT like a business that can be explained with the design of the model or interpretation of alignment. Overall, the framework provided interesting results and served the purpose of displaying the current maturity situation but for the model to be an optimal measurement tool, some modifications are necessary.

6.5 Measuring overall maturity

Calculating the overall maturity in the framework, the results show that the seven respondents have an average maturity level across the strategies of 71, 4 percent. The figures for each of the focuses (CSFEB and EFCSB) demonstrate a slight higher average for EFCSB (63 percent⁴² compared to 75 percent⁴³). These figures can be interpreted as a rather high level of maturity for Green IT in the participating companies. Although since there is no other, to our knowledge, previously conducted measurements similar to this we are unable to compare whether this result is unique in any way. However, this was not our intention, merely to shine a light on the current situation in the consultant industry. Most respondents answered rather consistently in levels across the strategies with two exceptions, company B and G (see table 9, 5.2.3). They differed from level four to one and, five to two in the different strategies. According to Curley (2006), each of the strategies in the framework should be kept on a rather synchronized level and the spread across results for these companies indicates in our framework a sub-optimal value output of Green IT.

6.6 Connecting research questions

We mentioned in the introduction that the purpose for this study was also to investigate if there would be some connections between research questions and if we could relate difficulties to levels of maturity and reverse. The attempt to check this was performed as analysing research questions in relation based on individual companies as seen in 5.2.3. As we wanted to investigate whether the poor figures of enforcement and evaluation in the Green IT index can be explained by being signs of difficulties. We set out to test this in the consulting industry using interviews and the maturity framework. Our results show that, yes, the poor figures can be explained with there being difficulties but this is not the only reason. Reviewing table 9 (see 5.2.3) we can see common factors such as difficulties with measuring, thus evaluation and this is also the part in the index with the lowest value.

The other common reasons are the financial crisis, lack of definitions and standards and Green IT being such as recent concept. Two respondents also mentioned lack of proper technology and the concept placed on wrong levels in the companies, as it should be a strategic decision rather than managed by the IT departments. The second connection in figure 1 (see 1.3.1) asking whether reasons for difficulties are that the concept is not fully aligned in the organisation can

⁴² $(70 + 95 + 25) = 190 / 3 = 63,33$ percent

⁴³ $(60 + 90 + 75) = 225 / 3 = 75$ percent

also be somewhat answered with an affirmative answer. Looking at the difficulties, divided in Organisation & Culture and Measurement & Definition, we found that many issues concern lack of top management dedication and we interpret this as a sign of less alignment in the organisations. It should be part of strategic decisions and managerial discussions together with other IT or environmental related questions to be considered fully integrated to provide maximum output value. Our results also show that in the three companies with 80 percent and more in maturity they all mentioned that Green IT initiatives are strongly supported by top management.

6.7 Limitations on chosen methods and approach

Maintaining a critical approach towards our research was important and we tried to remain as objective and bias free as possible but this proved difficult. However, bringing potential flaws and criticism to the surface and addressing them is the approach we have chosen to adopt in order to minimize these. As previously, described, the concept of Green IT is a recent phenomenon, not fully academically established and due to this, a somewhat lacking body of research existed. Especially when looking at a specific business such as consultant companies. The amount of unknown factors made it difficult to predict problems as well as designing valid and reliable research. Although, the very same problems were part of the reasons why we choose to do this study. We wanted to add to the lacking academically empirical research conducted on this specific area.

It is important to state that when we started the study we assumed due to the results found in the prestudy that there would be difficulties in enforcement and evaluation, creating interview questions that demonstrate this possibly contributing to skew data. Another aspect concerning the chosen research strategy is that the authors selected all data, materials and methods but this is the general problem when conducting qualitative studies. The chosen literature has definitely affected the outcome of the study but it is difficult and rather pointless to cover all possible alternative sources we could have used instead. Also in the empirical research we are interpreting subjective data and this can be argued as difficult to replicate but we have tried to maintain an as detailed audit trail as possible in order for others to continue with our research. To present an interpretive study with less subjective data we could have chosen to do a case study during a longer time period but this was already recently conducted (see Lorusso, 2008) and not possible in the allocated time frame of ten weeks.

We are aware that we risk losing the possibility of a broader view since we chose the method of using others surveys rather than conducting our own. The choice of consultant companies can also be criticised as biased as we want to become part of this industry, investigating other businesses could have targeted the actual environmental “villains”, and less developed companies but this we leave for future research. We chose consultant companies due to the double aspects of them both marketing and helping others with Green IT and using it themselves, which provided an interesting aspect.

Using a Capability Maturity Model as method of collecting data was satisfactory although it had some limitations. It is an extensive and rather complicated method and we could only use a small amount of the potential model in this study. In addition, the framework created by us became somewhat ad hoc due to the parsimonious material received by Mr Donnellan concerning the Green IT Maturity Framework. We had to interpret a large amount of the information using the Intel article by Curley (2006). Although this provided us with a unique framework that adds to the studies contribution to the IS research field. Depending on the semi adoption from two

frameworks, our interview questions suffered from this and especially question eleven could have been modified further before being sent out to the respondents.

