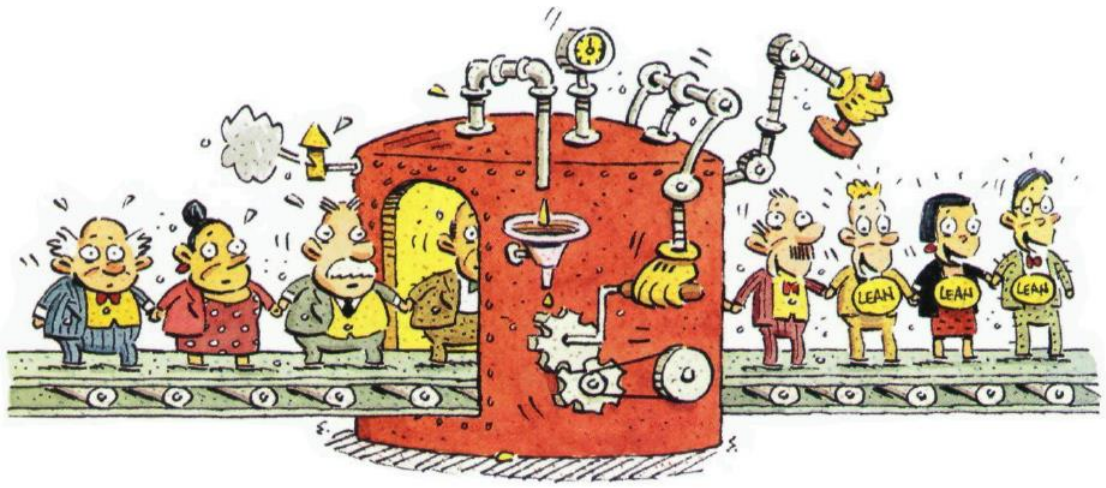
Brew new IT:
Lean in an IT environment

"What are critical success factors for continuous improvement in an IT process environment at HEINEKEN the Netherlands?"



NIEK BRUNNINKHUIS
UNIVERSITY OF TWENTE.

COLOPHON

Brew new IT: lean in an IT environment

"What are critical success factors for continuous improvement in an IT process environment at HEINEKEN the Netherlands?"

Author
Niek Brunninkhuis

E-mail
niekbrunninkhuis@outlook.com

Student number
s1123742

Study programme
Business Administrations: Information Management

Supervisors
Dr.ir. Ton Spil, University of Twente
Prof.dr. Jos van Hillegersberg, University of Twente
Matthijs Quak, MSc, external supervisor, HEINEKEN

PREFACE

After 7 months of work I can now truly say that my last university project has come to an end with this thesis as a result. These seven months where a rollercoaster sometimes, with in the beginning a total new environment, both at HEINEKEN and my living situation in the western part of the Netherlands. Nevertheless, I enjoyed these period.

The beginning of the process was tough, the practical side of my assignment at HEINEKEN proceeded laborious with a lot of discussing. After the first months the core team continuous improvement came up to speed, and I could speed up writing my thesis. I have to confess that writing this thesis would have been difficult without all the support and contributions I received.

Therefore, I would like to thank a few people in particular. Firstly, I would like to thank Matthijs Quak for providing supervision from HEINEKEN and giving me the opportunity to write my thesis at HEINEKEN. Your knowledge and enthusiasm about the subject were very helpful and enjoyable for me. Next, I want to thank Ton Spil and Jos van Hillegersberg for providing supervision from the university. You showed me the way through the process and, through your commitment, pushed me to reach my potential. Furthermore, I want to thank all the members of the continuous improvement core team where I have been working. Lastly I would like to thank my family for giving me support, not only during this last seven months, but throughout my entire student life. Finally, I thank Silke, my girlfriend, for always being there for me and cheering me up whenever I needed it.

Thanks everyone for the wonderful time and I wish you, Reader, much pleasure reading my thesis.

Niek Brunninkhuis
04-04-2013

SUMMARY

Continuous improvement has become a popular study topic in last decade, and the lean approach, outside the original manufacturing area, has received a great deal of attention. Organisations want to become better every day. Also HEINEKEN IT the Netherlands (IT HNL) realise that their role in the organisation is becoming increasingly important, and that the dependence on successful ICT processes is growing. In order to satisfy this important role IT HNL wants to continuously improve their environment according to the lean philosophy.

In this study we focus on critical success factors during a transformation from an IT environment to a lean IT environment and answer the main research question *"How, and under what circumstances, can continuous improvement (lean IT) within IT HEINEKEN the Netherlands have a positive impact on performance?"*

This study was conducted during an internship at HEINEKEN the Netherlands, this organisation offered us the opportunity to carry out an action research within their IT environment. In addition we have conducted a multiple case study for which we have selected five IT environments at different organisations to see how they transformed into (successful) lean IT environments. With this combination of a multiple case study and action research we were able to find answers to our research questions.

We have found that lean IT can have a positive impact on the performance of an IT environment. When an IT environment wants to become 'the learning organisation' it has to go through three time phases: (a) implementation, (b) operation, and (c) sustaining. To successfully grow in maturity during the three time phases an organisation has to know that: (1) lean in an IT environment differs from lean in other office environments, IT is more tacit (2) the start of lean IT has to be a conjunction of bottom-up and top-down, (3) a pro-active, positive role of top management regarding to lean IT is essential for success, (4) the lean IT team should be cross-functional, and a lean IT project improvement team should mainly exist of specialised employees, (5) all communication concerning lean IT should be transparent, and conducted as much as possible through visual management, and (6) an organisation should create an internal lean centre.

The action research combination with the multiple case study gave us insight into what the most important challenges are for IT HNL at this moment. HEINEKEN IT the Netherlands did well until today in the implementation phase and has to focus now on the role of the managers and (visual) communication to make sure that they will be successful in the future in their transformation to a successful lean IT environment. They should educate their managers according to the lean philosophy and principles; also they should introduce day sessions (15 min) and week sessions (30min – 1hour) in combination with day and week panels for visual management.

INDEX

INTRODUCTION 8
1.1 The need to improve 8
1.2 HEINEKEN the Netherlands 8
1.3 Problem description 8
1.4 Research questions 9
1.5 Structure of report 9
THEORETICAL BACKGROUND 11
2.1 Organisational learning and continuous improvement 11
2.1.1 History of continuous improvement 11
2.1.2 Definition of continuous improvement 12
2.1.3 Continuous improvement methodologies 12
2.1.4 Lean for continuous improvement 13
2.2 Lean implementation; operation; and sustaining 14
2.2.1 Bringing lean to the (IT) office 14
2.2.2 Achieving continuous improvement success 15
2.3 Lean in an IT environment 17
2.4 Lean enablers and barriers in an IT environment 20
2.4.1 Lean IT enablers and barriers during implementation phase 20
2.4.2 Lean IT enablers and barriers during operation phase 20
2.4.3 Lean IT enablers and barriers during sustaining phase 21
2.5 Interview framework 22
2.6 Summary and study objectives 22
RESEARCH METHODOLOGY 24
3.1 Research design 24
3.2 Data collection 25
3.2.1 Respondents 26
3.2.2 HEINEKEN IT the Netherlands 26
3.3 Measures 27
3.4 Data analysis 27
3.5 Summary 29

VIEW OF LEAN IT EXPERTS 30
4.1 Case I: Red 31
4.1.1 Implementation of Lean IT 31
4.1.2 Lean IT during operation 31
4.1.3 Lean IT on the long term 33
4.1.4 Conclusion/Summary 33
4.2 Case II: Blue 34
4.2.1 Implementation of Lean IT 34
4.2.2 Lean IT during operation 35
4.2.3 Lean IT on the long term 35
4.2.4 Summary 36
4.3 Case III: Black 37
4.3.1 Implementation of Lean IT 37
4.3.2 Lean IT during operation 37
4.3.3 Lean IT on the long term 38
4.3.4 Conclusion/Summary 38
4.4 Case IV: Orange 40
4.4.1 Implementation of Lean IT 40
4.4.2 Lean IT during operation 40
4.4.3 Lean IT on the long term 40
4.4.4 Conclusion/Summary 41
4.4 Case V: Green 42
4.5.1 Implementation of Lean IT 42
4.5.2 Lean IT during operation 42
4.5.3 Lean IT on the long term 42
4.5.4 Conclusion/Summary 43
4.6 Case VI: IT HEINEKEN Netherlands 44
4.6.1 Implementation of Lean IT 44
4.7 Summary / Conclusion 46
ANALYSIS 48
5.1 Explanatory effects matrix 48
5.1.1 Theorems 48
5.2 Discussing the success factors for lean IT 52

5.2.1 Success factors in the implementation phase 52
5.2.2 Success factors in the operation phase 53
5.2.3 Success factors in the sustaining phase 55
5.3 IT Heineken Netherlands 56
5.3.1 How can IT HNL become the learning organisation 56
CONCLUSION & DISCUSSION: LEAN IT AT IT HEINEKEN THE NETHERLANDS 58
6.1 Conclusion 58
6.1.1 Main findings 58
6.2 IT HEINEKEN the Netherlands: practical implications and managerial recommendations 59
6.2.1 Role of the managers 59
6.2.2 (Visual) communication 59
6.2.3 Recommendations for IT HEINEKEN the Netherlands 60
6.3 Discussion 60
6.3.1 Research limitations 60
6.3.2 Suggestions for future research 61
REFERENCES 62
APPENDIX A: Different CI methodologies explained 64
APPENDIX B: Description of the five lean principles 65
APPENDIX C: key routines associated with CI 66
APPENDIX D: Interview questions 68
APPENDIX E: Standard matrix for records for lean IT at IT HNL (action research) 70
APPENDIX F: Case studies 72

INTRODUCTION

1.1 The need to improve

Continuous Improvement is a topic that has gained an increasing amount of interest in the last decade in the academic literature. The lean approach has spread from the manufacturing area, where it has its roots, into other industries (Bortolotti & Romano, 2012; Chen & Cox, 2012; Nicoletti, 2011; Staats & Upton, 2011). An increasing number of organisations have seen or experienced the advantages of lean, for example the St Jansdal hospital in Harderwijk, where they have become more efficient through the lean principles and also are nominated as 'Leukste ziekenhuis om bij te werken' (Nu.nl, 2011). Is this improvement in efficiency and overall improvement of the workplace also possible for the IT environment at HEINEKEN the Netherlands, and how might this be possible?

In this chapter we first will highlight the specific setting, IT HEINEKEN Netherlands, where we have completed our study. Furthermore in this chapter we introduce the study by describing the background, objective, problem description and research question. This is subsequently followed by the research approach, relevance and the structure of the thesis.

1.2 HEINEKEN the Netherlands

Virtually everyone in the world knows the brand HEINEKEN. Where everyone almost immediately thinks of (drinking) beer, only a few think about the process behind brewing this famous beer. IT HEINEKEN the Netherlands (IT HNL) is the IT environment that delivers the ICT services to whole of HEINEKEN the Netherlands (HNL), both for: projects with an IT component and for operational IT services. The employees of IT HNL realize that their role in the organisation is becoming increasingly important, and that this dependence on successful ICT processes is growing. In order to fulfil this important role, IT HNL wants to continuously improve their environment.

1.3 Problem description

The IT environment of HNL is broadly unfamiliar with the principles of continuous improvement (CI). However, as CI had been marked as a key IT initiative for 2012 by the management board, employees on the floor of IT HNL were then expected to make CI part of their daily business. As described briefly above, lean is originally a manufacturing CI method, nevertheless the management board of IT HNL selected lean (IT) as the methodology to be used. As CI and thus lean IT, are both new for IT HNL, the management board want clear

insight into CI in general, and specifically into the lean IT approach. The question from the management board is how lean can be successful at IT HNL IT.

IT HNL wants to use this research as an eye-opener to how they can use lean IT in their environment. The critical success factors and best practices relating to lean IT can be used as guidelines during the implementation, operation and sustaining phases at IT HNL, which will hopefully result in a flawless implementation of lean IT at IT HNL. This research is also a valuable contribution to the scientific literature as it tries to understand and describe the little-studied topic of lean IT.

1.4 Research questions

As IT HNL wants to know how they can be successful in CI the following central research question has been defined:

"How, and under what circumstances, can continuous improvement (lean IT) within IT HEINEKEN the Netherlands have a positive impact on performance?"

To answer this research question, four sub-questions should be addressed:

1. What is a) continuous improvement, b) lean?
2. What can be found in the literature about using lean in an office/ IT environment, and what are the critical success factors during the implementation, operation and sustaining phases?
3. How do other organisations use lean for continuous improvement in their daily IT processes? How does HEINEKEN differ?
4. How should IT HEINEKEN the Netherlands make use of these critical success factors for lean IT to optimally run their IT environment?

To answer the above-mentioned questions, this research takes the form of an explanatory multiple case study in combination with action research. We will elaborate on and discuss this approach in chapter three.

1.5 Structure of report

This chapter, chapter one, introduces the research. The company (HEINEKEN the Netherlands) where the research was executed is briefly presented, followed by the problem description and research questions. In chapter two a theoretical background is provided, first CI is discussed in general and then the lean methodology is addressed specifically. This is

done by presenting citations from scientific articles and books. In the following section we highlight the methodology used. Chapter four consists of the case studies carried out at the different organisations and gives insight into the current situation at IT HNL. In chapter five an analysis of the cases is conducted. Chapter six presents the conclusion, including the answers to the main research question and a recommendation to IT HNL. Finally we contribute to the further discussion of the topic by presenting limitations of this research and possible options for further research on this topic.

In the diagram below (figure 1) a graphic overview of the research questions answered in this report is represented.

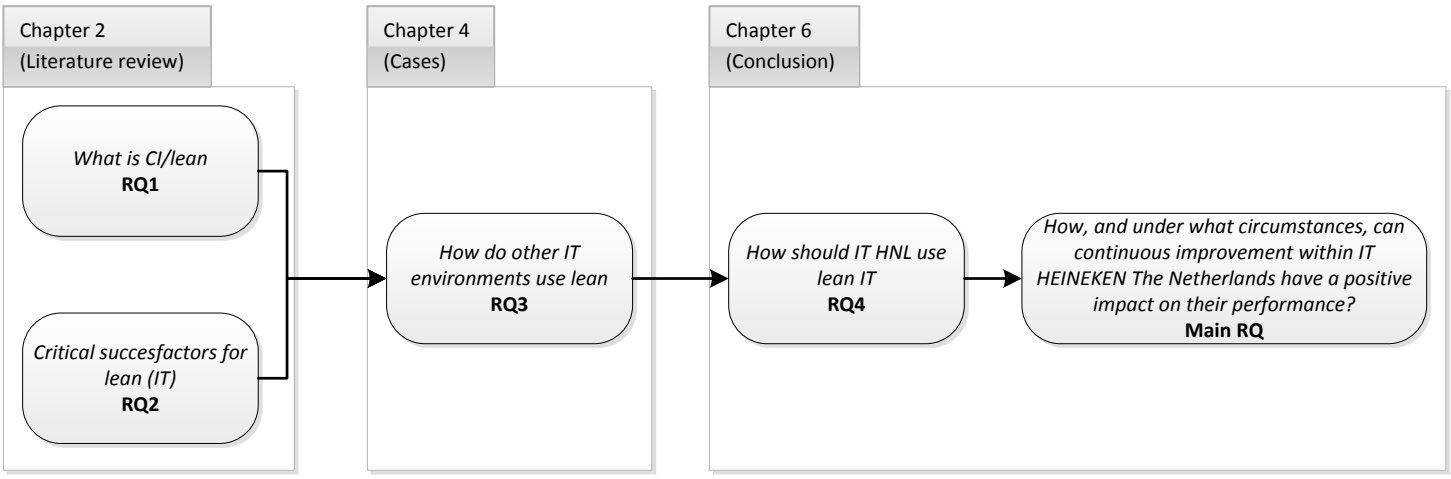


Figure 1: overview of the where research questions are represented

THEORETICAL BACKGROUND

At the beginning of this chapter Continuous Improvement (CI) principles are explained, followed by a more detailed explanation of lean (IT).