Concerning how we performed the interviews a combination of survey, in-depth interviews and observations (triangulation) would have been the ideal method of collecting data but the timeframe made this choice impossible. Using a combined technique with both face to face and telephone /email interviews provided rich data but it is difficult to predict if the results would differ choosing another technique. Our approach generated an extensive amount of data and transcribing all was time consuming and left a rather small amount of usable text in relation to the amount of time spent. We could have decided only to transcribe some of the recordings but this would have presented a less truth worthy study. The choice of not including all the transcribed interviews might seem odd but the thesis would have been 2/3 transcripts and since we chose to remove identifiable data, they would provide no valuable material. Only an extract from a transcript is included (see Appendix 5). All information are kept and if interest occurs for further research, all material belongs to the study and can be received (with identifiers removed) from the authors upon request.

In addition, we are rather novice at interviewing so the result might have suffered from this. Reviewing the results after the transcriptions were done we discovered that some answers could have been investigated further for a richer result and in some interviews a little too much attention were drawn to questions not directly useful in answering the research questions. However, we started minor analyses directly after each interview was transcribed and this led us to modify the questions in the following interviews. The questions in 3.4 have the original layout that we sent to all the respondents prior to the interviews. Analysing the results we should have cut down the number of questions and focused deeper on number 2-4 and perhaps 13 in part one and a lot less time on number one. The alternative could have been fewer interviews; each lasting longer but this would have generated a smaller sample.

6.8 Summary and key features of chapter 6

Chapter 6 presented our discussion of the results from analysing the theoretical and empirical data. The chapter started with a short background and the purpose of the study including rough answers to our research questions (see 6.1). We then continued with a general discussion bringing up some major issues such as the financial crisis, characteristics of the consultant industry, the lack of standard definition of Green IT and hyped appearance as well as the two focuses, EFCSB and CSFEB (see 6.2). The chapter proceeded with a deeper discussion of the results, divided in research questions. Part I included trying to pin the reasons for poor enforcement and evaluation found in the Green IT index aiming for RQ1. Several reasons were found (see 6.3) including remaining difficulties that were discussed in more detail (see 6.3.1). Part II discussed the four major strategies in our framework aiming for RQ2 and presented the maturity levels across participating companies (see figure 14, 6.4). A section discussing the measured overall maturity and connecting the research questions cross companies were also included, indicating a rather high level of maturity (71, 4 percent) and that there in fact could be some connections between the research questions as mentioned in the introduction (1.3.1). Chapter 6 concluded with a discussion on limitations concerning chosen topic, methods and approach (see 6.7). The next and final chapter 7 will provide the answers to our research questions, some key issues from the results as well as a discussion on study contribution and suggestions for future research, thus presenting our conclusion.

7. Conclusion

This final chapter will conclude our study. Initially we will provide a short summary of the study purpose, general conclusions on Green IT, and some key issues from the empirical data as well as answers to our research questions. The chapter will continue with a discussion on our studies academic contribution to the IS field but also to the practitioners of Green IT. Chapter 7 ends with some suggestions for future research.

7.1 Conclusion

The purpose of this study was twofold. We wanted to contribute to the lacking academic literature and empirical studies investigating Green IT and in this case the IT consultant industry. We have described how this is handled in this business and tried to pin the reasons for the poor enforcement and evaluation found in the Green IT index. Additionally we have analyzed the maturity level of how integrated Green IT are in the organizations using a Green IT Maturity Model. We interviewed seven consulting companies in Sweden based on the two parts and the study generated an extensive amount of data and we have presented and discussed the main point in previous chapters 5 and 6. The results demonstrate some key issues from the empirical data that somewhat support previous research but also present new features. First some points on the topic of Green IT that we find relevant.

Green IT can be viewed as a current trend towards an inevitably more sustainable society adding fire to the ongoing global environmental debate. The concept is the IT industry's response to the problems with large emissions, growing hardware equipment to recycle, legislation compliance and demands from environmental conscious consumers. Looking at the global attention on Green IT you can interpret that the business sphere is serious in its attempts dealing with these issues and the reasons are both pure "environmental thinking" but also mainly cost driven. It is proven that Green IT saves a lot of money and this appears to have increased the popularity of dealing with "greener IT". We believe it is an important development for a further sustainable future.

One issue neither usually included in discussions on Green IT nor mentioned by any of our respondents is the overall tendency towards sustainability in the IT industry concerning recyclable software systems. Previous trends has been "out with old systems in with new" or "in with new graphical layouts on top of the old systems" (these problems still exist as there are tons of legacy systems available but this topic is outside the scope of this study). However, more and more companies investigate the possibilities of "recycling their old systems", thus looking at ways of using the processes behind them in a sustainable way and moving more towards the web. This is cost saving for the companies and the manufactures have realized this and are not late to follow developing new solution. We believe this also should be included in Green IT as it is use of IT resources in an efficient way causing minimal impact on the environment. Optimal usage of your old system equals less new systems equals less environmental impact, more saved money and this is the essence of Green IT marketing today.

The second issue we found in our research is the split of the concept in the two focuses, Green IT work primarily having environmental focus with cost saving bonus (EFCSB) or cost saving focus with environmental bonus (CSFEB). This division could also explain the amount of definitions found in the business. Although there are equal distributions between the two focuses

in this particular study it is difficult to predict whether a sample of i.e. 50 respondents instead of seven would provide the same results. However, investigating available marketing campaigns on Green IT also indicate this split in the industry. Unexpectedly our empirical data demonstrated no major similarities or differences in the responses to our interview questions depending on focus and neither was this division due to size or structure of the companies. Measuring the overall maturity in the two focuses showed a slight higher average for EFCSB (75 percent compared to 63 percent) but since we found no other distinguished features we suggest further research with a larger sample of participants to analyze this further looking for patterns within the different focuses.