2.1 Organisational learning and continuous improvement

To compete in the modern market and deal with turbulent business environments, an organisation's ability to learn is becoming a key factor for becoming successful and remaining successful. Levitt and March (1988) state that through organisational learning performance can be improved, and that today most organisations do try to learn and improve their organisation, but not all succeed. "Organisational learning is achievable when the transfer of individual knowledge occurs through social interactions to different groups of individuals as a result of a shared interpretation. In turn, the accumulated knowledge allows individuals to learn from the organisation, thus generating an on-going, two-way process of knowledge transfer among individuals, groups, and the organisation" (Santos-Vijande, Lopez-Sanchez, & Trespalacios, 2012). It is not easy to achieve the above-mentioned level of organisational learning, therefore organisations and their employees have to start with recognizing errors and resolving them. Reaching this is already hard enough. Argyris (1977) observed the phenomenon that if people often work for a long time in an organisation in a specific job, they do not see the errors anymore. They have reached the mind-set that it is part of normal organisational life. It is hard to recognize the errors in an organisation, thus learning and improving the company is even harder. Therefore, to constantly learn and improve within the organisation several continuous improvement (CI) methodologies can be used.

2.1.1 History of continuous improvement

The origin of CI goes far back. Bhuiyan and Baghel (2005) traced the basics of today's CI principles back to the 1800s. A considerable time later, after the Second World War, the Japanese developed CI ideas into a management tool for on-going improvement affecting all parts in an organisation.

Over the decades more and more CI methodologies have been developed for process and/or quality improvement. Jha, Noori, and Michela (1996) describe that with the increasing competitive challenges, and the rising accountability and performance expectations placed on organisations they try more and more to reduce waste and work more efficiently. By this force for improvement business environments became more

complex day by day, Anand, Ward, Tatikonda, and Schilling (2009) state that organisations do not compete on processes nowadays, but on the ability to constantly improve these business processes.

2.1.2 Definition of continuous improvement

There are several definitions of CI. To give some insight we will mention and discuss the two most applicable definitions for us here. First, the CI definition of Anand et al. (2009), defines CI as a systematic effort to seek out and apply new ways of doing work, and this process improvement involves organisational learning to make changes in operating routines. The interesting part is how organisations get that systematic effort in the routine of employees daily work, and even more in their organisational culture. Another definition of CI is getting the right things, to the right place, at the right time, in the right quantity while minimizing waste and being flexible and open to change (Womack & Jones, 2003). It provides a way to do more and more with less and less; less human effort, less equipment, less time and less space while coming closer to providing customers exactly what they want. From this definition we would like to highlight the waste and customer aspect: no organisation wants waste in their processes, but why is the waste then still there? And what role does the customer play in the route to create an optimal process in an organisational environment? In this study, a combination of several definitions is most applicable: CI is the elimination of waste in all systems and processes of an (IT) organisation by all the employees, all day for the benefit of the customer. The challenges for IT HNL are in 'waste' and 'by all the employees'. 'All the employees' means executives in the strategic level, (team) managers in the tactical level, and workers in the operational level.

2.1.3 Continuous improvement methodologies

As the need to constantly improve grew within organisations over the decades, the number of CI methodologies grew along with this need. The most frequently mentioned CI methodologies are lean manufacturing, (lean) six sigma, total quality management (TQM), and the balanced scorecard. These were all based on the concept of process improvement, reduce waste, simplify the production line and improve quality. The above-mentioned methodologies will be briefly examined in appendix A to give an impression of CI possibilities.

IT Heineken Nederland (ITHNL) has made the choice for lean (IT). This choice is based on elements lean touches in an organisation: the management board wants motivated employees, improved processes and better financial results. They first want the lean

principles to be used by the employees in the IT environment, thereafter eyes will be on the six sigma part.

Therefore, this thesis focuses on lean in an IT environment. Lean IT differs emphatically from lean manufacturing. When we study lean manufacturing we speak more of a manual work, for lean IT we speak of knowledge work (Drucker, 1999). The next paragraph is dedicated to lean as it is important to understand the basics of the lean methodology.

2.1.4 Lean for continuous improvement

In paragraph 2.1.3 we briefly highlighted lean, and this section goes more in-depth into this methodology. The history of the lean manufacturing principles goes back to the 1950s, when the Japanese company Toyota used it in their production line for cars (Zangwill & Kantor, 1998). Using the lean manufacturing principles it was possible for Toyota to achieve higher levels of productivity and quality. In the late 1980s it was even so that the output per worker at Toyota was two or three times higher than at European or U.S. plants (Cusumano, 1994). Based on the successful principles of Toyota many organisations in the 1990s applied a form of lean management for quality and/or process improvement to their daily processes. (Bhuiyan & Baghel, 2005; Bruun & Mefford, 2004).

In their book 'Lean Thinking' Womack and Jones (2003) mention the five lean principles where i.a. Toyota build their work philosophy on: (1) Value; (2) The Value Stream; (3) Flow; (4) Pull; (5) Perfection. These five principles are the foundation of the lean idea. A complete description of these principles can be found in appendix B.

Although it is difficult to define most wastes in offices, organisations nowadays try to apply the lean manufacturing methodology in their knowledge based environment. One can see bottles breakage in the manufacturing industry, but wastes are much more difficult to see in offices. Applying lean principles in an (IT) office environment is therefore not easy, and it is not possible to just copy successful tools and methods from the manufacturing industry. Where it is possible to see all pieces in a process in manufacturing and how they fit together, processes and their connections in lean (IT) offices are often invisible, and task uncertainty is high (Staats, Brunner, & Upton, 2011).

> *"Think about your own workplace. How many e-mails clutter your in-box because someone cc'd you unnecessarily? How long did you have to wait to start a regularly scheduled meeting because attendees slowly trickled in? How many reports are created that nobody reads?" (Staats & Upton, 2011)*

2.2 Lean implementation; operation; and sustaining

2.2.1 Bringing lean to the (IT) office

Bringing lean into the (IT) office is more difficult than a bringing lean into a manufacturing area. Processes are fundamentally different in these two settings (Bortolotti, Romano, & Nicoletti, 2010; Chen & Cox, 2012; Nicoletti, 2011). Nevertheless, some office environments have brought lean into the (IT) office and are successful nowadays. Bessant, Caffyn, and Gallagher (2001) studied lean, and they described how to realize the transformation from a normal office environment to a lean office environment. To prevent the mind-set that CI and thus lean is just a single activity they try to explain that CI involves a suite of behaviours which evolve over time, rather than that is a single activity. To realise the transformation the organisation culture, and therefore the routines of employees, have to change most of the time. Through inter-alia training, structures, tools, and procedures it is possible to develop and reinforce the behaviours and routines of employees. It is a lengthy learning process. Bessant et al. (2001) suggest three levels of CI: 1) learning; 2) practising; and then 3) mastering the behaviours. Organisations can classify themselves, and see in which 'stage' they are currently in.

Bessant et al. (2001) list eight key abilities associated with these three levels of CI, namely: understanding CI; supporting CI; getting the CI habit; focussing CI; aligning CI; CI across boundaries; CI of CI; and learning organisation. An extensive description of these abilities is shown in appendix C. If we examine the table shown in appendix C and discuss the three levels of CI we can conclude that organisations have three levels, so time phases on the way to create 'the learning organisation' wherein employees learn from their experiences and seek out opportunities for learning. To become 'the learning organisation' organisations have to start with an *implementation* (learning) phase, thereafter the *operation* (practising) phase take place and finally they get into the *sustaining* (mastering) phase (Bessant et al., 2001).

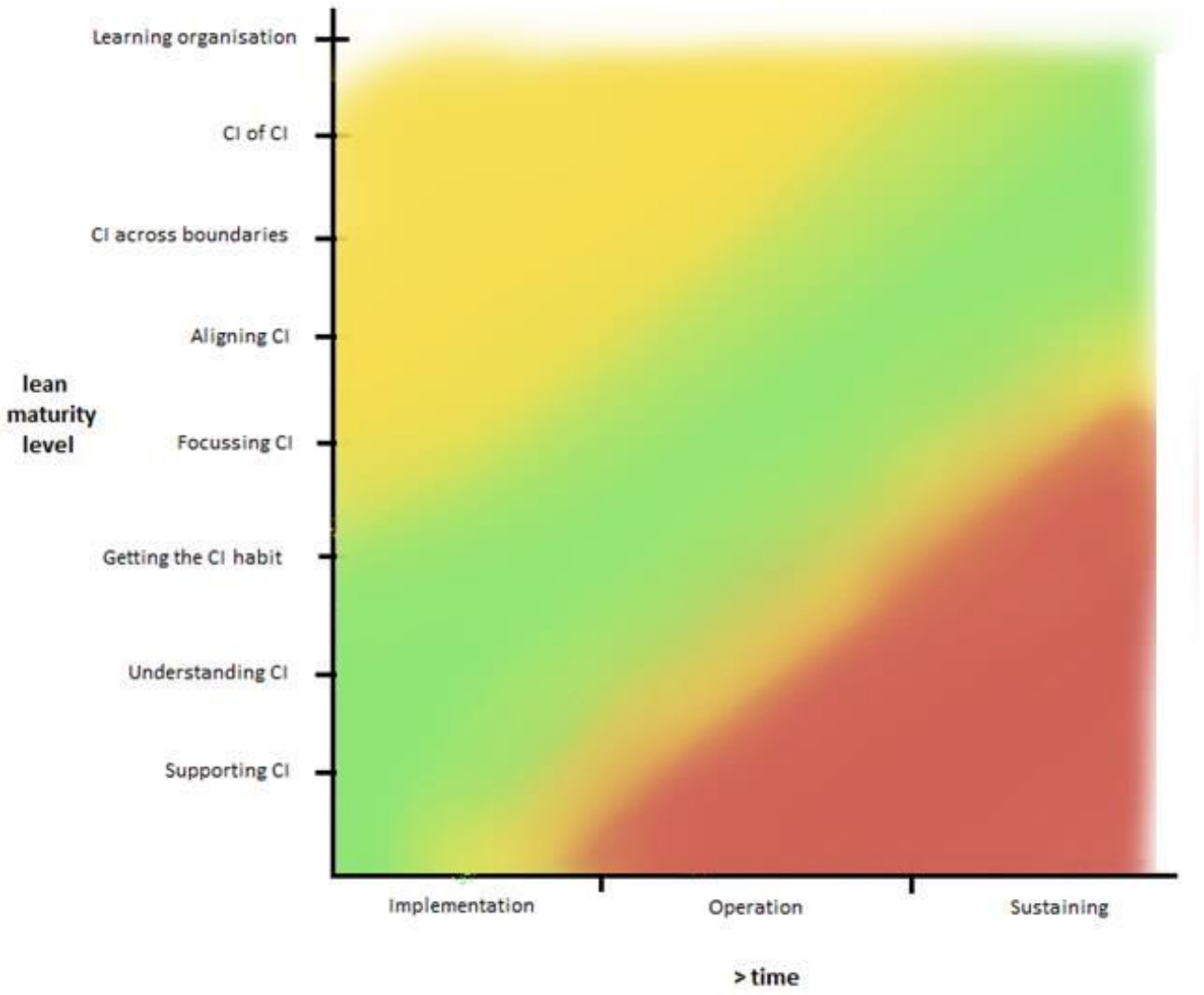


Figure 2: Lean maturity model

In figure 2 the several lean maturity levels (abilities) are shown (see the vertical axis) during the three levels/time phases (see the horizontal axis). Organisations can rank themselves in this lean maturity model. The challenge for organisations is how to move through these time phases successfully, next section tries to identify how to be successful during these phases.

2.2.2 Achieving continuous improvement success

The previous paragraph mentioned the three time phases, and this paragraph takes a critical look at how organisations and employees should act to achieve success in these three time phases.

By discussing how to be successful in the three time phases, we will start with success factors described by Bhuiyan and Baghel (2005). Their vision on CI is a culture of sustained

improvement targeting the elimination of waste in all systems and processes of an organisation. They created a set of ten generic CI behaviours for organisations to reach their vision, these behaviours have been listed as success factors for CI in organisations of all types and sizes (table 1).

Table 1: success factors for CI in organisations of all types and sizes

Success factors of CI in organisations.	
(1)	employee demonstrates awareness and understanding of the organisation's aims and objectives;
(2)	individual groups use the organisation's strategic goals and objectives to focus and prioritize their improvement activity;
(3)	the enabling mechanisms (e.g. training, teamwork) used to encourage involvement in CI are monitored and developed;
(4)	ongoing assessment ensures that the organisation's structure, systems and procedures, and the approach and mechanism used to develop CI, constantly reinforce and support each other;
(5)	managers at all levels display active commitment to, and leadership of, CI;
(6)	throughout the organisation people engage proactively in incremental improvement;
(7)	there is effective working across internal and external boundaries at all levels;
(8)	people learn from their own and from other's experience, both positive and negative;
(9)	the learning of individuals and groups is captured and deployed; and
(10)	people are guided by a shared set of cultural value underpinning CI as they go about their everyday work.

We can divide these success factors into the three time phases. Numbers 1,3 and 5 belong to the implementation phase, numbers 2,6, 7 and 8 belong to the operation phase, and numbers 4, 9 and 10 belong to the sustaining phase.

Continuing on to success factors Jha et al. (1996) listed a number of success factors for CI, separated into leadership; corporate culture; employee attitudes; training; and planning

& execution. These success factors are in line with the ten success factors compiled by Bhuiyan and Baghel (2005).

Another study by Anand et al. (2009) attempted to identify the crucial decision areas to create an effective organisational infrastructure for CI. These decision areas are purpose; process; and people, and management decision in these categories have impact on the *sustainability* of CI.

The last study to mention in this paragraph is from Bessant, Caffyn, Gilbert, Harding, and Webb (1994). This is an important study to mention because their study was on CI and how to be successful in the long term, how CI should be managed *after the implementation*. As several authors mentioned, also this study of Bessant et al. (1994), they prescribes clear targets and communication about CI (targets) across the whole organisation. Without clear communication employees do not see progress and/or results and become demotivated. In this the management plays an important role, and not just at the start of the CI initiative rather, commitment of the management maintains long-term steering and guiding of the CI program. CI needs to be managed as a process rather than as a single event (Bessant et al., 1994). Another point mentioned by Bessant et al. (1994) which starts in the *implementation phase* is that CI needs an underlying supportive culture, and this involves having a positive attitude towards mistakes instead of punishing workers for mistakes. In addition making use of supporting tools will assist in enabling CI in the organisation and help to tackle complex and difficult problems.

We must point out that there is no blueprint for the right organisational form for CI (Bessant et al., 2001); organisations have to find a match between the CI program and their organisation form. For both, loosely and tightly structured organic organisations are successful CI examples. Since there is no universal blueprint for all organisations, we look in the next paragraph at comparable studies in an (IT) office environment. Then success factors and barriers for lean IT are discussed.

2.3 Lean in an IT environment

In 2.1.4 we examined lean in general, and in this paragraph a critical look is taken on what has been studied about lean in an IT environment.

There are almost no scientific articles on the study topic which are applicable for us. To provide a first impression about lean IT, we will first use some professional literature to

make lean IT tangible, followed by scientific literature. In practice, lean is used in IT more and more, often in customer-oriented processes but also for general IT-services and IT-management (Liefers, 2011). Lean IT means using lean principles for the purpose of improved/better IT environment processes. Just as there is waste in manufacturing, there are wastes also in IT. Table 2 gives an overview of the seven wastes defined by lean with examples for manufacturing and IT.

Table 2: Seven lean wastes, examples for manufacturing and IT

Kind of waste	**Manufacturing**	**IT**
Transport	Unnecessary material movement	Data on different locations
Inventory	Large batch size	Data storage
Motion	Transferring parts from one hand to another	Change request
Waiting	Defect machine	Slow e-mail
Overproduction	Storage of material	Double data
Over-processing	Over controlling	Too detailed request forms
Defects	Incorrect product information	Intranet breakdown

Poor customer service, miscommunication, increased costs, lost productivity, low job satisfaction are for example just a couple of de business outcomes of the IT wastes show in column three in table two. For IT, the customers are the users of the applications and/or services, in our case of IT HNL, the employees of HEINEKEN that make use of these applications and/or services. Another point of attention for lean IT is that business services cross organisational boundaries, this can be a problem when different management tools and methods are used in the organisation (Waterhouse, 2008).

Next section discusses the most applicable scientific literature relating to our study. As in manufacturing there is a common way and understanding of how to make work lean, in knowledge work this is not the case. IT HNL facilitates the ICT services for the whole of HNL, and strives to apply IT in such a way that it contributes to optimal HNL business results. The processes and work activities performed by the IT HNL department can be seen as knowledge work. In a recent study, Staats and Upton (2011) made the switch from lean

manufacturing to lean knowledge work, where knowledge work stands for the service processes within Wipro. However, many people in the business world believe that the lean principles are not useful in an office environment and previous attempts to apply lean in knowledge work indicated that it is indeed very difficult (Chen & Cox, 2012; Staats & Upton, 2011), Staats and Upton (2011) produced a 'roadmap'. The authors describe how to make knowledge work lean. They prescribe six principles: (1) continually root out all waste; (2) strive to make tacit knowledge explicit; (3) specify how workers should communicate; (4) use the scientific method to solve problems quickly; (5) recognize that a lean system is a work in progress; and (6) have leaders blaze the trial. Translating this to IT, we can conclude that all six principles are valid for IT, where point two needs further attention. Work in IT is even more tacit than in other knowledge work environments (Hurwitz, 2009), how can we visualise this tacit knowledge and make it more explicit?

In line with Staats and Upton (2011) Chen and Cox (2012) did a case study of value stream management for a lean office, and as a result of their case study they provide a systematic procedure that ensures that organisations and people involved in lean office better understand the benefits of lean and how to start, this increases chance of success. The six steps they present is shown in figure 3.

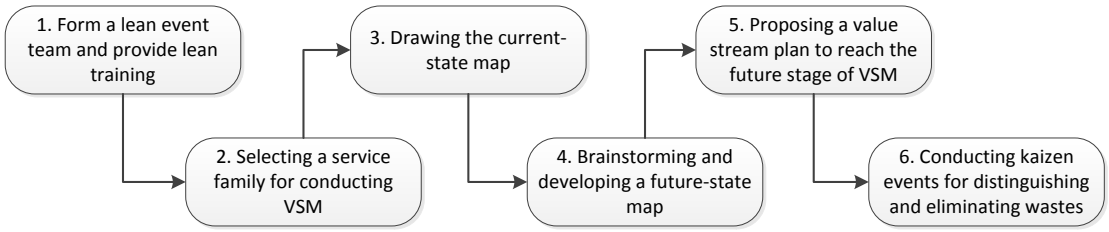


Figure 3: Systematic procedure to conduct lean events in office environments

The 'roadmap' from Staats and Upton (2011) describes how to transform into an office with a lean culture through employees behaviour, the purpose of Chen and Cox (2012) is also to create a lean environment. However, their six step approach tries to reach a lean culture by primarily focussing on improvement projects instead of on employees' behaviour. When doing an improvement project in IT step two from the six steps presented in figure three is an interesting one. In IT you have service families like 'change management' or 'incident management', these service families are too large to improve in the beginning, as one on the success factors is to start small. The lean team, mentioned in point one in the six steps, has

to be aware of this. They have to choose a smaller service family than change or incident management, or a tangible part of these service families.

One thing we could see in both approaches is that implementing lean in an IT environment is not just a one-step process. Creating a lean IT environment is a step-by-step process, and employees and stakeholders from the entire IT environment are needed. It is very hard, almost impossible, to create a lean IT environment right the first time, it is a learning process and it will take years to build (Nicoletti, 2011; Staats & Upton, 2011). Therefore, the next section will examine enablers and barriers for the best use of lean in an IT environment during the three time phases.

2.4 Lean enablers and barriers in an IT environment

First, this paragraph describes the enablers and barriers during the implementation phase (§2.4.1), then the operation phase (§2.4.2) and finally the sustaining phase (§2.4.3).

2.4.1 Lean IT enablers and barriers during implementation phase

The first step for a successful implementation, operation and to sustain lean in an IT environment is creating a *lean IT team* (Bortolotti & Romano, 2012; Chen & Cox, 2012; Nicoletti, 2011). The lean IT team should consist of employees with different backgrounds in the IT organisation. If questions arise among employees, this team can serve as a point of contact. Staats and Upton (2011) and Nicoletti (2011) discussed the importance of communication. *Proper communication* is needed for successful lean IT, the lean team should structure the communication regarding the lean project. They have to define who is communicating what to whom. Through proper communication a shared understanding can be created, all the employees feel involved in the improvement process. This support from the IT employees is, together with support from the IT management board, fundamental for success (Bortolotti & Romano, 2012; Staats & Upton, 2011).

One barrier that comes into play every time-phase is the *resistance* of IT employees, they simply do not want to change. They have no idea of the amount of inefficiency in their daily jobs and are sceptical towards changes because of mistrust in management, or lack of confidence in them (Staats & Upton, 2011).

2.4.2 Lean IT enablers and barriers during operation phase

Support is an important aspect in the operation phase. Thus an important role in the operation phase is reserved for the IT managers in the organisation, they must motivate their teams and take a role as ambassador of lean IT. Another way to get *support* from your IT employees is showing results (Nicoletti, 2011): if employees see the impact of lean IT, or a

certain improvement process, they feel triggered to be part of lean IT. Not every waste in the IT environment is equally suitable for improvement, therefore everyone in the IT organisation should *look for wastes* and put these forward. That applies not only to the big wastes in the IT organisation, but also to the small ones (Staats & Upton, 2011). The IT organisation can help their employees with this, teach them to ask constantly 'why?' when they are doing a task a specific way. This tool is called the five whys, and it helps employees to see how much wastes there are surround them. Also, in the white paper on lean IT Hurwitz (2009) described that managers in an IT environment require visual management systems to manage successful. With these required systems the managers should get insight into the performance and utilization. Besides that, every employee must be a part of lean IT and, the role of every employee in the organisation must be clear. Many jobs in IT are unstructured and broad, 'work' is often done inside the heads of employees. By looking for repeatable parts and by keeping studying the 'tacit' work in the IT organisation roles can be made clear. *Task specification*, who does what and why they are doing that task, results in fewer defects, less rework and improved productivity (Staats et al., 2011).

Most barriers discussed in the literature pertain to the operation phase. Organisations have to be aware of the *customer demands* when they execute improvements through the lean IT principles, since without customer demands you create a blurred or even completely wrong future state of the improvement (Bortolotti et al., 2010; Chen & Cox, 2012; Nicoletti, 2011; Staats & Upton, 2011). Customers of IT are the employees that use IT applications and/or IT services. Another barrier belongs to employee behaviour. Where the lean IT overall goal is in organisational interest, employees are also *focussed on their own success* (Nicoletti, 2011). The last barrier in this phase is related to stakeholders and customers, however they are very important in lean IT they are also a barrier. They often have a solution their mind as outcome of an improvement process and want to push to this solution (Nicoletti, 2011), the lean team and managers should be wary of these *visionaries*.

2.4.3 Lean IT enablers and barriers during sustaining phase

The last phase is operation. The most important enabler found in literature is *monitor the process.* By monitoring and visualising the process employees can see how improvement processes are related to each other and which team and/or employee is responsible. Having an overview and codifying the lessons learned can be seen as step five (perfection) from the original lean principles. Other enablers are perform on-going assessments and reviews.

The barrier for the sustaining phase is 'losing' the lean principles in the daily work of employees, therefore employees in the IT environment have to communicate about what they are doing everyday again and again, and they should look for improvements and recurring tasks in their jobs.

2.5 Interview framework

An overview of the above discussed general lean literature with success factors and specific lean IT enablers and lean IT barriers is shown in table 3.

Table 3: overview of enablers and barriers for lean (IT) in implementation- (1); operation- (2); and sustaining phase (3)

Enablers	**Barriers**
Create a lean IT team (1)	Resistance of IT employees (1;2)
Proper communication among IT employees in and between teams (1;2)	Employees own success (2)
Commitment from IT management board (1)	Customer demands (2)
Support; Training (1;2)	Visionaries (2)
Task/job specification, IT is tacit (2)	Knowledge work, IT knowledge is difficult to transfer to another person (1;2;3)
Show results (2)	
Monitor the process (3)	
Proper selection of wastes, do not take large IT service families like change management in the beginning (1;2; 3)	
On-going assessments (3)	

These findings are used to formulate a large part (13 out of 18) of the interview questions. The compiled interview questions are allocated to general lean IT questions, or question concerning the enablers and barriers in the implementation phase, operation phase, or sustaining phase during a transformation to create a lean culture in an IT environment. The questionnaire can be found in appendix D.

2.6 Summary and study objectives

In this chapter we gave an overview of theory available on continuous improvement in general and specifically in lean (IT) applicable to our study.

We started with focussing on CI in general. We covered the definition of CI, the history of CI and the different methodologies that have been developed, as well as how to achieve CI success. In section 2.2 we described how organisations use lean for CI, pointed out that the main focus points of lean are during the three time phases, and how organisations can be successful in each of them. The next step was to link to the IT environment, lean IT. We elaborate on lean offices to get an impression of what lean IT will be in the situation of IT HNL. In 2.4.3 we have tried to list and discuss enablers and barriers for lean IT during the three time phases, and the last part gives insight into the basis of the interview framework.

At this moment we can state that the transformation into a lean IT office has to go through three time phases within the organisation to achieve overall success: 1) implementation phase; 2) operation phase; and 3) sustaining phase. CI and thus lean IT in these time phases within the organisation must grow in maturity (abilities) over time, with the ultimate lean maturity level 'learning organisation' as the goal.

In the following chapter the research methodology is explained, including which method is used, how data is collected and analysed, and how this data will lead to reliable answers on the research question.

RESEARCH METHODOLOGY

The research methodology has been mentioned briefly in chapter one. In this section, the methodology is explained in more detail.

Social sciences can be classified into several disciplines, and the topic of this study fall into the discipline *economics*, as the science of firms, markets, and economics. To create scientific knowledge laws and theories are needed to explain a phenomenon or behaviour, in our case critical success factors. Bhattacherjee (2012) state that logic (theory) and evidence (observations) are the, two and only two, pillars upon which scientific knowledge is based. As the purpose of this scientific research is to explain how to be successful, this study is of the explanatory type. We identify critical success factors that can be adopted by the organisation. In the following sections the method, design, collection and analysis are described.

In the next section, the methodology will be further discussed, and certain research methodology choices will be explained.

3.1 Research design

The choice for a particular research design is an important one, as the research design is a blueprint for fulfilling the research objectives and answering the research questions (Bhattacherjee, 2012). In his book, Bhattacherjee (2012) lists seven popular research designs, being: experimental studies, field surveys, secondary data analysis, case research, focus group research, action research and ethnography. As for which design was most applicable for our research questions, we discussed the options and concluded that the case research design fits best in combination with an action research. Yin (2008) states that every case study has a diverse set of possible audiences, in our case this is the thesis committee, IT HNL and other interested parties. This case study serves all audiences.

This study partly takes the form of what Yin (2008) describes as a multiple case report, the different cases will be presented as separated paragraphs in chapter four. Additionally, this study takes the form of action research, and action research is a work in progress. It seeks to bring together action and reflection, theory and practice (Brydon-Miller, Greenwood, & Maguire, 2003). This is what we were doing by collecting data from the case study, and apply this received data/knowledge at IT HNL during action research. Bhattacherjee (2012) describes action research: 'In this method, the researcher is usually a consultant or an organisational member embedded within a social context such as an

organisation, who initiates an action such as new organisational procedures or new technologies, in response to a real problem such as declining profitability or operational bottlenecks.' In our research design we were the 'organisational member or consultant' who was observed the results.

3.2 Data collection

In case research, multiple methods of data collection are possible, like interviews, observations, using pre-recorded documents, and using secondary data (Bhattacherjee, 2012). In action research, participant observation is the main data collection method. Data collection techniques we used in our study are interviews, documents, and (participant) observations. As interviews are the primary manner of collecting data for a multiple case study, and participant observation is the primary manner of collecting data for action research our findings were mainly based on these two. In the following section the three techniques will be discussed.

Since the primary mode of data collection in case study is *interviews*, an interview protocol should be designed to guide the interview process(Bhattacherjee, 2012). The most typical form of interviewing is used: *face-to-face interview.* There are three basic styles of interviews: 1) the structured interview; 2) the semi-structured interview; and 3) the unstructured interview. Based upon the fact that the study is explorative, and we wanted to give ourselves and the respondents the chance to elaborate on questions, the *semi-structured interviews* has been chosen. This combination of *face-to-face and semi-structured interview* offers the advantage to clarify issues, or to ask probing or follow-up questions.

The primary mode of data collection in action research is *participant observation*. To enable participation, we were included for seven months in the 'continuous improvement core team', which was a part of and composite within the IT environment.

The second source of collecting data is *documents.* Documents were used in the multiple case study and action research. For the action research, internal documents about the IT environment at IT HNL were studied and discussed with an internal expert and the CI core team. In advance of the interviews, available information about the interviewee and the organisation he/she works for was reviewed. This was done by using the organisation's website, the profile of the interviewee on LinkedIn (assuming that it was available), presentations and brochures sent by the company, and/or articles. Documents provided

and/or referred to during the interview were reviewed as well. The documents can serve to supplement and validate interview data (Bhattacherjee, 2012).

Direct observations are the third method of gathering data for the multiple case study. As the interviews were held at the different organisations, we were able to observe the way work was structured and carried out. For us specific this can be the (IT)-tools used for CI, overall this observation helped to understand the answers the interviewee gives.

3.2.1 Respondents

Interviews were held at five different organisations with respondents from various organisational levels (see table 4) and in different positions, in an effort to obtain divergent perspectives of success factors in CI (chapter 4). Organisations with different sized IT environments were chosen, ranging from smaller IT environments like IT HNL (+/- 100 employees) to large IT environments (+/- 2000 employees). This choice has been made because the bigger organisations used in this research are more experienced in the use of lean IT, and can therefore give us a more complete picture of lean in an IT environment. The respondents that were interviewed are personally involved with CI, and are able to answer accurately and adequately. The interviews were recorded, with the permission of the respondents.

Table 4: overview of the organisations/interviewees

Organisation	Sector	Function interviewee	Date
Orange	Consulting industry	Lean six sigma consultant	12-10-2012
Blue	Government	Lean IT coach	02-11-2012
Red	Finance industry	Lean IT consultant	14-11-2012
Green	High-tech industry	IT Manager Business Process Improvement	26-11-2012
Black	Insurance industry	Lean division manager	07-01-1013

3.2.2 HEINEKEN IT the Netherlands

The action research with participant observation at IT HNL started on Monday 18th of June 2012 and ended on Friday 8th of February 2013. With the input coming from the case study actions were set out at the IT environment of HNL. We were working together with 10 employees of IT HNL who participated in the CI core team. In this period of approximately seven months a session with the CI core team was held every two weeks, with a total of 19 CI

sessions. Also three sessions were held with the IT management board. During these seven months we were the protagonists and driving force of lean IT at HNL. In the last month, an improvement project at IT HNL was started with help of an external consultant, and a process was improved according to the lean IT principles, involving not only the employees of the CI core team but also regular employees of IT HNL. An overview of important points and key decisions is shown in table 5. The first successes of the action research are discussed in paragraph 4.6.

Table 5: overview of important points and key decisions

Date	Point/decision
18-06-2012	Start of observation
20-06-2012	First CI session
07-12-2012	Hired external consultant
03-01-2013	Start improvement project
08-02-2013	End of observation

3.3 Measures

The compiled interview questions are allocated to the categories of general lean IT questions, or questions concerning the enablers and barriers in the implementation phase, operation phase, or sustaining phase (figure 5) during a transformation to create a lean culture in an IT environment. The questionnaire can be found in appendix D.

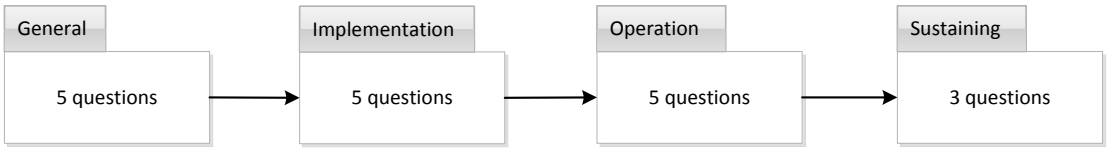


Figure 5: distribution of the interview questions

The CI sessions, documents and remaining participant observations were used to gain insight into the current situation at IT HNL and how IT HNL specifically is transforming to a learning organisation.