The third issue concerns our definition and the general notion of how Green IT is perceived in the consultant industry. Most agreed and some disagreed with our definition which reflects we believe how the business overall views the concept. There is no available industry standard and everyone interprets it differently. The lack of standard and recognized definition contributes to both the strength and weakness of Green IT. Its strength due to the large amount of perpetrators with their own definition and use which has helped spread the word creating the hype. Since there are no requirements as to whether you can claim you are dealing with Green IT, everyone can use the term in ways suited. This also contributes somewhat to the weakness of the concept as it provides no form of quality marking. Among the criticism on our definition where that it was too wide and easy to achieve providing no means of quality control and to this we agree; Green IT as it is used today does not demonstrate something being good or bad only that you are striving towards change. Although we are indecisive whether to institute a business standard on what should be considered Green IT. We agree with the respondents that this will limit the concept but maybe this is required to fully establish it in the industry and provide something more meaningful. To achieve this, independent measurements and forms of quality marking should be added and to maintain this, some sort of standard needs to prevail.

This study aimed to answer the following two research questions:

RQ1: What are the reasons for poor enforcement and evaluation of Green IT?

RQ2: How well are Green IT initiatives and policies in IT consulting companies integrated into the organisation?

From our research questions, we conclude that the reasons for poor enforcement and evaluation can be explained by there being signs of difficulties but this is not the only reason. The results demonstrate common factors such as difficulties with measuring, thus evaluation and this is also the part in the index with the lowest value. Other common reasons are the impact on the economy and decisions due to the financial crisis and Green IT being such as recent concept. Our respondents also mentioned lack of proper technology (no easy available measuring tools) and the concept placed on wrong levels in the companies. It should be a strategic decision rather than managed by the IT departments. Investigating whether reasons for difficulties are that the concept is not fully aligned in the organisation can also be somewhat answered with an affirmative answer. The difficulties were divided in Organisation & Culture and Measurement & Definition and this demonstrated many issues concerning lack of top management dedication and this we interpret as a sign of less alignment with the general organisation. It should be part of strategic decisions and managerial discussions together with other IT or environmental related questions to be considered fully integrated to provide maximum output value. Our results also show that in the three companies with 80 percent and more in maturity they all mentioned that Green IT initiatives are strongly supported by top management.

In the answer to RQ2 looking at the overall maturity from the framework, the results show that the seven respondents have an average maturity level across the strategies of 71, 4 percent. These figures can be interpreted as a rather high level of maturity for Green IT in the participating companies and this can as previously mentioned be explained with the respondents considered innovators in the field. Although since there is no other, to our knowledge, previously conducted measurements similar to this we are unable to compare whether this result is unique in any way. The use of the Green IT Maturity Model was satisfactory for the purpose of the study to display the current tendencies in the IT consultant industry although it had some limitations. We created a unique framework that adds to the studies contribution in the IS research field but due to the semi adoption from two frameworks, our interview questions suffered from this and consequently the data collected. In order to be a successful measurement tool of maturity some modifications are necessary such as the use of either open or closed questions to collect data on levels in the framework.

7.2 Contribution to IS research and practitioners of Green IT

Green IT is a highly relevant topic for the IS research community and this is evident when the largest international conference on information systems ICIS⁴⁴ celebrates its 30th anniversary with Green IT as of the tracks in the 2009 theme. Our study is also interesting due to the fact that the framework we have built our Green IT Maturity Model on is co-written by one of the chairs for the track, Mr. Brian Donnellan.

The Green IT and Green IS interest in the IS academic field is increasing and during 2009 Association for Information Systems AIS⁴⁵, the premier global organization for academics specializing in Information Systems have proposed a Green Initiative Special Interest Group due end of April. This group is intended to be a forum for AIS members to discuss and develop the role of IS in the global green agenda (Hasan, 2009).

Looking at what has previously been written on the topic, our academic contribution is adding to the knowledge base of Green IT but we are bold enough saying it also differs from previous work. We have not encountered in any of the other theses or reports read where someone has investigated “being green” They all appear to study “becoming” green. (Hence the title, difficulties being green? rather than to be green) This is displayed in all the step by step plans and various frameworks to use when establishing Green initiatives or policies.

We have in this study taken the research a step forward investigating what happens after you establish all these initiatives or policies and have tried to reveal potential difficulties to overcome during enforcement and evaluation. Another contribution to the IS research field is the literature review were we have somewhat summarized current available publications but also the thin amount of literature available should encourage more studies being conducted. Our major contribution is the Green IT Maturity Model that with some minor modifications can be used diagnosing current maturity levels on Green IT regardless of industry as it is created as an “industry neutral” framework.

Green IT is also very relevant in the business sphere and although the hype has decreased slightly due to the financial crisis putting the topic currently as previously mentioned at the “Trough of Disillusionment” in the Gartner hype cycle (Gartner Inc.) we see that the climb up the “slope of enlightenment” (ibid) might be quicker than initially predicted. This is evident as Green IT is one

⁴⁴ International Conference on Information Systems, ICIS, <http://www.icis09.org/>

⁴⁵ Association for Information Systems, http://home.aisnet.org/associations/7499/files/Index_Markup.cfm

of the major highlighted cutting edge IT solutions at CeBIT 2009⁴⁶ in Hannover, Germany. This exhibition is considered the No.1 conference and showcase for the ICT community.

Our contribution to the practitioners of Green IT and the business sphere is a study identifying difficulties to overcome when adopting this current concept. We have pinpointed some of the reasons for the poor enforcement and evaluation and this can contribute to an increased awareness early on in starting Green IT initiatives. As much of the previous research demonstrates, our study also shows the importance of measuring the progress and following up your work towards your goals as well as making sure the concept is placed on a strategic level, fully accepted by top management to provide maximal output value. Our results present “food for thought” for organisations wanting to stay green and what difficulties to be aware of when becoming green. The Green IT Maturity Model is also a measuring tool similar to the Green IT index (Exido, 2008) displaying an overall current situation and for organisations “dealing with or wanting to take part of” Green IT to use, comparing their progress against each other and a specific industry.

7.3 Future research

The choice of respondents provided us with a large amount of data but since almost all participated in the same project (IT&Telekomföretagen, Grön IT) the results run the risk of reflecting a local phenomenon that could affect the accuracy of consultant companies as a context. Consultant companies as an industry could also not be evaluated fully as one connective context due to no comparative case. In order to obtain a larger picture of the business and to exclude potential local effects, further research on other companies are needed. In addition, in order to review consultant companies and their specific features a comparison with other industries needs to be made. In addition, to fully test the framework and gain a more complete picture of the IT consultant industry or other businesses, further research needs to be conducted including more maturity comparisons.

We also would like to perform a similar study in the future investigating Green IT when the concept is less recent to compare the alignment maturity in the IT consultant business and other. Future research including international measures using the framework would also be interesting as well as global comparisons using the model. Would i.e. German IT consultant companies display the same average percentage maturity level as the UK or how mature are Ireland compared to our seven consultant companies in this study? These are potential topics for future thesis. Slightly modifying the framework could also lead to a tool using for advancing in your Green IT work. If we identify and present ways of moving between levels in the model, it can become a powerful maturity roadmap towards optimized Green IT alignment and maximal output value for the organisations.

⁴⁶ CeBIT 2009, http://www.cebit.de/homepage_e

Appendix

Appendix 1, Interview Guide

Interview guide

Study description, Anonymity, Confidentiality, Contact information

Warm up – if needed (face-to-face interviews).

Tell recording who is being interviewed, which author, date

Part I

When introduction is completed start questions on Green IT policy or initiatives

- ✓ Initiatives and policies available
- ✓ What and how to measure
- ✓ Publish the results to whom
- ✓ Difficulties in enforcing and evaluating the policies or initiatives

Part II

When the first part is completed start questions on Green IT Capability Maturity Framework

Managing Green IT like a business:

- ✓ Is the policy integrated with the overall business goals
- ✓ Select one of five alternatives
- L1 - Green IT **is focused on technology**
- L2 - Green IT **is seen as a cost centre**
- L3 - Green IT **is viewed as a service centre**
- L4 - Green IT **is viewed as an investment centre**
- L5 - Green IT **is operating as an entrepreneurial value centre**

Managing the Green IT budget:

- ✓ Is the policy integrated with the overall business budget
- ✓ Select one of five alternatives
- L1 - Green IT **spending is ad hoc**
- L2 - Green IT **budget is defined**
- L3 - Green IT management is using **systematic cost reduction techniques**
- L4 - Green IT management **expands funding options**
- L5 - Green IT achieves a **sustainable economic model**

Realising and assessing Green IT value:

- ✓ Does the policy include expected benefits and verifying tools for achieving these
- ✓ Select one of five alternatives
- L1 - There are **no defined processes for managing Green IT value**
- L2 - The Green IT management **focus on Total cost of ownership solutions**
- L3 - Green IT management **focus on the business value the solutions deliver**
- L4 - Green IT management **uses advances techniques such as portfolio management**
- L5 - Green IT management **using sophisticated investment analysis techniques**

Delivering Green IT Capability:

- ✓ Does the policy include assets, value chain, core competencies and complete workflow to support or perform business activities
- ✓ Select one of five alternatives
- L1 - There is **no formal Green IT presence**
- L2 - Green IT **offers little or no strategic input to the business**
- L3 - Green IT **is established as a quality service**
- L4 - Green IT **is discussed and used when setting strategic directions**
- L5 - Green IT is **operational and information superiority over the competition**

Conclude the interview and thank the respondent. Ask if there are any further questions and tell contact information. Let them know they will receive the result when approved, presented and published.

Interview guide telephone/follow-up

Presentation of authors, ask if ok to record

Tell recording who is being interviewed, which author, date

After introduction start questions on how they got on with the questions

- ✓ Any difficulties
- ✓ Anything they couldn't answer
- ✓ Elaborations
- ✓ Go through all the questions if necessary or just the ones left unanswered

Conclude the interview and thank the respondent. Ask if there are any further questions and tell contact information. Let them know they will receive the result when approved, presented and published

Appendix 2, Interview questions

Green IT interview questions

Short description: The interview questions you have received (13 in total) are part of a master thesis in Informatics investigating any difficulties in enforcing and evaluating Green IT in consulting companies in Sweden. Our aim is also trying to measure the maturity of green policies and initiatives according to a Capability Maturity Framework adopted from Intel's IT business plan in order to answer how well the policies are integrated into the business.