3.4 Data analysis

Once the data is collected concerning the case study, it must be analysed in order to make it valuable. Analysing qualitative data is 'sense making' or understanding a phenomenon,

rather than predicting or explaining (Bhattacherjee, 2012). In our study we make use of the general view of qualitative data analysis explained by Miles and Huberman (1994). Data reduction, data display, and conclusion drawing/verification are the three current flows of activity we need for our analysis of the interviews. In the next paragraphs, these three are briefly discussed.

"*Data reduction* is a form of analysis that sharpens, sorts, focuses, discards, and organizes data in such a way that 'final' conclusions can be drawn and verified" (Miles & Huberman, 1994). From the presented methods related to data reduction we chose session summary sheet and memoing for our research. The session summary sheet is a one-page summary listing the most important findings gathered during the interview session, memoing is a way to capture remarks, intuition, etc.; memoing includes more than data.

The second major flow is *data display.* As hundreds of unstructured text pages are difficult and time-consuming to analyse, Miles and Huberman (1994) suggest the use of matrices, graphs, charts, and networks to display the data. In our study we use matrices for summarizing (session summary sheet) and comparing the different case settings. We also make use of the explanatory effects matrix for helping us to understand lean IT concepts. Statements to be tested are formulated in advance of the interview. By using matrices the structured data is easily accessible and workable for the analyst.

The third, and last stream of analysis is c*onclusion drawing and verification.* Miles and Huberman (1994) recommend that from the start of data collection to the researcher should think about what things mean, take notice, and search for explanations, patterns, possible configurations, etc. During all of this, the researcher must constantly oversee the quality of the data.

Data concerning the action research was also methodically collected and organized. We did this inter alia by making a standard matrix which was filled in before and after every CI meeting (example can be seen in appendix E), which can be seen as a form of data reduction and data display. All findings and conclusions were discussed by the CI core team, findings that had a major impact on the IT environment were also discussed with the management board of IT HNL (including budget request, hiring consultant, and so on).

3.5 Summary

To be able to give IT HNL solid advice, we try to explore how other organisations are successful in CI (multiple case study), and finally how IT HNL can be successful in CI (action research). Therefore face-to-face, semi-structured interviews were executed at five different organisations that use the lean principles and philosophy in their IT environment. To provide a brief background of the organisations taking part:

- Insurance industry, 2000 IT employees
- Finance industry, 3000 IT employees
- High-tech industry, 150 IT employees
- Government, 2000 IT employees
- Consulting industry, 1000 IT employees

All interviews were recorded and then summarized; analyses are presented as different cases in the next chapter.

In addition, action research was held at IT HEINEKEN the Netherlands during seven months. By studying the different cases, knowledge coming from the case study could be directly applied at IT HNL by action research. The initial situation and how it chanced during action research is discussed in section 4.6 and specific advice is presented in chapter 6.

VIEW OF LEAN IT EXPERTS

The previous chapter described research methodology and chapter two described CI and specific lean (IT) with the critical factors to achieve success during the implementation, operation, and sustaining phase. This chapter verifies and test the theory. Five cases will be discussed before we will investigate additional success factors for lean IT. In figure 6 the five cases plus IT Heineken Netherlands (IT HNL) are ranked in the lean (IT) maturity model. As you can see, IT HNL is at the beginning of their lean IT transformation.

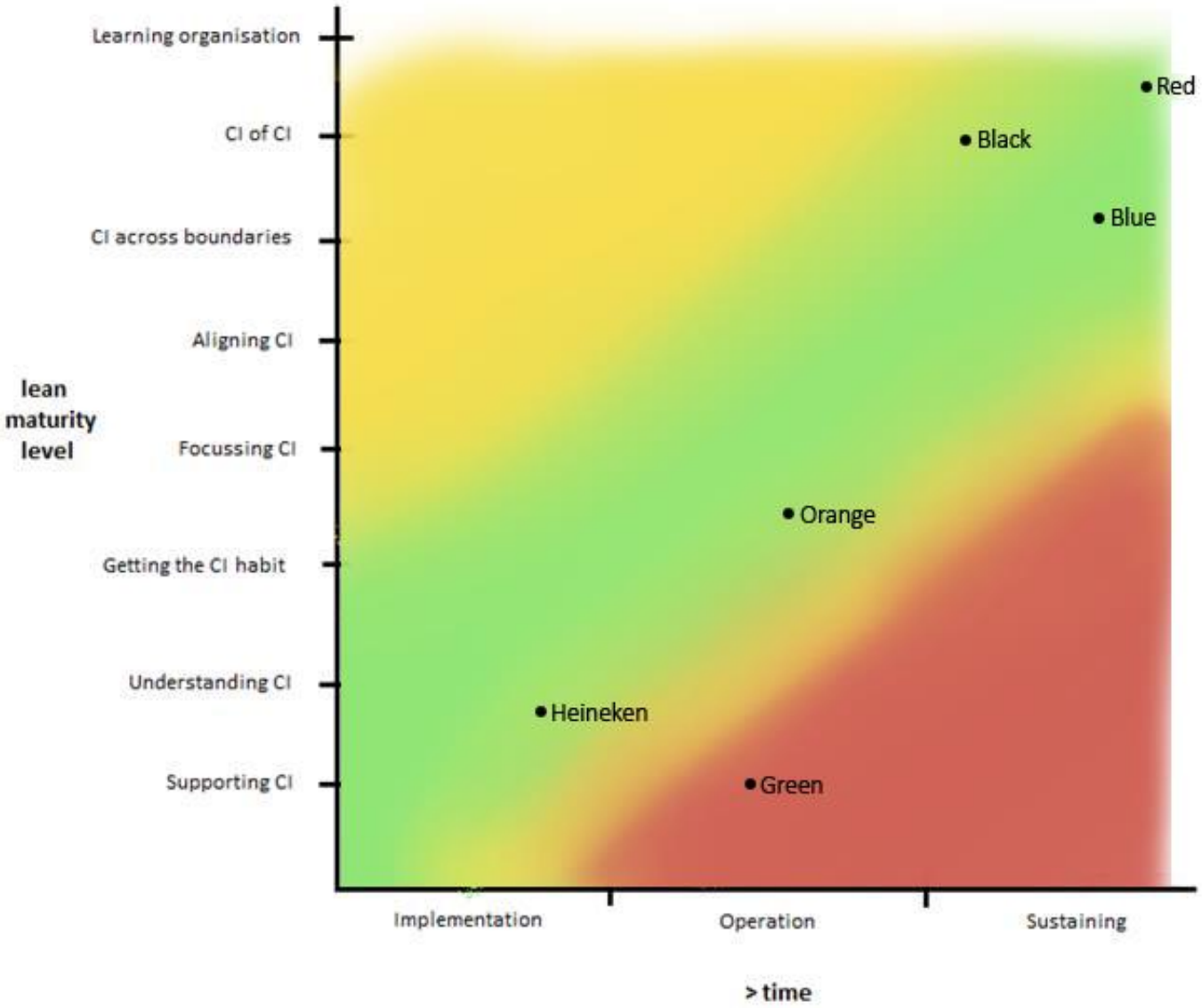


Figure 6: The different cases ranked on the lean (IT) maturity model

In the following section the five different organisations (Blue; Orange; Green; Red; and Black[1]) are discussed. We start with an extensive analysis of the highest ranked case in the lean maturity model (Red) and discuss subsequently for each studied case only how they differ from the above-discussed case(s) (extensive analysis of each case can be found in appendix F). Finally IT HNL is presented in its current situation.

4.1 Case I: Red

The first case discussed is Red. Red is a large-scale organisation with around 60.000 employees, 3000 of them work in the IT environment. Lean IT at Red really differs from lean manufacturing, simply because there are no real products produced. It also differs from lean in a finance environment. For example, employees in an IT environment need more clear communication and when something goes wrong it is the system that is at fault and never themselves.

4.1.1 Implementation of Lean IT

The interviewee of organisation Red states that the start of lean IT is a collaboration of top management and employees on the work floor. Top management defines the lean IT strategy and the employees must perform according to this strategy. From the first communication moment of top management (lean IT initiative) the top management has always been one step ahead of the team/employee in their communication.

Once Red started with the lean IT initiative they created an internal lean team and hired external help; without help it is an impassable route to lean IT success, not only for Red but for any organisation according to the interviewee. For implementing lean IT at the different teams in the IT environment there are three fixed phases but there is no fixed planning for these phases, this depends on the size of the teams in their organisation. First the lean IT program and available tools are offered to the team, thereafter when the team know the tools and methodology the lean IT consultant helps the team with customising lean IT to the specific team needs. After this assistance, the team is to continue on its own using lean IT principles and philosophy. Lean IT is what they call customisation at Red.

4.1.2 Lean IT during operation

Visual management and exemplary behaviour are getting a great deal of attention in the operation phase at Red. To get employees into the lean IT culture, visual management is a big enabler; when employees see what they, and others, are doing it gets them motivated

[1] These are not the real names of the organisations, but are used for their anonymity.

and more familiar with lean IT principles. At Red visual management is only at local places performed at the teams (see figure 7), so every team is responsible for its own visual management. Communication concerning the whole IT environment is carried out through the 'lean portal' on the intranet; every two weeks a lean IT improvement story is published. Lessons learned (failures) are also communicated through the intranet. Red's vision is that employees have to learn from each other. This learning aspect is considered by employees as a positive element. With this approach (local and the broader environment) employees receive only lean IT information that is important for them.

Figure 7: Local visual management at one of the teams at Reds IT environment.

When a team is starting with lean IT the manager gets a simple lean IT class. This is important because lean IT works only when the responsible manager can act as a role model. Also, the employees in a team must steer each other on lean IT principles, but most employees imitate their manager faster and take advice from the manager more easily than from a colleague on the same 'level'. The interviewee states that it takes about two years before you can create self-awareness of employees, and that exemplary behaviour can assist a great deal in creating this self-awareness.

4.1.3 Lean IT on the long term

To sustain lean in the IT environment culture, Red made some employees responsible for dealing with lean IT on a full-time basis. These employees formed a lean centre, and the lean centre at Red has launched several activities. The goal of all these activities is that the employees must stay involved with lean IT. For example, 1) the managers have audits at other teams and take best practices back to their own team, 2) lean IT is a standard action point on the agenda at every MT meeting, 3) the lean centre organises "lean experiences" where employees tell their story to other employees, and 4) once a month there is a "customer arena" where customers and stakeholders can ask questions and suggest improvements. The intranet also provides a function in sustaining lean IT in the culture, for example the tools are always available from here.

The lean centre knows which teams work according to the lean IT principles and philosophy, but they do not monitor each improvement. It is too difficult to monitor each improvement due to the size of Red's IT environment, but they mentioned that it would be possible in a smaller IT environment and could have advantages for smaller IT environments.

4.1.4 Conclusion/Summary

Lean IT	There are few differences between lean in different office environment.
Start of lean IT	Lean IT collaboration of top management and employees on the work floor.
Lean IT combined with ITIL/PRINCE	ITIL and PRINCE works together with lean IT.
Implementation route of lean IT	At the start of the lean IT initiative an organisation needs external help. Once implementing lean into the IT environment at the teams there is no fixed planning, but there are fixed phases.
Commitment for lean IT	What you need for lean IT to be successful is commitment from top management.
Communication lean IT initiative	The first time, top management communicates the IT initiative. Lean IT only works when the responsible manager serves as a role model.
Support/training for lean IT	Red's lean IT coaches are externally trained in the beginning. When starting to transform a team to use lean IT, the managers take part in a 'simple' lean class.
Enablers and barriers during	Enablers: - 'doing it slowly'; - visual management; - make use of your sponsor for the initiative.

implementation	Barrier:- do not think that you can use a standard approach for every team
Lean IT team	A lean IT team consists of cross-functional employees.
Improvement team	An improvement team consists of the team that is already together.
Communication (of success/failure)	To communicate with the IT environment, Red uses the intranet. Visual management is only done locally at the teams level. Overall lean IT communication is done through the intranet. Successes and/or failures concerning lean IT are both communicated.
Self-awareness of employees	Red creates self-awareness of employees through exemplary behaviour from managers and employees.
Continuous lean IT	Lean IT is a standard action point on the agenda every MT meeting. Also once a week an update regarding lean IT and improvements is sent out to employees by mail. Managers of the teams have audits at other teams. The lean team organizes lean-experiences where employees tell their stories to other employees.
Monitoring	Monitoring is difficult for an organisation such as Red, they are too big. The coaches know which teams are using the lean IT principles, but they do not know exactly which improvement processes are done.

4.2 Case II: Blue

Organisation Blue is the second organisation discussed in this chapter. They see small differences in the use of lean in an IT environment in comparison with lean in other office environments. Lean IT expands across the IT environment boundaries in their organisation, where lean in other office environments does not, so Blue has involved third parties (customers, stakeholders) from their organisation.

4.2.1 Implementation of Lean IT

Emphasis was made by the interviewee that without the commitment of top management the lean IT initiative fails in any IT environment, and management commitment is essential for success.

A difference according to Red is that within the IT environment of Blue there is a standard approach for implementing lean in the teams, this is a set process of twelve weeks. It starts with a bootcamp for the involved managers to create commitment, the employees in the team can make use of the lean IT tools, and ‘a lean IT environment’ with the help of

visual management. During implementation period the team receives intensive coaching from an internal lean IT coach, thereafter the manager of the team is responsible.

4.2.2 Lean IT during operation

At Blue, big differences can be seen in successfulness between teams where managers did exhibit exemplary lean IT behaviour and teams where managers did not. Employees in teams without the support from their managers did not conform to the lean IT principles, whereas employees in the teams with support of their managers did conform to the lean IT principles.

At Blue, communication regarding lean IT is important (figure 8), but in contrast to the theory and to the other cases they do not communicate everything. Blue only focusses on the successes concerning lean IT; only successes are communicated to the environment, failures are not. Blue is worried about the negative consequences, and they believe that communicating about failures creates unnecessary resistance by employees. They have not thought about the learning aspect (lessons learned) of communicating failures. This is why Blue is ranked lower than Red. To reach the maturity of organisational learning, Blue should also be transparent in communicating failures.

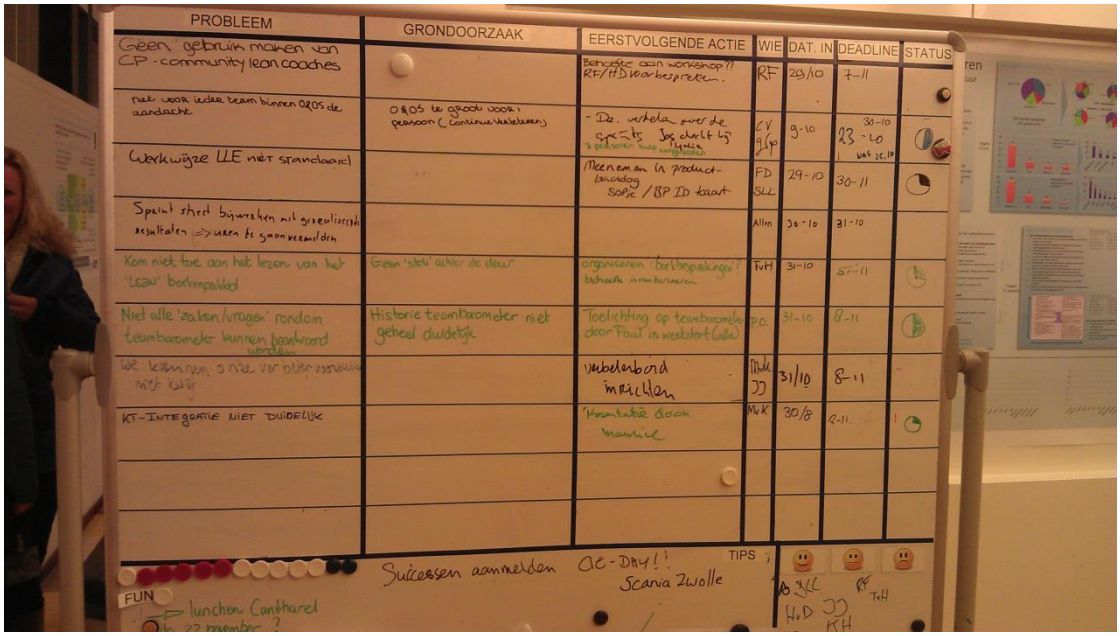


Figure 8: Visual Management: Improvement panel at Blue IT environment.

4.2.3 Lean IT on the long term

Sustaining lean IT in the environment culture is 'a hell of a job', according to the lean IT professional of Blue. The top management had decided to create a lean IT centre in Blue, all teams start every day with a team session of fifteen minutes and once a week they have a weekly session of one hour. These sessions are completely devoted to lean IT principles.

It is impossible for the lean IT centre of Blue to monitor each team and their lean IT behaviour due to the size of the IT environment, however the team themselves do monitor and document lean IT improvements.

4.2.4 Summary

Lean IT	Using lean IT means that you have to involve third parties from your organisation because IT goes across the IT environment boundaries.
Start of lean IT	Lean IT start from both sides, bottom-up and top-down.
Lean IT combined with ITIL/PRINCE	ITIL and lean IT can be both used in an organisation next to each other.
Implementation route of lean IT	Within Blue there is a standard approach for implementing lean within a team, this is a process of twelve weeks. It starts always with a boot camp for the involved managers, after the twelve weeks the team works lean and the transformation process ended with a presentation of the results. Then it is up to the responsible manager(s) to keep working lean.
Commitment for lean IT	Management commitment for lean IT is essential, therefore the Blue organizes boot camp.
Communication lean IT initiative	A top manager must communicate the lean IT initiative.
Support/training for lean IT	Basic lean IT knowledge is needed by all the members of the IT organisation.
Enablers and barriers during implementation	Enablers: - clear task description for employees; - start with a small improvement project instead of a big one. Barrier: - the resistance of employees.
Lean IT team	The lean team within Blue consists of cross-functional employees from the IT environment. This team evolves to a lean-centre.
Improvement team	An improvement team consists of employees that have ‘specific’ knowledge about the process to be improved.
Communication (of success/failure)	Lean IT communication is done through intranet, there is a special lean IT blog and page. Communication of lean IT successes is important, mistakes and/or failures concerning lean IT are not communicated to the IT environment.
Self-awareness of employees	You create self-awareness of employees by repeating – repeating – repeating the lean IT principles.
Continuous lean IT	To lock lean IT in the culture Blue organizes lean-days, every employee must be present on this day. Also there are lean IT bars created in the

	organisation. Day session (15min), week session (1hour).
Monitoring	On this moment Blue does not save their improvements centrally. The lean IT coaches within the lean IT centre are responsible for a number of tools used by the lean IT method.

4.3 Case III: Black

Black is an organisation with approximately 20.000 employees, about 2.500 of these employees work in the IT environment.

4.3.1 Implementation of Lean IT

Within Black there was a conscious choice made to work according to the lean principles, therefore there has always been top management commitment.

Nowadays Black has a standard implementation route for implementing lean IT in the teams, and this is a combination of individual team level and the organisation as a whole. In the beginning this route was a process of 18 weeks. After doing this several times Black realized that 12 to 14 weeks would be enough. Black's approach for a single team consist of a number of phases: pre-diagnosis, diagnosis, preparation, rollout, and lastly a development.

4.3.2 Lean IT during operation

Unlike the other cases, Black makes use of digital day and week panels (figure 9). This is due to the multiple locations of Black's employees. The interviewee states that these digital panels work even better because employees cannot change the standards of a panel easily, with the result that there are fewer discussions. Successes and failures are communicated within Black as "TIPS and TOPS", and all the lessons learned are stored by the lean centre.

Interesting at Black is their focus on lean IT behaviours that set a good example, even more than in the previous cases. The interviewee mentioned the importance by saying that 90% of the impact of lean is due to exemplary behaviour.

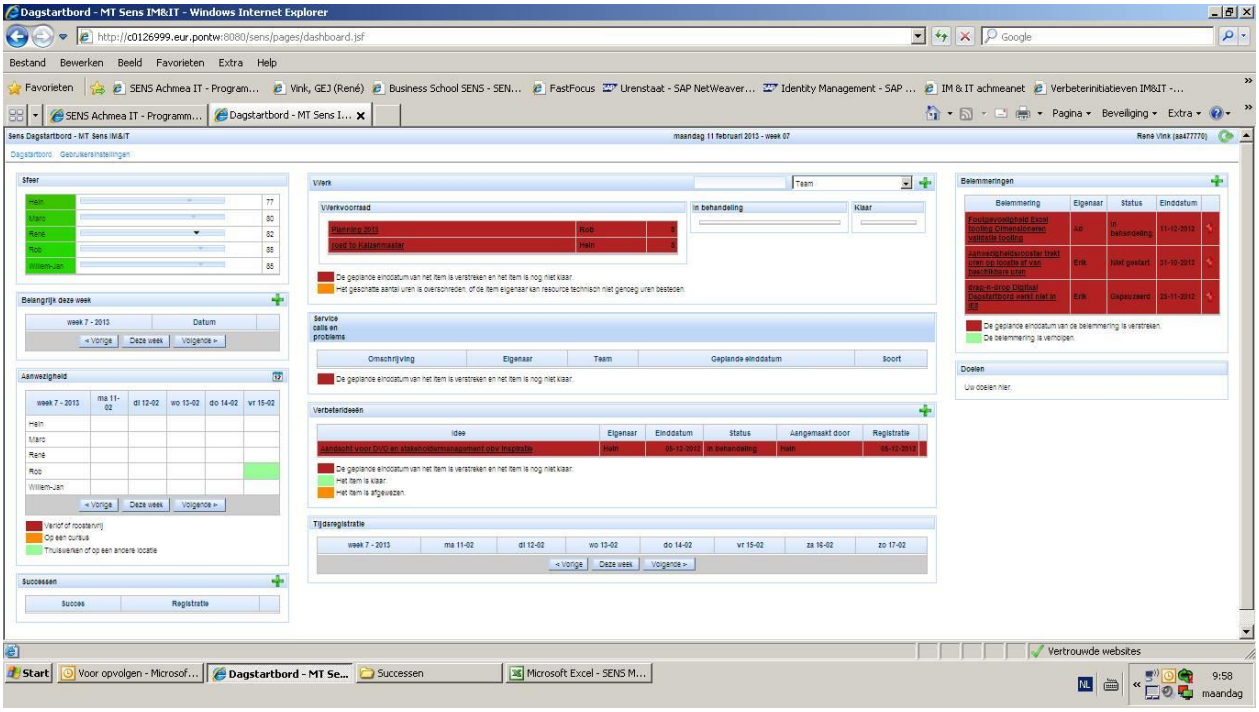


Figure 9: digital lean day panel at Black.

4.3.3 Lean IT on the long term

Black has 220 lean experts in their IT environment, and these experts are guided by an internal lean centre. Of these 220, there are less than five external consultants. To create this internal lean IT knowledge in the organisation Black has set up a lean IT training program together with a prominent business school.

In addition, the lean centre has made a tool available for the monitoring of improvements through the lean principles in the teams. Furthermore, each team has to deliver a monthly report about lean IT in their team, and since 2013 Black has started to assess employees on their lean IT behaviour in their biannual evaluation.

4.3.4 Conclusion/Summary

Lean IT	The similarities of lean IT in comparison with 'normal' lean are greater than the differences. Lean IT differs on unique IT processes, but for example operational management is the same.
Start of lean IT	Lean IT start from both sides, bottom-up and top-down. First own IT processes, thereafter processes across IT boundaries.
Lean IT combined with ITIL/PRINCE	Black combined lean IT with HBPTO, whereby HBPTO is leading. This because Black cannot deviate from some processes, however that process can be 'more lean'.

Implementation route of lean IT	Within Black there is a standard approach for implementing lean within the teams, in the beginning this was a process of 18 weeks. After doing this several times Black realized that 12 to 14 weeks would be enough. Black's approach for a single team includes multiple phases: pre-diagnosis, diagnosis, preparation, rollout, and lastly development.
Commitment for lean IT	Commitment is needed for successful lean IT. This commitment is needed in the line-management and by the CEO of the IT environment.
Communication lean IT initiative	Communicate the lean IT initiative to the managers in your IT environment beforehand, what is going to happen and what you expect from them. Thereafter the managers communicate to their employees.
Support/training for lean IT	Lean IT knowledge is needed, therefore Black hired external help in the beginning. Now they have set-up a lean training in association with University Nyrode for their employees.
Enablers and barriers during implementation	Enablers: - exemplar behaviour of managers, - clear communication about 'why' the change to lean IT is needed prevents much resistance. Barrier: - optimizing one process in a team can have adverse effects in an-other team.
Formation of a lean IT team	The lean team within Black consist of 40% original IT employees (cross-functional), thus it is not necessary that all members have an IT background.
Formation of an improvement team	The standard teams within the IT environment in Black serve as an improvement team, in the beginning supplemented with a lean IT coach.
Communication (of success/failure)	Black's communication is open, they communicate TIPS and TOPS. Primary manner is through verbal communication. Besides, communication is done through the intranet, but this should be improved. Within the teams Black uses day and week panels (visual management).
Self-awareness of employees	Crucial in the gaining of self-awareness is exemplar behaviour of managers, 80% of the success is determined by this according to Black.
Continuous lean IT	To sustain lean IT in the culture Black set up an internal lean centre. They take care of the tools and training/workshops for employees. Likewise every team starts every day with a team session (15min), and every week with a weekly session (30min).
Monitoring	Black monitors their lean IT activity digitally. They monitor all improvements, also all the team must deliver monthly reports concerning lean IT in their team. As well lean safaris (watching at other teams) are an important way of monitoring and learning for Black.

4.4 Case IV: Orange

Organisation Orange is an international IT consulting organisation, they consult to other organisations that want to make use of lean in their IT environment, and they make use of lean IT in their own environments. Orange is not necessarily worse in lean IT than previous cases, but they are not as far in their transformation.

4.4.1 Implementation of Lean IT

The handover of tools is the easy part of implementing lean in the IT environment, the change in work approach and mentality of the employee thereafter is the hardest part. To make your employees aware of the need for change a top manager has do to the first communication about the lean IT initiative. Thereafter constant and clear communication about lean IT is necessary to create a first mind-set among employees, the lean team can be responsible for this kind of communication.

4.4.2 Lean IT during operation

The interviewee at Orange puts more focus on the changing role of the manager than other interviewees did. Orange tells us that a major change in the IT environment is that simultaneously with the organisational change to lean IT the traditional role of the management has to change, from a delegating role to a more advising- and discussing partner role (figure 10).

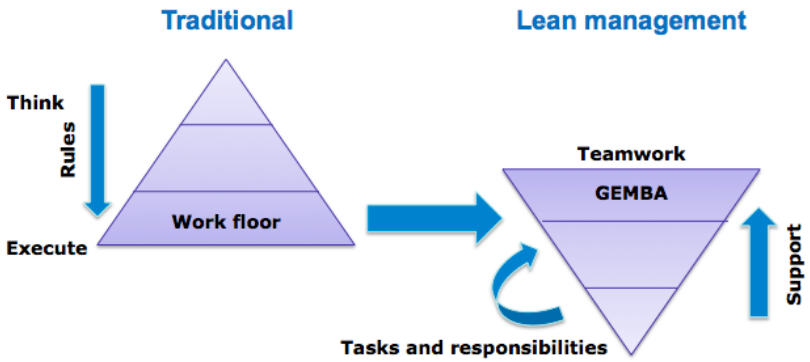


Figure 10: Changing role of the IT management.

In accordance with Red and Blue, also Orange tells us that (visual) communication is one of the lead factors for the success or failure of lean IT.

4.4.3 Lean IT on the long term

Becoming the perfect lean IT environment is a route of learning – doing – learning – doing – and so on. With time, your employees will have the knowledge and skills by themselves and then the external consultants are no longer necessary.

Orange mentioned that a blog for each team is for example a simple way to monitor improvements, and it will keep your employees involved. Likewise, adding lean IT to employees' evaluations, like at Black, is a possible option that can be used.

4.4.4 Conclusion/Summary

Lean IT	For offices lean differs from production, and in offices there are also small differences. Wastes and benefits in IT are often found across boundaries.
Start of lean IT	The start of lean IT is a conjunction between bottom-up and top-down.
Lean IT combined with ITIL/PRINCE	Lean can be combined with methods as ITIL, BISL, and ASL.
Implementation route of lean IT	You do not create a lean IT culture in one year, it takes years. Orange has a standard approach of 3 months for implementing lean IT within a team.
Commitment for lean IT	Commitment is essential, this commitment must come from top management.
Communication lean IT initiative	Firstly the top management has to communicate about lean IT, in order to have more impact on the current employees. Thereafter constant and clear communication about lean IT is necessary to create a first mind-set among employees.
Support/training for lean IT	In the beginning you need external experience to implement lean IT. With the time your own employees have the knowledge themselves you have to start your own 'lean knowledge centre'.
Enablers and barriers during implementation	Enabler: - Start small, think big; - Do not do only easy, quick win improvements. Barrier: - The mental part (awareness) for workers of the transformation to a lean IT environment .
Lean IT team	Employees that take part in the lean IT team must be broadly educated people from all across the (IT) organisation.
Improvement team	The formation of an improvement team is a mix of specialist and outsiders who can look at the process with a fresh perspective.
Communication (of success/failure)	Communication is one of the lead factors for the success or failure of lean IT. Visual management is a strong 'tool'. Communicate successes regarding lean IT, but also failures – lessons learned – regarding lean IT.
Self-awareness of	Start with supplying the lean IT tools and let them work with it, the workers behaviour will follow slowly. Give them the feeling they are

employees	part of the IT environment and they contribute to the successes of lean IT. Simultaneously with the organisational change to lean IT the role of the manager has to change, from a delegating role to a more coaching role.
Continuous lean IT	To prevent that lean IT is just an initiative for a short time organisations have to create an in-house lean program. Likewise audits between teams and adding lean IT to someone's evaluation can help to keep lean IT in the organisations culture.
Monitoring	Orange advises to capture every step in the improvement process.

4.4 Case V: Green

Organisation Green is, relative to the other organisations, a young organisation that has grown explosively in the last decade, in Green there is not much difference between the lean methodology/philosophy in the different office environments. In the IT environment lean IT resulted only in sub-optimisation of some 'errors', therefore they reach only a clearly low level of lean maturity.

4.5.1 Implementation of Lean IT

The first difference at Green relative to all the other cases is that lean IT started bottom-up at Green. They did an improvement project to introduce lean IT at the IT environment. After the improvement project the lean IT initiative was put on hold, this because the fact that there was not enough commitment from top management. Since lean IT at the IT environment of Green is still in its infancy, they do not have an implementation route for lean IT at the team level.

4.5.2 Lean IT during operation

The IT environment of Green assumes that they are in the operation phase but they do not behave like an IT environment that really is in this phase. Nevertheless, Green knows how they have to perform and what is needed to make lean IT work. Green does not want to force their employees to behave in a specific way. They try, by doing several improvement projects according to the lean IT philosophy, to get their employees in touch with lean IT and to enable them to recognize principles and behaviours that belong to lean IT.

4.5.3 Lean IT on the long term

In contrast to the IT environments in the other cases the responsible employees at Green have intended to monitor everything concerning to lean IT. According to the size of the IT

environment this is possible. A disadvantage of the 'small' company size is that you cannot make enough people responsible for lean IT on a full-time basis, so your lean IT centre is composed of employees that may spend a limited number of hours for the purpose of the lean IT centre besides their daily work.