The answers can be written in Swedish or English.

All respondents will receive a digital copy of the thesis when approved, presented and published.

Anonymity: Please mark the box below with an **X** if you and the company you represent wish to be totally anonymous in the study. The name and information you provide on this document will only be used for internal purposes to ensure who answered what for the analysis. If you choose not to be anonymous, the company name and your name will be visible in a short presentation of participants but it will NOT be possible for readers to know whom of the respondents that answered what in the interviews.

We wish to be anonymous

Confidentiality: All of the information you provide us will be treated confidential and not spread to other persons than the authors.

Respondent validation (face- to- face- interviews):

If you wish to validate the answers given before the study is published, please mark the box below with an **X**.

I wish to approve my answers before the study is published

Contact Information: If you have any questions, please contact the authors:

Lina Hellmo
BORTTAGET
BORTTAGET

Liridona Ferizi
BORTTAGET
BORTTAGET

All questions are voluntary and if you do not want to answer some of the questions, this is your choice to make. Although in order to obtain a complete result, we encourage you to try to answer all the questions and if there are any difficulties, you can contact us or answer them by phone on the follow-up conversions.

Questionnaire

Please fill out the information below (for the authors only)

Name:

Company:

Position:

Date:

Part I. This part contains four open questions. Our definition of Green IT in this study is “any initiative, technique, product or policy (established or not) concerning sustainable or environmental-friendly use of IT”.

Please start your answer after A# and continue until you are finished, the line will move as you write.

Q1. Could you describe in as much detail as possible what Green IT initiatives are available in your company and what kind of policies you have and what they contain?

A1.

Q2. What do you measure in your Green IT initiatives? ⁴⁷. How do you measure this, what tools or techniques are used? If not, what do you believe are the reasons for not measuring your results?

A2.

Q3. Please describe how you evaluate and present your measured results and if so, to whom do you present them?⁴⁸ If not, what are the reasons for not doing this?

A3.

Q4. Are there any difficulties enforcing and evaluating your Green IT? ⁴⁹ If so, please describe these difficulties and what you believe are the reasons? If not, please elaborate how your company deals with this successfully.

A4.

Part II. This part is divided into four sections related to major strategies in our framework. Each section contains two questions. One open question and one multiple choice question. For Q5, Q7, Q9, Q11 please start your answer after A# and continue until you are finished, the line will move as you write.

Section 1. Managing Green IT like a business:

Q5. Do you believe your Green IT policies or initiatives are aligned with your overall business goals?⁵⁰ If so, please explain how they are integrated. If not, what do you think are the reasons for this?

A5.

Q6. Which of the following does best describe your organisation?

Please mark the number of the alternative in the box.

A6.

1. Green IT is focused on technology and has few or no cost management systems in place
 2. Green IT is seen as a cost centre and has basic cost management practices in place
-

⁴⁷.Cost savings, legislation compliance, carbon footprint, energy efficiency etc.

⁴⁸.Do you present them internally in the organisation or externally to customers, suppliers etc.

⁴⁹ Difficulties in evaluation or follow-up

⁵⁰ Are the goals of your Green IT independent or integrated with the companies goals

3. Green IT is considered a service centre delivering needs and generates value from current investments and infrastructure
4. Green IT is considered an investment centre driven more by business strategy than by external benchmarks or targets.
5. Green IT is operating as an entrepreneurial value centre

Section 2. Managing the Green IT budget:

Q7. Do you have a Green IT budget? If so, is it part of your overall company budget or handled separately? Please describe in as much detail as possible what the budget contains and how it is managed. If not, what do you believe is the reason for not having a Green IT budget?

A7.

Q8. Which of the following does best describe your organisation?

Please mark the number of the alternative in the box.

A8.

1. Green IT spending is ad hoc with few budget controls
2. Green IT budget is defined and monitored
3. Green IT management is using systematic cost reduction techniques
4. Green IT management expands funding options and introduces budgeting flexibility
5. Green IT achieves a sustainable economic mode

Section 3. Realising and assessing Green IT value:

Q9. Please describe if your Green IT policy or initiative include expected benefits and verifying tools for achieving these?⁵¹ If so, what kind of tools and techniques do you use? If not, what do you believe are the reasons for not including expected benefits?

A9.

Q10. Which of the following does best describe your organisation?

Please mark the number of the alternative in the box.

A10.

1. There are no defined processes for managing Green IT value
2. The Green IT management focuses on Total Cost of Ownership solutions
3. Green IT management focus on the business value the solutions deliver
4. Green IT management uses advances techniques such as portfolio management to optimize Green IT investments
5. Green IT management demonstrate optimal return using sophisticated investment analysis techniques

Section 4. Delivering Green IT Capability:

Q11. Please describe what you think Green IT can do for the IT industry and what it delivers to your organisation. Do your policies or initiative include descriptions of the assets, value chain, core competencies and complete workflow in the value chain to support or perform business activities? If so, please explain the details of these descriptions and if not, what do you believe are the reasons for not including this?