4.5.4 Conclusion/Summary

Lean IT	Between offices there is not much difference in lean.
Start of lean IT	Green started lean bottom up, they get support from an external party.
Lean IT combined with ITIL/PRINCE	Lean IT can be combined with ITIL and/or PRINCE.
Implementation route of lean IT	At Green there is no standard implementation route.
Commitment for lean IT	Without commitment it is impossible to create a lean IT environment, this is what happened at Green.
Communication lean IT initiative	As lean IT is not an IT environment 'thing' the sponsor of a specific improvement project communicates the lean IT initiative.
Support/training for lean IT	Training is necessary, you cannot start without knowledge about lean IT.
Enablers and barriers during implementation	Enabler: - communicate your wins directly; - create a lean IT competition for the best leaner. Barrier: - you have to watch out that employees do not see the lean IT initiative as a 'person x' project; - Small IT environments cannot make employees available full-time for lean IT.
Lean IT team	Start with small selection employees of the IT environment, not with cross-functional employees.
Improvement team	An improvement team within Green exists, made up of employees that have the knowledge about the process that is going to be improved, supplemented by a lean IT coach.
Communication (of success/failure)	Communication within Green is totally transparent. They use the intranet for lean IT, everything is visible.
Self-awareness of employees	By doing several improvement projects according to the lean IT philosophy the employees get in touch with lean IT, they can recognize principles and behaviours that belong to lean IT.
Continuous lean IT	The finance environment serves as example for the IT environment at Green, they train their own employees for lean. They also have lean

	awards, for the best improvement project and organizing lean days.
Monitoring	Through the 'small' IT environment of Green they monitor all their lean IT improvement projects.

4.6 Case VI: IT HEINEKEN Netherlands

IT HNL delivers the ICT services to the whole of HNL, for both projects with an IT component and operational IT services. Each year the management board of IT HNL selects several 'spearheads', and one major spearhead they announced this year is continuous improvement through lean IT philosophy and principles. We were the protagonists and driving force of lean IT at HNL the last seven months. To start with lean IT the environment and the CI core team needed 'how to' examples and best practices, and with the case study we provided these examples and success factors which could be applied at IT HNL.

4.6.1 Implementation of Lean IT

IT HNL realizes that their role in the organisation is becoming increasingly important, and that this dependence on successful ICT processes is growing. IT HNL wants to take this role in the organisation as important element, and wants successful IT processes. However, this is in contrast with how IT HNL acts today in many parts of the IT environment and how their IT environment and work is seen by their clients (score of the client satisfactory survey). Therefore, last year the decision was made to introduce a continuous improvement (CI) core team, and work by the lean IT philosophy and principles.

Figure 11: Value Stream Started Map of the started improvement project 'User verhuizingen'

Since July of last year IT HNL, specifically the CI core team, took a number of steps that can be ascribed to the implementation phase of lean IT. As IT HNL started with almost no experience some companies (Cases I to V respectively) were visited, lessons learned and best practices were taken back to IT HNL. We presented our plans at a management team meeting following on the visits to create even more top management commitment. At this meeting we also made our request for external help, as this critical success factor was mentioned at all visited companies. On this moment the CI core team is supported by an external consultant, an improvement project is started (figure 11) and also the core team members followed a lean (IT) workshop. Below is a short overview of the current situation at IT HNL concerning lean IT:

Start of lean IT	Start of CI/lean IT comes from both sides, top-down and bottom-up.
Implementation route of lean IT	At this moment there is no set implementation route. IT HNL, especially the core team CI, gets external help. Additionally this study, with advice for IT HNL, will serve as guidance.
Commitment for lean IT	There is commitment from the management team of IT HNL.
Support/training for lean IT	The members of the CI core team followed a lean (IT) workshop, and one member is following a green belt[2] curses.
Lean IT team	The lean IT core team consists of cross-functional IT HNL employees.

As the transition to a lean IT environment is a process of multiple years and IT HNL is just in the beginning of the implementation process of lean IT, a further analysis in the implementation phase, operation phase and sustaining phase is not possible. In chapter five analyses is done how IT HNL can grow to a 'learning organisation'. Based on this analysis, the literature and findings from the case studies on what it takes to be successful advice to IT HNL is provided in chapter 6.

[2] Official lean certification

4.7 Summary / Conclusion

In figure 11 an overview is given of the studied cases. Here we can see the similarities and differences between de studied cases. Assuming that at this moment only Green is unsuccessful in their transformation to a lean IT environment (see figure 6), and on some points they quite differ from the successful cases (see figure 11) we can conclude that Green made mistakes in their transformation by:

(1) Starting lean bottom-up,

(2) Starting without top-management commitment,

(3) Communicating the lean IT initiative through the improvement project sponsor,

(4) Having a small select part of employees in the lean IT team, no cross functional employees,

An interesting topic of discussion is if, and how, the communication should be carried out. From the successful cases Blue indicates that communicating failures concerning lean IT will have a negative impact on the employees' behaviour, therefore they only communicate successes. In the other cases communication is totally transparent, everything concerning lean IT is communicated. We think this totally transparent communication is the best way, as it is about creating a learning organisation.

The next chapter we analyse the gathered data from our multiple case study and action research further, to subsequently give solid advice to IT HNL in chapter 6 based on the findings and conclusions.

Case	Red	Blue	Black	Orange	Green
Lean IT	There are little differences	IT goes across the IT environment boundaries.	Lean IT differs on unique IT processes.	In offices there are small differences between lean.	Between offices there is not much difference.
Start of lean IT	Collaboration.	Lean IT start from both sides	Lean IT start from both sides	A conjunction.	Bottom-up.
Lean IT combined with ITIL/PRINCE	ITIL and PRINCE works together with lean IT.	ITIL and lean IT can be both used in an organization next to each other.	Black combined lean IT with HBPTO, whereby HBPTO is leading.	Lean can be combined with methods as ITIL, BISL, and ASL.	Lean IT can be combined with ITIL and/or PRINCE.
Implementation route of lean IT	External help, no fixed planning, there are fixed phases.	External help, standard 12 week approach for implementing lean within a team.	External help, standard 12-14 week approach for implementing lean within a team.	External help, orange has a standard approach of 3 months for implementing lean IT within a team.	No standard approach/ implementation route.
Commitment for lean IT	Yes, from top management	Essential for success	Commitment is needed for successful lean IT.	Commitment is essential, this commitment must come from top management.	Without commitment you cannot create a lean IT environment.
Communication lean IT initiative	Top management communicate the IT initiative. Responsible manager fulfill a role model.	A top manager must communicate the lean IT initiative.	The managers communicate to their employees.	First communication must be done by top management.	The sponsor of a specific improvement project communicates the lean IT initiative.
Support/training for lean IT	External trained, managers getting a lean class.	Basic lean IT knowledge is needful	Lean IT knowledge is needed, they have set-up a lean training in association with Nyenrode.	External experiences to help you creating own IT knowledge.	Training is necessary, you cannot start without knowledge about lean IT.
Lean IT team	Cross-functional employees.	Cross-functional employees.	The lean team within Black consist of 40% original IT employees (cross-functional)	Broadly educated people from all across the (IT) organisation.	Start with small select part employees, not with cross functional IT employees.
Improvement team	Team that is already together.	Employees that have 'specific' knowledge about the process to be improved.	The standard teams serve as an improvement team.	Mix of specialist and outsiders who can look at the process afresh.	Employees that have the knowledge about the process
Communication (of success/failure)	Successes and failures are both communicated.	Only successes are communicated	Black's communication is open, they communicate TIPS and TOPS.	Communicate successes regarding lean IT, but also failures.	Communication within Green is totally transparent.
Self-awareness of employees	Exemplary behavior from managers and employees.	self-awareness by repeating – repeating – repeating	Exemplar behaviour of managers.	Give employees the feeling they are part of the successes of lean IT.	By doing several improvement projects employees are going to recognize principles and behaviours.
Continuous lean IT	Every MT meeting. Audits, lean-experiences, lean centre.	Lean-days, IT bars, day session - week session, lean centre.	Lean centre, day session/week session, adding lean IT to the evaluation.	Create an in-house lean program, audits, adding lean IT to the evaluation.	Train your own employees for lean, lean awards, lean days.
Monitoring	Difficult, they are too big.	Blue does not save there improvements centrally.	Black monitors their lean IT activity digital.	Capture every step if possible.	Monitor all their lean IT improvement projects.

ANALYSIS

In this chapter we analyse the data and discus the success aspects in the three time phases. Thereafter in paragraph 5.3 we will analyse how IT HNL can become 'the learning organisation' and be successful in the three time phases (implementation, operation, sustaining). This advice is based on the cases combined with aspects from theory. We start this chapter with an explanatory effect matrix (Miles & Huberman, 1994), followed by the success factors in the three different time phases and finally end this chapter with a specific analysis for IT HNL in which as route is mapped of how they become the learning organisation that they want to be.

5.1 Explanatory effects matrix

An explanatory effects matrix is a useful first-cut exploration. The matrix helps clarify a domain in conceptual terms and helps us understand things temporally and provides initial understanding for advice. The matrix is extensively described by Miles and Huberman (1994) in their book Qualitative Data Analysis.

Each hypothesis is reviewed in a matrix and subsequently can be accepted or rejected. For most hypotheses we give several quotes from the interviewees, this helps to understand the thoughts of the interviewees.

5.1.1 Theorems

In this paragraph we discuss several statements. The second columns of the tables (see table 3 to table 8) show to what extent the interviewee of the organisations accept or rejects the statement.

Theorem 1: Lean IT starts top-down

All the companies reject the statement. However they all verbalize their argument differently, see table 6. Concluding from this theorem we can state that the start of lean IT is a collaboration of top-down and bottom up.

Table 6: Acceptance of the statement 'Lean IT starts top-down' by the different organisations.

Company	Accept/reject	Quote of interviewee
Green	Reject	Lean IT here started bottom-up.
Orange	Reject	A conjunction between bottom-up and top-down.
Blue	Reject	Lean IT starts top-down and bottom-up. Not only top-down.
Red	Reject	A collaboration of top management and employees on the workfloor.
Black	Reject	Lean IT starts top-down and bottom-up.

Theorem 2: There is a standard approach implementing lean IT in teams

There is not a common answer among the companies. Some companies accept this statement and others reject the statement (table 7). It differs for each IT environment: if there is not much difference between the teams it will work, if the teams differ significantly a customization approach is needed.

Table 7: Acceptance of the statement 'There is a standard approach implementing lean IT in teams' by the different organisations.

Company	Accept/reject	Quote of interviewee
Green	Reject	Our lean IT is still in its infancy, so we do not have a standard implementation route yet.
Orange	Accept	Yes, but remember that it is a long process to culture change.
Blue	Accept	We have a standard approach of 12 weeks.
Red	Reject	A lean consultant helps the team with customizing lean IT to the specific needs of the team. Lean IT is what we call customization.
Black	Accept	We changed from an 18 week approach to a 12 – 14 week approach.

Theorem 3: Commitment from top management is essential for success

All interviewees accepted the statement 'Commitment from top management is essential for success', see also table 8. Without top management commitment it is impossible to have a successful transformation to a lean IT environment.

Table 8: Acceptance of the statement 'Commitment from top management is essential for success' by the different organisations.

Company	Accept/reject	Quote of interviewee
Green	Accept	We do not have full commitment, and we are confronted with the consequences now.
Orange	Accept	It is important, essential.
Blue	Accept	Management commitment for lean IT is essential, therefore we organizes specific commitment-sessions for (top) managers (boot camp).
Red	Accept	What you need for lean IT is: 1. Commitment from top management.
Black	Accept	From the beginning we had top management commitment on lean IT.

Theorem 4: Communication concerning lean IT should be totally transparent

Four out of five interviewees accepted the statement 'Communication concerning lean IT should be totally transparent' (table 9). Blue did not because they are fearful of negative effects on employees behaviour, and they did not think about the learning aspect of failures. All other cases show us that transparent communication has a positive influence on employees, therefore we can conclude that communication concerning lean IT should be transparent.

Table 9: Acceptance of the statement 'Communication concerning lean IT should be totally transparent' by the different organisations.

Company	Accept/reject	Quote of interviewee
Green	Accept	We use the intranet for lean IT, everything is visible.
Orange	Accept	Communication is one of the lead factors for the success or failure of lean IT.
Blue	Reject	We do not communicate our failures.
Red	Accept	Mistakes and/or failures concerning lean IT are also communicated through the intranet.
Black	Accept	This is mainly done verbally.

Theorem 5: Composition of a lean IT project improvement team should be cross-functional

Four out of five interviewees rejected the statement 'Composition of a lean IT project improvement team should be cross-functional' (table 10). They even stated that the

composition of an improvement team should consist of employees that are working together and have specific knowledge about the improvement. Therefore, we can conclude that a lean IT improvement team does not have to consist of cross-functional employees.

Table 10: Acceptance of the statement 'Composition of a lean IT project improvement team should be cross-functional' by the different organisations.

Company	Accept/reject	Quote of interviewee
Green	Reject	
Orange	Neutral	It should be a multidisciplinary team
Blue	Reject	An improvement team consists of employees that have 'specific' knowledge about the process to be improved
Red	Reject	An improvement team consists of team members that are already together and working on that process.
Black	Reject	Lean IT improvements are done by the existing teams

Theorem 6: Sustaining lean IT in the organisation is only possible when you monitor all your improvement projects

There is not a common answer among the companies. Most companies rejected this statement: 'Sustaining lean IT in the organisation is only possible when you monitor all your improvement projects' (table 11). The interviewees in the different cases dissent because they all think it depends on the (size of the) organisation.

Table 11: Acceptance of the statement 'Sustaining lean IT in the organisation is only possible when you monitor all your improvement projects' by the different organisations.

Company	Accept/reject	Quote of interviewee
Green	Neutral	No for big organisations. Yes for a small IT environment, then it is possible to monitor everything.
Orange	Accept	Capture every step in the improvement process.
Blue	Reject	We do not save our improvement processes centrally, but we conserve the culture.
Red	Reject	People are getting lazy and use the described solution that is monitored.
Black	Reject	We monitor every improvement project, but it is not necessary for successful sustaining.

5.2 Discussing the success factors for lean IT

Based on the theory (chapter 2), case studies (chapter 4), and theorems (chapter 5.1) we are able to assign success factors to the three time phases during a lean IT transformation (table 12).

Table 12: Success factors for the three time phases during a lean IT transformation.

Implementation	Operation	Sustaining
Start is a conjunction between top-down & bottom-up	Transparent communication	Lean days
Top IT management commitment is essential	Visual management	Monitor
You need a driven/motivated IT champion/sponsor	Minimalizing external help	Create your own lean centre
Cross functional lean IT team	Role IT managers, exemplar behaviour	Audits
External help	Communicate wins directly	Adding Lean IT to someone's evaluation
Lean IT knowledge in lean team	All employees basic lean IT knowledge	
Start small, think big	Repeating – repeating the principles	

As mentioned in chapter two, it takes multiple years to transform to a successful lean IT environment. In the section below we will discuss how to be successful during this transformation and the barriers of the change for each time phase.

5.2.1 Success factors in the implementation phase

The start of lean IT has to be carried out in conjunction between top management and employees on the work floor, top-down as well as bottom-up. If it is only coming from 'one-side' the initiative for lean IT has a great chance to fail, this is agreed upon by all interviewees. This probably explains why there are different opinions in the literature (Bhuiyan & Baghel, 2005; Nicoletti, 2011; Staats et al., 2011; Staats & Upton, 2011) about how to start.

Setting up a lean IT team is the next step in the implementation phase. This team should consist of employees from all parts of the IT environment, so a cross-functional lean IT team should be created. The team members have to follow a course or a workshop on the purpose

of lean IT. As the lean IT team is the point of contact for other IT employees the employees in the team must have basic lean IT knowledge. However this team cannot guide and realise the transformation process on its own in this phase. Therefore, it is good to get external help. All the interviewees agreed on this. Each of the case organisations that are successful now has had external help in the beginning.

Once started with a lean IT team, an organisation can create a standard approach to how they want to lean the different teams or processes in the IT environment. However, the approach to lean in an IT environment differs by organisation: it depends on the current culture, company size, environment structure, background of the employees involved, and so on. Organisations can create guidelines in which they describe how they want to implement lean IT in the different teams. However, lean IT in a specific environment or even a specific team has to be customised. There is no single opinion about the best approach, but it is clear that top management commitment is essential for lean IT. Without top management commitment you might as well not even start with the transition to a lean IT environment. In addition to top management commitment a driven and motivated champion and/or sponsor of the lean IT initiative is needed, this sponsor is the calling card for the IT environment concerning lean IT.