A11.

Q12. Which of the following does best describe your organisation?

Please mark the number of the alternative in the box.

A12.

⁵¹ I.e. Return-of-investment measurements, coordination of investments, business case discipline etc.

1. There is no formal Green IT presence, users themselves create policies
 2. Green IT offers little or no strategic input to the business
 3. Green IT is established as a quality service
 4. Green IT is discussed and used when setting strategic directions
 5. Green IT is considered a core competency for the company
-

Q13. Our definition of Green IT for this study is “any initiative, technique, product or policy (established or not) concerning sustainable or environmental-friendly use of IT”. Do you agree with this definition or do you define and use it differently?

A13.

Thank you!

Appendix 3a, Green IT index questions from IT & Telekomföretagen. In Swedish.

Grön IT index – GITindex™

Grön IT index – GITindex™ – lanserades av IT och Telekomföretagen i februari 2008. GITindex baseras på Exido/IT-barometern och syftar till att belysa hur svenska företag och organisationer arbetar med att minska IT's negativa miljöpåverkan samt hur IT används som miljöteknik, dvs. för att minska företagets övriga miljöpåverkan. Genom att svara på frågorna nedan få du ett GITindex för ditt företag eller organisation jämfört med GITindex i Sverige.

Miljöhänsyn vid investeringar?

Tar ni hänsyn till miljöeffekter i samband med era IT-investeringsbeslut?

Ja, i stor utsträckning

Ja, i viss utsträckning

Ja, men i begränsad utsträckning

Nej

Viktiga miljöaspekter

Vilken eller vilka miljöaspekter har betydelse i samband med ditt företags IT-investeringar?

Energiförbrukning

Återvinning

Transporter, resande

Val av IT-arkitektur

Image

Ansvar mot anställda

Annat

Vet ej

Policy för Grön IT?

Finns miljöpolicy (eller motsvarande) för inköp och användning av IT-produkter och -tjänster ("Grön IT-policy") inom företaget/organisationen?

Ja

Nej, men vår övergripande miljöpolicy omfattar även vår IT-verksamhet

Nej, men vi är på väg att etablera en policy för Grön IT

Nej, och vi har inga planer på att etablera en policy för Grön IT

Vet ej

Grön IT-policy: innehåll

Vad omfattar/innehåller er miljöpolicy för IT (Grön IT-policy)?

IT-arkitektur

Mål med Grön IT-arbetet

Inköp av hårdvara

Drift av IT

Användande av IT för att minska företagets miljöpåverkan

Redovisning av vår IT-verksamhets miljöeffekter

Annat nämligen

Inget av ovanstående

Miljöhänsyn, hårdvara investeringar

Vad tar ni systematiskt hänsyn till (ur ett miljöperspektiv) i era IT-hårdvaru investeringar?

Materialval (plaster, metaller etc.)

Låg energiförbrukande system

Låg energiförbrukande hårdvara

- Hårdvarans livslängd
- Skalbarhet
- Miljöcertifierade leverantörer
- Återvinningsbarhet
- Annat nämligen
- Vi tar ingen systematisk miljöhänsyn vid investering i hårdvara
- Vet ej/Ingen uppfattning

Miljöhänsyn, driftinvesteringar

Vad tar ni systematiskt hänsyn till (ur ett miljöperspektiv) i er IT-drift?

- IT-verksamhetens energiförbrukning
- Val av leverantörer
- Val av outsourcing leverantörer
- Tunna klienter
- Virtualisering
- Öppna standards
- Energieffektiva servrar
- Annan energieffektiv utrustning
- Konsolidering av datacenters
- Digital dokumenthantering
- Strukturerad informationshantering (t ex minskade mängder back up och taggad info)
- Annat nämligen
- Vi tar ingen systematisk miljöhänsyn när det gäller vår IT-drift
- Vet ej/Ingen uppfattning

IT för att minska miljöpåverkan

På vilka av nedanstående sätt använder ni IT för att minska företagets miljöpåverkan?

Telefonmöten

Webb- och videomöten

Hem- och distansarbete

Fjärrstyrd leverans och underhåll samt distanssupport

Minskade utskrifter

IT-systemstöd för styrning och kontroll av miljöpåverkande faktorer

Virtuella projektarbeten

Annat nämligen

Inget av ovanstående. Vi använder inte IT aktivt för att minska miljöpåverkan

Vet ej/Ingen uppfattning

Utvecklade/köpta IT-lösningar för miljö

Inom vilka områden har din verksamhet utvecklat eller köpt IT-lösningar för att minska företagets miljöpåverkan?

Lösningar för bättre resursplanering

Lösningar för mindre energiförbrukning

Lösningar för effektivt resande (rutt optimering)

Lösningar för effektivt utnyttjande av lokaler (energiförbrukning)

Fjärrstyrd leverans och underhåll samt distanssupport

IT-systemstöd för styrning och kontroll av miljöpåverkande faktorer

Virtuella projektarbeten

Inget av ovanstående. IT i produkten/erbjudandet som kan minska kundens miljöpåverkan

Annat nämligen

- Vi har inte tagit aktiv miljöhänsyn då vi utvecklat eller köpt IT-lösningar
- Vet ej/ingen uppfattning

Efterlevnad, Grön IT-policy

Hur väl efterlevs och utvecklas företagets IT-miljöpolicy (eller motsvarande)?

- Mycket väl
- Ganska väl
- I viss utsträckning
- Inte alls
- Vet ej

Redovisning/beräkning av Grön IT

Beräknar och/eller redovisar ni er IT-verksamhets miljöpåverkan?

- Ja
- Nej
- Vet ej/ingen uppfattning

Appendix 3b, Green IT index questions from IT & Telekomföretagen. In English.

Green IT index – GITindex

Green IT index - GITindex™ - was launched by the IT and Telekomföretagen in February 2008. GITindex is based on Exido / IT-barometer and aims to highlight how the Swedish companies and organizations are working to reduce IT's negative environmental impact and how IT is used as environmental technology, i.e. to reduce the company's other environmental impacts. By answering the questions below, you get a GITindex for your company or organization, compared with GITindex in Sweden.

Environmental considerations in investments?

Do you regard environmental impacts associated with your IT investment decisions?

Yes, to a large extent

Yes, to some extent

Yes, but to a limited extent

No

Significant environmental aspects

Which aspects are relevant in the context of your company's IT investments?

Energy consumption

Recycling

Transport, travel

Choice of IT architecture

Image

Responsibility towards employees

Other

Do not know

Policies for Green IT?

Is there any environmental policy (or equivalent) for the purchase and use of IT products and services ("Green IT policy") within the company / organization?

Yes

No, but our overall environmental policy also covers our IT operations

No, but we are going to establish a policy for Green IT

No, and we have no plans to establish a policy for Green IT

Do not know

Green IT policy: the content

What does / contains your environmental policy for IT (Green IT policy)?

IT architecture

The goal with Green IT work

Purchase of hardware

Operation of IT

Use of IT to reduce the company's environmental impact

Accounting of our IT-business environment

Environmental considerations, operating investment

What do you systematically consider (from an environmental perspective) of your IT operations?

IT-business energy consumption

Choice of suppliers

Choice of outsourcing suppliers

Thin Clients

Virtualization

Open standards

Energy efficient servers

Other energy-efficient equipment

Consolidation of data centers

Digital document management

Structured information (e.g., reduced quantities of back-up and tagged info)

Other namely

We take no systematic environment considerations in terms of our IT operation

Do not know / No opinion

IT to reduce the environmental impact

In which of the following methods do you use IT to reduce the company's environmental impact?

Phone Meetings

Web and video meetings

Home- and teleworking

Remote delivery and maintenance and remote support

Reduced printing

IT system support for management and control of environmental factors

Virtual project

Other namely

None of the above. We do not use IT actively to reduce environmental impact

Do not know / No opinion

Developed / purchased IT-solutions for the environmental

In what areas has your business developed or purchased IT solutions to reduce the company's environmental impact?

Solutions for better resource

Solutions for less energy consumption

Solutions for efficient travel (route optimization)

Solutions for efficient use of buildings (energy consumption)

Remote delivery and maintenance and remote support

Accounting / calculation of Green IT

Do you calculate and / or report your IT-business impacts?

Yes

No

Do not know / no opinion

IT system support for management and control of environmental factors

Virtual project

None of the above. IT is the product / offer that could reduce the customer's environmental impact

Other namely

We have not taken an active environment considerations in which we have developed or purchased IT solutions

Enforcement, Green IT policy

How well enforced and developed is the company's IT-environment policy (or equivalent)?

Very well

Fairly well

To some extent

Not at all

Do not know

Appendix 4. Summary of links

Accenture

www.accenture.com/home/default.htm

AIS, Association for Information Systems

http://home.aisnet.org/associations/7499/files/Index_Markup.cfm

Almega forum for service companies

www.almega.se

American EPA United States Environmental Protection Agency

www.epa.gov

Brown Wilson Group

<http://theblackbookofoutsourcing.com/>

Cap Gemini

www.capgemini.com/

CeBIT 2009,

www.cebit.de/homepage_e

CSCI, Climate Savers Computing Initiative,

www.climatesaverscomputing.org

EICTA European Industry Association for Information Systems Communication Technologies and Consumer Electronics,

www.eicta.org

Energimyndigheten, Swedish Energy Agency,

www.energimyndigheten.se

Exido. Analysis and advisory company,

www.exido.se

Gartner Inc. Information Technology research and advisory company

www.gartner.com

Global Action Plan

www.globalactionplan.org.uk/

Green Electronics Council,

www.greenelectronicscouncil.org

Greenhouse Gas Protocol Initiative.

www.ghgprotocol.org

IDC, a subsidiary of IDG
www.idc.com

International Conference on Information Systems, ICIS
www.icis09.org/

International Organization for Standardization
www.iso.org

IT & Telekomföretagen
www.itotelekomforetagen.se

IT & Telekomföretagen webpage on Green IT project
www.anvandgronit.se

IIPS Swedish Institute for Growth Policy Studies
www.iips.se

KTH Royal Institute of Technology
www.kth.se

McKinsey & Company
www.mckinsey.com

Miljöstylningsrådet MSR, The Swedish Environmental management Council,
www.msr.se

Software Engineering Institute
www.sei.cmu.edu

Stora IT dagen 20 November, 2008 at Lund University
www ldc.lu.se

Swedish Energy Agency
www.energimyndigheten.se

TCO Development, Swedish Confederation for Professional Employees
www.tco.se

The Green Grid
www.thegreengrid.org

United States Environmental Protection Agency
www.epa.gov

Appendix 5. Extract from a transliterated interview. In Swedish.