If an IT environment is ready for lean IT, let a top manager (ideally the lean IT sponsor) communicate the lean IT initiative to the IT environment. The message will have more impact on employees if a top manager communicates about the lean IT initiative than if a floor employee communicates about the lean IT initiative. In the implementation phase the lean IT team should not overreach; they can think big but have to start small. This means that they have to start with a small process or team and make the involved employees familiar with the lean IT philosophy and principles. The success of these smaller projects can boost the other employees' regard of lean IT initiative in the IT environment.

5.2.2 Success factors in the operation phase

Clear communication in an IT environment has a major impact on the success of lean IT. To use examples from the literature, Bhuiyan and Baghel (2005) communicating successes and failures, and Bessant et al. (2001) instructed not to blame others are the two pillars upon which lean IT should be able to build. This is also what can be concludes from the case study, employees learn from each other, whether these are successes or failures. Communicating can occur through different mediums but each of the interviewees put extra emphasis on

visual management. Different to what is described by Hurwitz (2009) in his white paper is that all employees should make use of visual management systems, and not only the IT managers. An example of visual management is the day and week panels. These panels are mostly team-specific and help a team to maintain an overview in daily operations, whereas the intranet can be used for environment-wide communication. Especially in an IT environment special attention should be paid to communication because 'the IT employees are naturally not the strongest communicators' according to the interviewees of Red and Black.

During the operation phase the role of the managers is going to change, and their delegating role is transforming into a coaching role. Also, their behaviour is important, as most of the interviewees said that the behaviour of managers has a huge impact on the behaviour of the members in their span of control. Lean IT stands or falls with the behaviour of (top) managers, all interviewees agreed on this. This is in line with the theory (Bessant et al., 2001; Bhuiyan & Baghel, 2005; Bortolotti & Romano, 2012; Jha et al., 1996; Staats & Upton, 2011) that tells us that support and commitment from the management is fundamental for success. In one of the cases the lean team saw big differences in lean IT success between teams where managers did exemplar behaviour and in teams where managers did not. Through exemplary behaviour employees feel more at their leisure, and dare to behave to the lean IT principles. Therefore managers must have solid lean IT knowledge. This can be obtained in various ways of training, from a boot camp with all managers to a private training.

If lean IT is introduced in a team the composition of that team does not have to change, the needed lean IT knowledge will- and should be created. This is a task of the lean IT team: the lean IT team has to teach the employees the basic principles. Once the lean IT knowledge is there the responsible manager should take over the task of the lean IT team. The manager should ensure that the employees keep work according the lean IT philosophy and principles. If a team performs well and is successful in an improvement process the success should be celebrated and communicated directly.

Though not necessarily a success factor, another point mentioned by the interviewees was reducing external help gradually. This starts in the operation phase and finally ends in the sustaining phase where the external help is no longer needed.

5.2.3 Success factors in the sustaining phase

Becoming a learning organisation is not easy, but keeping the environment on the same level every day might even be more difficult. To keep the environment on the same level, the IT environment should create their own lean IT centre. Instead of constantly falling back on the external expert the lean IT knowledge should be available internally within the lean IT centre. The lean centre is a following step on the lean team described by Bortolotti and Romano (2012); Chen and Cox (2012); Nicoletti (2011) that arises at the start of the lean initiative. By having a lean centre, where employees can be trained as lean IT experts, the organisation ensures that if employees are leaving the organisation the lean IT culture stays. The employees taking part in the lean IT centre can be responsible for several events concerning sustaining the lean IT culture, such as lean days. The interviewees agreed that organising lean days has a positive influence on employees' daily lean behaviour. During such a lean day employees see each other improvements and other ways to approach work. This leads to different insights into how to work, and employees take best practices back to their own team.

Another way of exchanging best practices between teams is audits. This means that team leaders or managers take a look at another team in the IT environment. They see how other team leaders or managers run their team, which of the lean IT tools they are using.

Keeping an overview of your lean IT environment in terms of which team is working according the lean IT principles, and monitoring the behaviour of employees in these teams should always be done. This is possible for every IT environment, the size of the IT environment does not matter. However, keeping an overview of all the improvements using the lean principles is more difficult for large IT environments (>1000 IT employees). Only one of the visited big companies could monitor all their improvements, however all interviewees agreed that if they could monitor all the improvements they would. Therefore, we are assume that keeping an overview of the density of lean IT is essential for success and keeping an overview of your lean IT improvements is not.

Adding lean to the (bi)annual evaluation of an employee is one of the last steps that an organisation has to do to sustain lean IT in the organisations culture. This step should not be taken too early; the resistance will be high if employees suddenly are assessed on the extent of how lean they work.

5.3 IT Heineken Netherlands

In the paragraph 4.6 the current situation by means of an action research at IT HNL has been briefly described. This section will analyse how IT HNL can become 'the learning organisation' and be successful in the three time phases.

5.3.1 How can IT HNL become the learning organisation

As described previously, IT HNL currently is in the implementation phase of their transformation to a lean IT environment. In table 13 the various success factors for each phase are listed, these factors are based on the paragraph above. Comparing these factors with the current situation at IT HNL we found that IT HNL during our action research already reaches some success factors, and these are highlighted in the table.

Table 13: Success factors per phase (IT HNL factors highlighted).

Implementation	Operation	Sustaining
Start is a conjunction between top-down & bottom-up	Transparent communication	Lean days
Top management commitment is essential	Visual management	Monitor
You need a driven/motivated champion/sponsor	Minimalizing external help	Create your own lean centre
Cross functional lean IT team	Role managers, Exemplar behaviour	Audits
External help	Communicate wins directly	Adding lean IT to someone's evaluation
Lean IT knowledge in lean team	All employees basic lean IT knowledge	
Start small, think big	Repeating – repeating the principles	

Even though IT HNL had a good start with their transformation to a lean IT culture they have to take care to reach the unaddressed success factors. For most success factors the general advice given and discussed in §5.2 can be assumed, however on some success factors IT HNL deviates from these recommendations (lean IT knowledge in lean team; visual management; all employees basic lean IT knowledge; monitor; and create your own lean centre). For these success factors specific advice for IT HNL is included below.

Knowledge about Lean IT principles and tools in the lean team is important, and within IT HNL all the members took part in a workshop on lean IT. By taking part in this workshop minimal lean IT knowledge has been gained, but to make them lean IT ambassadors more lean IT knowledge is needed. To create this knowledge all the lean core team members should be educated to green belt, however it is expensive this is a long-term investment for the purpose of lean IT. Currently there are only two certificated lean employees in the organisation, and this is not enough in comparison to the total IT HNL employees.

The next specific piece of advice concerns visual management. Visual management appeared in every interview as an important success factor, where the literature suggest visual management for the IT managers only, all the interviewees suggest visual management for all employees. This should not be underestimated by IT HNL. At this moment most of the teams within the IT environment at HEINEKEN do not make use of any type of visual management. The team leader or manager has the overview and the team members have only insight into their own daily tasks. A huge advance is necessary within IT HNL toward visual management. When the management team decides visual management, such as day- and week panels, are of less importance the transformation to a lean IT environments stuck in the operation phase.

When IT HNL reaches the sustaining phase it should monitor the density of lean IT in the teams and keep an overview of the improvements done according to the lean IT principles: this can be managed because the IT environment of IT HNL consist of approximately one hundred employees. This has a positive influence on the performance of the lean centre and new starting improvement projects, even though keeping an overview of your improvements is not an important success factor.

The last specific piece of advice to IT HNL regards setting up its own lean centre. IT HNL should create an internal lean centre, and this centre has to differ from the ones described in the cases. The principles remain the same, but it is not possible for IT HNL to make employees available full-time for lean IT. The lean IT centre within IT HNL should consist of multiple employees that spend a fixed number of their working hours to lean IT, instead of one or two employees working on lean IT fulltime.

CONCLUSION & DISCUSSION: LEAN IT AT IT HEINEKEN THE NETHERLANDS

6.1 Conclusion

At the beginning of this study we formulated the question: "How, and under what circumstances, can continuous improvement within IT HEINEKEN The Netherlands (IT HNL) have a positive impact on performance?". In this chapter the answer to this question will be given but first the main findings about (successful) lean IT is presented.

6.1.1 Main findings

Based on the analysis and the literature discussed earlier in this thesis we are able to make some general conclusions about lean IT and how to be successful in a lean IT transformation.

(1) Lean in an IT environment differs from lean in other office environments, it is more tacit.

(2) The start of lean IT is a conjunction of bottom-up and top-down.

(3) A pro-active, positive role of top management regarding to lean IT is essential for success.

(4) The lean IT team should be cross-functional, where a lean IT project improvement team should mainly consist of specialised employees.

(5) All communication concerning lean IT should be transparent, and as much as possible should be communicated through visual management.

(6) Each organisation should create an internal lean centre.

Work in the IT environment is more tacit than work in other office environments, business services consist, more than in other office environments, of bits and packets coursing through electronic infrastructure. Employees in IT are not seen to the public as people who socialize a lot. Therefore, finding five has 'surprised' us. Employees in IT environment benefit greatly from visual management in the shape of day and week panels, where they meet each other every day to debate about their work.

The question as to if and how an IT environment should monitor their improvement projects or not is an interesting one. Most interviewees agreed to the proposition that if you can monitor you should monitor, but they do not know how to this in large IT environments. Additionally you can discuss if you share your collected improvements or not, whether or not when you do in favour of going directly to the solution.

6.2 IT HEINEKEN the Netherlands: practical implications and managerial recommendations

The case study analysis and the literature provide us with multiple success factors (see §5.2, table 9). Studying the current situation at IT HNL and looking forward to what comes next, two important success factors are critical for IT HNL to keep successful:

- the role of the managers
- (visual) communication

The action research at IT HNL in combination with the multiple case study gave us insight into the most important challenges for IT HNL right now. IT HNL and the lean core team within IT HNL did well in the implementation phase according to reaching the success factors, however for the two findings above IT HNL has not yet and they should discuss how to develop these critical success factors. Below, we give impetus for this discussion.

6.2.1 Role of the managers

The role of the managers has a major impact on the behaviour of employees in their team, this can be positive as well as negative. Therefore the managers should perform lean IT exemplar behaviour; their delegating role is going to transform into a coaching role. To fulfil this coaching role and execute correct exemplar behaviour the managers must have the necessary knowledge about lean IT.

Another critical role that should be performed by the overall IT manager concerns communicating the lean IT initiative to the IT environment. This is because employees take the message more seriously when a top managers tells them about the lean IT initiative. The need for change will be clearer.

6.2.2 (Visual) communication

As all the interviewees agreed communication is an important success factor for lean in an IT environment. Four out of five organisations that participated in the case study had an open and transparent system of communicating successes and failures. These were communicated to the IT environment as lessons learned and are a step to success.

In addition to the transparent communication systems, employees should know from each other in their team what he or she is doing. According to the lean philosophy, organisations should make use of day and week panels to gain insight into daily tasks within a team, and all the interviewees stated that their IT environment has these day and week panels. The layout of the panels can differ but generally the panel includes all the names of the team members on the vertical axis, and the workdays on the horizontal axis.

6.2.3 Recommendations for IT HEINEKEN the Netherlands

As described several times in this report it is not easy to build a lean IT environment, and it will take years. Therefore this recommendation focusses on the two points mentioned above because IT HNL is going to face these two critical points for success next in their transformation. It provides an answer to the question "how" IT HNL should make use of these two critical success factors.

If IT HNL wants for CI to have a positive impact on performance they should educate their managers according to the lean philosophy and principles. Managers without knowledge of lean IT cannot perform exemplar behaviour, and without exemplar behaviour of managers employees will not make CI part of their daily job. IT HNL should make a budget available for this lean IT learning of managers, and mandate that their managers should participate in a course and/or workshop(s) and behave according to the lean IT principles.

The following text refers to the communication within IT HNL, to make the switch from little communication within the teams to communicating almost everything, IT HNL should introduce day sessions (15 min) and week sessions (30min – 1hour). By making a day panel available for each team, participants can talk and discuss their work, positively or negatively. These panels should be tangible, not digital. Beside this local visual communication within the teams, the lean team should get its own page on sharepoint where IT HNL employees can contact the lean team and find lean IT tools, for example.

6.3 Discussion

6.3.1 Research limitations

A number of critical comments should be made. Because of the explorative nature of this study all conclusions described above should be considered as indicative. Further research is needed to attempt to solidify these conclusions and address the limitations of this study. In this respect, more IT environments should become subjects of the study. Also, the study should focus on smaller IT environments as four out of five IT environments studied had more than 1000 employees. Also, lean is a broad topic and needs to be defined more clearly. Most of the literature it is about how to become a lean office rather than becoming lean in an IT environment specifically.

Another comment should be made on how IT HNL was analysed, and it should be noted that this differs from how other cases were studied. There were no individual interviews conducted, instead all the data are gathered from group sessions with the lean IT core team

within IT HNL. This group was therefore already intrinsically motivated towards lean IT, and focusses primarily on the advantages of lean instead of the disadvantages.

6.3.2 Suggestions for future research

Interesting for further research is whether the success factors for lean IT found in this research correspond with success factors for lean IT in smaller IT environments, how they create a lean centre and sustain lean IT in their environment. Second, the role of the IT manager, toward more of a coaching role is interesting, are they really as important as conveyed by the interviewees?

Third, future research can focus on the differences between lean in office environments. How large is the influence of IT being more tacit, does the difference in knowledge work between office environments have much influence on the lean philosophy and principles?

REFERENCES

Anand, G., Ward, P. T., Tatikonda, M. V., & Schilling, D. A. (2009). Dynamic capabilities through continuous improvement infrastructure. [Review]. *Journal of Operations Management, 27*(6), 444-461. doi: 10.1016/j.jom.2009.02.002

Argyris, C. (1977). DOUBLE LOOP LEARNING IN ORGANIZATIONS. [Article]. *Harvard Business Review, 55*(5), 115-125.

Bessant, J., Caffyn, S., & Gallagher, M. (2001). An evolutionary model of continuous improvement behaviour. *Technovation, 21*(2), 67-77.

Bessant, J., Caffyn, S., Gilbert, J., Harding, R., & Webb, S. (1994). Rediscovering continuous improvement. *Technovation, 14*(1), 17-29.

Bhattacherjee, A. (2012). Social Science Research: Principles, Methods, and Practices.

Bhuiyan, N., & Baghel, A. (2005). An overview of continuous improvement: from the past to the present. *Management Decision, 43*(5), 761-771.

Bortolotti, T., & Romano, P. (2012). 'Lean first, then automate': a framework for process improvement in pure service companies. A case study.

Bortolotti, T., Romano, P., & Nicoletti, B. (2010). Lean first, then automate: An integrated model for process improvement in pure service-providing companies. *Advances in Production Management Systems. New Challenges, New Approaches*, 579-586.

Bruun, P., & Mefford, R. N. (2004). Lean production and the Internet. *International Journal of Production Economics, 89*(3), 247-260.

Brydon-Miller, M., Greenwood, D., & Maguire, P. (2003). Why action research? *Action research, 1*(1), 9-28.

Chen, J. C., & Cox, R. A. (2012). Value Stream Management for Lean Office—A Case Study. *American Journal of Industrial and Business Management, 2*(2), 17-29.

Cusumano, M. A. (1994). The Limits of" Lean". *Sloan Management Review, 35*, 27-27.

Drucker, P. F. (1999). Knowledge-worker productivity. *California management review, 41*(2), 79-94.

Hurwitz, D. D., K. (2009). *The case for Lean IT*. White paper.

Jha, S., Noori, H., & Michela, J. L. (1996). The dynamics of continuous improvement: Aligning organizational attributes and activities for quality and productivity. *International Journal of Quality Science, 1*(1), 19-47.

Kaplan, R. S., & Norton, D. P. (1992). The balanced scorecard–measures that drive performance. *Harvard Business Review, 70*(1), 71-79.

Levitt, B., & March, J. G. (1988). ORGANIZATIONAL LEARNING. [Review]. *Annual Review of Sociology, 14*, 319-340. doi: 10.1146/annurev.so.14.080188.001535

Liefers, R. H., C. (2011). *Efficiencyverbetering binnen IT heeft baat bij Lean.* Retrieved from www.compact.nl/pdf/C-2011-3-Liefers2.pdf

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*: Sage Publications, Incorporated.