- L. frågan är vilka gröna IT- initiativ som ni har i ert företag och sen vilken typ utav policy som BORTAGET har?
- J. ja, jamän, ja, gröna initiativ, det som jag strävar efter, det finns gäng olika men först och främst resemissigt, se till att de anställda, egentligen alla på jobbet har mobila arbetsplatser, så att de kan jobba från där de är. Var kunden är, beroende på vilken kund det är, de ska inte behöva göra onödiga resor för att komma till jobbet eller komma till kunden om de kan sitta och göra det någon annan stans det lika bra då.
- L. nej
- J. ett sätt att få ner rese, alltså miljöavtrycket på resor helt enkelt
- L. vad det gäller utbildningar, så försöker vi också vara aktiva på att ha, använda oss av vad som kallas webinar, alltså att man ansluter sig till seminarier och liknande på internet. Man går och gör självstudie kurser framförallt och liknande på internet, för att slippa flyga till Stockholm och sitta där på en skolbänk i några timmar och sen flyga tillbaka igen. Sen den information som vi behöver kan man lika gärna ta tillvara på via nätet då. Och det är samma sak, det är ett mål för att få ner resandet. Ehmm, sen har vi, de här bitarna är, det är mer beskrivet i ett, ja, vad ska man säga, policydokument, där vi reglerar allt som har med resande och arbetsplatser och göra.
- L. Har ni en policy för de här olika, alltså en för resor, en för sån här utbildning och en sån här för?
- J. Nej, nej
- L. Ni har en?
- J. en policy som distribuerar alla saker som är viktiga när man jobbar hos oss, det är allt från resor, och hur hanterar man tidsrapportering, och hur sköter man uppläggsredovisning, och ja, vi har bakat ihop det till en medarbetarpolicy helt enkelt.
- L. ok, som CSR, Corporate Social Responsibility, känner du till det?
- J. ja, ja
- L. ok.
- J. sen tar man i övrigt, vad jobbar vi med, sen jobbar vi med, vi försöker ha standardutrustning, det är inte upp till var och en att köpa vilken PC, eller vilken bärbar eller vilken mobiltelefon, utan vi har tagit fram en standard och sagt att ni får välja mellan den här och den här modellen. Då har vi valt den familj som är grönt helt enkelt, då har vi Fujitsu Siemens med sin Svanen märkta datorer
- L. har ni Energy Star maskiner också?
- J. ja, Svanen är en högre klassning kan man säga, Energy Star är det något som nästa alla datorer har, de här är både Energy Star och Svanen.
- L. Ok, ok
- J. det vi sen ser till och göra, det är ju att aktivera den typ av policy som man kan använda för nätverket, att en dator som står på men inte används går ner till ström spar läge, om det står ytterligare på ström spar läge då ska den stängas ner helt enkelt. Nyttjar man inte datorn då ska den dra så lite ström så möjligt.
- L. är det pga. miljötänkt eller pga. kostnadsbesparingstänkt?
- J. det är miljötänkt.
- L. det är miljötänkt.
- J. vi har hyran som vi betalar här som inkluderar strömmen.
- L. Ok
- J. vi har liksom ingen mening att dra ner på strömförbrukning, utan det är mer, tekniskt sätt så är det inget problem och göra. Då tycker vi att det är dumt och inte göra, man kan spara på energiförbrukning.
- L. Ja, ok
- J. Det handlar också väldigt mycket om att det vi gör hos kunderna, de kunder som vi sköter om deras klientplattformar, eller serverhallar eller liknande, därför försöker jag få kunderna till att tänka på de här bitarna, aktivera de här olika inställningarna och liknande som finns då.
- L. Mmm
- J. då känns det som om man har fått trovärdighet i det. Så ska man jobba själv på samma sätt också,
- L. Absolut
- J. själv ha en standard, att man själv jobbar på samma sätt helt enkelt.
- L. är det några lösningar som ni säljer till andra som ni har skapat hos er, försöker sälja in på något sätt inom detta, eller är det bara informellt som ni?
- J. det är så här att lösningarna, de tekniska lösningarna, det är såna som finns och har funnits länge, har man en, historiskt sätt om man tittar på en vanlig kund som inte jobbar med IT, utan har en annan kärnverksamhet, köper datorer och stoppar i dem ett nät och installerar applikationerna på dem och sen så börjar de jobba. De vet inte om vad man kan göra mer med den här datorn, ställa in

den så att den går ner i ström spar läge. Har man en skrivare t ex, det är det enklaste beskrivningen egentligen, har man en skrivare, så köper kunden oftast en skrivare som klarar av att skriva ut i färg och klarar av att skriva ut dubbelsidigt. Sen när man installerar utskriftskon till användarna så gör man det på det enklaste sättet. Man kör en standard installation, det gör det att alla användare när de sitter vid sin dator och trycker på utskriftsknappen, då kommer sidan ut i färg och enkelsidig. Det är det, dels kostar det mer och dels är det sämre för miljön.

L. absolut

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