Nicoletti, B. (2011). Lean and digitize sourcing. *Journal of internet and information system Vol, 2*(3), 35-42.

Nu.nl. (2011). Verpleegkundigen gelukkiger door nieuwe management-filosofie 1. Retrieved 19-09-2011, 2011, from http://www.nu.nl/werk-en-prive/2619434/verpleegkundigen-gelukkiger-nieuwe-management-filosofie-.html

Santos-Vijande, M. L., Lopez-Sanchez, J. A., & Trespalacios, J. A. (2012). How organizational learning affects a firm's flexibility, competitive strategy, and performance. [Article]. *Journal of Business Research, 65*(8), 1079-1089. doi: 10.1016/j.jbusres.2011.09.002

Staats, B. R., Brunner, D. J., & Upton, D. M. (2011). Lean principles, learning, and knowledge work: Evidence from a software services provider. *Journal of Operations Management, 29*(5), 376-390.

Staats, B. R., & Upton, D. M. (2011). Lean Knowledge Work. *Harvard Business Review*, 100.

Waterhouse, P. (2008). *Lean IT: "Waste Not, Want Not"*. White paper.

Womack, J. P., & Jones, D. T. (2003). *Lean thinking: banish waste and create wealth in your corporation*: Simon and Schuster.

Yin, R. K. (2008). *Case study research: Design and methods* (Vol. 5): Sage Publications, Incorporated.

Zangwill, W. I., & Kantor, P. B. (1998). Toward a theory of continuous improvement and the learning curve. *Management Science*, 910-920.

Zheng, Y. (2009). Total Quality Management. *International Conference on Management and Service Science*, 1-4. doi: 10.1109/ICMSS.2009.5301742

APPENDIX A: Different CI methodologies explained

First one is lean manufacturing, Toyota introduced lean manufacturing to the general public in the 1950s, it was born to create an efficient production system for building cars. Lean manufacturing aims to eliminate waste during the process of building a product, including phases like product design and for instance customer relations. Womack and Jones (2003) highlight three essential principles for lean manufacturing: continuous flow, pull instead of push, and commitment of organisations.

In 1986 (lean) six sigma was introduces by Motorola, they measured process quality using statistical process control (Bhuiyan & Baghel, 2005). The basics are the same as lean manufacturing (minimalizing wastes in the process), the difference lies in the statistical part. Six sigma projects have in addition to reducing wastes the principle that there are measurable financial targets set in advance of the improvement project.

Total quality management (TQM) is used by many organisations to deliver high quality products. TQM is a very general concept regarding continuous improvement. When using TQM an organisation needs a specific defined goal, the organisation is constantly improving quality of products and services (Zheng, 2009). By doing it the first time right organisations can save on costs.

Financial, customer, internal business process, and learning and grow are the four perspectives of the balanced scorecard. The balanced scorecard was first described in an article of Kaplan and Norton (1992), in 2005 the same authors renewed their article. The balance scorecard is used by organisations to get insight in their business strategy linked with measurable parameters, the tools used provide feedback to the organisation. This feedback can be used to improve the organisation, but quoting Bhuiyan and Baghel (2005) “rather than improving the performance of existing processes, the emphasis needs to be placed on processes that must be executed successfully for an organisation’s strategy to succeed.”

APPENDIX B: Description of the five lean principles

To understand lean the five lean principles will be discussed next, starting with what is *value*? Placing a twist cap on a beer bottle? Expanding the assortment of beers? Womack and Jones (2003) state that value is doing that what is necessary to deliver what the customer wants. The specification of value for a specific product or service from customer perspective is the first step to deliver the right quality. Often organisations are doing fine in how they do, but are they "providing the wrong good or service the right way" what is a form of waste *(*Womack & Jones, 2003). Identifying the entire *value stream* for each product or service is step two in the process of lean thinking. All parts of an organisation have to work together as a whole, for example Womack and Jones (2003) mentioned a large manufacturer of aircraft jet engines. When they mapped their value stream for their three families of engines the organisation discovered massive wastes. Producing the jet engine takes four major phases, the melter – the forger – the machiner – and the assembler, but none of these parts communicated with each other. When they explained their activities to each other they discovered massive wastes, and almost immediately many activities could be eliminated with dramatic cost savings as result. When the first two steps are completed, the value-creating steps have to *flow*. A product or service wants as fast as possible go through the whole process, from the moment the process starts until it is finished there has to be a continuous flow. The fourth step of lean thinking is *pull* – the ability to design, schedule, and make exactly what the customer wants just when the customer wants it. Let de customer pull the product or service (Womack & Jones, 2003), instead of pushing your (unwanted) product or service to the customer. The fifth, and last phase, is *perfection* – lean isn't a project. It is a continue process, a never ending story. Employees has to strive for perfection, there are always possibilities or new technologies to make the previous four steps more perfect to the lean philosophy (Womack & Jones, 2003). These principles (value; value stream; flow; pull; perfection) and corresponding behaviours and tools are based on a manufacturing environment. Nevertheless more organisations try to apply these principles, behaviours and tools in an office environment.

APPENDIX C: key routines associated with CI

Ability	Constituent behaviours
Understanding CI	• people at all levels demonstrate a shared belief in CI • learn from mistakes, rather than to blame individual(s) • people make use of some formal CI principles
Getting the CI habit	• people use appropriate tools and techniques to support CI • people use measurement to shape the improvement process • people (as individuals and/or groups) initiate and carry through CI activities – they participate in the process
Focusing CI	• CI activities are an integral part of the individual or groups work, not a parallel activity • individuals and groups use the organisation's strategic goals and objectives to focus and prioritise improvements • individuals and groups assess their proposed changes against departmental or company objectives to ensure they are consistent with them • individuals and groups monitor/measure the results of their improvement activity and the impact it has on strategic or departmental objectives
Supporting CI	• managers support the CI process through allocation of time, money, space and other resources • managers recognise in formal (but not necessarily financial) ways the contribution of employees to CI • managers lead by example, becoming actively involved in design and implementation of CI • managers support experiment by not punishing mistakes but by encouraging learning from them
Aligning CI (structures, procedures, etc.)	• ongoing assessment ensures that the organisation's structure and infrastructure and the CI system consistently support and reinforce each other • individuals with responsibility for particular company processes/systems hold ongoing reviews to assess whether these processes/systems and the CI system remain compatible

	• people with responsibility for the CI system ensure that when a major organisational change is planned its potential impact on the CI system is assessed and adjustments are made as necessary.
CI activity across organisational boundaries	• people co-operate across internal divisions (e.g. cross-functional groups) in CI as well as working in their own areas • people understand and share an holistic view (process understanding and ownership) • people are oriented towards internal and external customers in their CI activity
Continuous improvement of continuous improvement	• the CI system is continually monitored (results) and developed • senior management make available sufficient resources (time, money, personnel) to support the ongoing development of the CI system.
The learning organisation	• people learn from their experiences, both positive and negative • individuals seek out opportunities for learning / personal development • individuals and groups at all levels share their learning from *all* work experiences • the organisation captures and shares the learning of individuals and groups • managers accept and, where necessary, act on all the learning that takes place • people and teams ensure that their learning is captured by making use of the mechanisms provided for doing so • designated individual(s) use organisational mechanisms to deploy the learning that is captured across the organisation

(bessant, 2001)

APPENDIX D: Interview questions

Geïnterviewde: …… Datum……

Organisatie:…… Plaats:……

Continuous Improvement & lean algemeen

- 'Wat is' lean in een IT omgeving? Groot verschil met andere organisatie onderdelen waar lean wordt toegepast?
- Start lean bottom-up, of top-down? Artikelen zeggen top-down. Waarom? [3 4 5 6]
- In hoeverre integreert lean met methoden als ITIL en Prince?
- Hoe moet je je organisatie/afdeling inrichten voor lean?
- Hoe creëer je het CI gevoel/cultuur bij medewerkers? [3 6]
    - Hoe ga je om met weerstand/verzet van medewerkers?

Implementatie van lean voor continuous improvement

- IT HEINEKEN Nederland willen starten met 2 pilot projecten in November? Verstandig? Waarom?
    - Hoe moet IT HEINEKEN Nederland starten, is er een vaste 'route' die gevolgd kan worden? [3]
    - Hoe kies je de juiste pilot projecten? Die waar het meeste winst is te behalen, de makkelijkste winst te behalen, kijken naar KPI? Waarom? [2]
- Hoe verzorg je de communicatie binnen de afdeling/organisatie waar lean geïmplementeerd wordt? [3] (wie, wat, welke, hoe, hoe vaak, wanneer)
- Hoe belangrijk is commitment van het middle en top management en waarom? [3 4 5 6]
    - hoe creëer je commitment vanuit het management?
    - Hoe laat je managers hun teams trainen en motiveren? [3 6]
- Hoe belangrijk is training van het 'lean team' binnen de organisatie?
- Wat zijn de meest voorkomende problemen bij de implementatie van lean binnen een IT omgeving?

Uitvoering van lean voor continuous improvement

- Wat voor samenstelling heeft een CI lean team? [4] Waarom?

- Hoe is een project verbeterteam samengesteld?

  A) werknemers vanuit verschillende functies om goed het hele geheel te zien. [2] [4]

  B) op basis van de kennis van de medewerkers ten opzichte van het verbetertraject. [6]
- Hoe behoudt je overizcht in en over je verbetertrajecten? Alle verbetervoorstellen ook via het CI team laten lopen?
- Successen vieren.
  - Welke communicatie middelen naar 'buiten'?
  - Frequent en regular wins? Hoe? [4]
  - Hoe communiceer je fouten zodat er van geleerd kan worden? [6]
- Hoe zorg je dat medewerkers uit zichzelf verbeterprojecten gaan 'zien'? [6]

Borging van lean voor continuous improvement in de IT omgeving

- Hoe zorg je dat de lean methode wordt geborgd in de IT organisatie?
  - Structure in de na-zorg, learning website, terugkijken naar eerder gedane verbetertrajecten?
- Hoe zorg je dat medewerkers constant met lean blijven werken en blijven verbeteren?
  - Wekelijks met CI team bij elkaar zitten [4]
  - Ongoing assesment voor gebruiken? [6]
- Constant monitoren? Hoe? [2] [4] Bereiken we wel wat de klant gewild heeft?

Chen, J. C., & Cox, R. A. (2012). Value Stream Management for Lean Office—A Case Study. *American Journal of Industrial and Business Management, 2*(2), 17-29.

[2] Bortolotti, T., & Romano, P. (2012). 'Lean first, then automate': a framework for process improvement in pure service companies. A case study.

[3] Staats, B. R., & Upton, D. M. (2011). Lean Knowledge Work. *Harvard Business Review*, 100.

[4] Nicoletti, B. (2011). Lean and digitize sourcing. *Journal of internet and information system Vol, 2*(3), 35-42.

[5] Staats, B. R., Brunner, D. J., & Upton, D. M. (2011). Lean principles, learning, and knowledge work: Evidence from a software services provider. *Journal of Operations Management, 29*(5), 376-390.

[6] Bhuiyan, N., & Baghel, A. (2005). An overview of continuous improvement: from the past to the present. *Management Decision, 43*(5), 761-771

APPENDIX E: Standard matrix for records for lean IT at IT HNL (action research)

Vergadering	Continuous Improvement		
Nummer	4		
Datum	12 juli 2012	Plaats	Zoeterwoude
Start	11:00	Locatie	4.1400
Aanwezig	Rob, Joris, Laurens, Nancy, Matthijs, Niek		
Afwezig	Nathalie, René, Katharina, Francien, Jan		

Actielijst (A= Actie, B=Besluit en I=ter Informatie**)**

Nummer	A,B,I	Onderwerp/Omschrijving	Wie	Due Date
1.	B	Awareness sessie in hooiberg organiseren als we starten.	Iedereen	NVT
2.	I	OGSM CI en artikel lean knowledge work beschikbaar op E-room	NVT	NVT
3.	I	Joris heeft contacten met een lean six sigma black belt, uitnodigen voor kennisvergaring?	NVT	NVT
4.	I	TAP → waar tegenaan gelopen en hoe kunnen wij dat voorkomen	NVT	NVT
5.	I	Strategie verder uitwerken vanuit de punten in OGSM CI	NVT	NVT
6.	I	Communicatieplan opstellen	NVT	NVT
7.	I	Wat is de mogelijkheid van een beloningssysteem, bijvoorbeeld in de vorm van een teamuitje voor het beste 'CI-team'.	NVT	12-07
8.	A	Niek begint aan opdrachtbrief.	Niek	17-07
9.	A	Iedereen helpt bij het aanvullen van de opdrachtbrief, Niek komt langs voor input.	Iedereen	20-07
10.	A	Katharina benaderen t.a.v. aanwezigheid volgende sessie ivm bespreken opdrachtbrief.	Niek	23-07

Afgevoerde items vorige BAL:

Nummer	A,I, B	Onderwerp/Omschrijving
1.	I	Het doel is cultuur creëren en dus niet uitkiezen wat verbeterd moet worden en hier zelf mee aan de slag gaan.
2.	A	Brainstormen over met welke middelen we de 3 subdoelen kunnen bereiken.
3.	A	Niek verzamelt de ideeën en maakt ze inzichtelijk voor de volgende meeting.
4.	A	Laurens neemt lean/six sigma map mee.

5.	B	Ons uiteindelijke doel is een cultuurverandering in gang brengen en deze en deze cultuur behouden. Om dit doel te bereiken zijn er een drietal subdoelen opgesteld betreffende Continuous Improvement: - IT HNL medewerkers moeten weten wat CI is en doet (kennis). Doelstelling → 100% na 1 jaar. - IT HNL medewerkers moeten in CI geloven (houding). Doelstelling → 60% na 6 maanden, 80% na 1 jaar. - IT HNL medewerkers gebruiken wekelijks CI methoden (Gedrag). Doelstelling → 60% na 1 jaar.
6.	B	We gaan in eerste instantie uit van een termijn van een jaar. Corresponderen met Katharina.
7.	B	Onze visie is: “Er is een cultuur waarbinnen continu verbeteren vanzelfsprekend is, waardoor de doelstellingen van IT HNL gerealiseerd worden.”
8.	B	De missie van IT HNL wordt aangenomen als missie van het CI kernteam: “IT HNL laat Heineken efficienter werken”

Eerder genomen besluiten:

Nummer	Onderwerp/Omschrijving
1.	Twee wekelijkse sessie op donderdag gepland
2.	Iedereen kijkt om zich heen voor voorstellen voor verbetering
3.	Het doel is al bekend (KPI’s IT HNL), die moeten verbeterd worden.

APPENDIX F: Case studies

Case II: Blue

Organisation Blue will be the first organisation discussed in this chapter. Organisation Blue has around the 30.000 employees and their IT environment consist of 2.000 employees. They see small differences in the use of lean in an IT environment in comparison with lean in other office environments. Lean IT goes across the IT environment boundaries, where lean in other office environments does not, so you have to involve third parties (customers, stakeholders) from your organisation.

Implementation of Lean IT

The start of the lean IT in Blue was a combination of top-down and bottom-up structure, the original initiative came from the top management team and they gave the start sign. Thereafter the employees on the work floor have to come up with wastes and possible improvements, the used tools to do so were provided by the managers. The interviewee made the statement that without the commitment of top management the lean IT initiative fails in any IT environment, management commitment is essential for success.

Within the IT environment of Blue there is a standard approach for implementing lean in the teams, this is a process of twelve weeks. It starts with a bootcamp for the involved managers to create commitment, the employees in the team can make use of the lean IT tools, and 'a lean IT environment' with the help of visual management. During implementation period the team gets intensive coaching from an internal lean IT coach, thereafter the manager of the team is responsible.

Lean IT during operation

During the operation phase the manager of a team can get help of a lean IT coach if they need. The role of the manager is important, they have to show exemplary behaviour. The interviewee tells us that you can see big differences in success between teams where managers did exhibit exemplary lean IT behaviour and teams where managers did not. Without the support from top management and the managers of the teams in Blue the employees on the work floor did not behave to the lean IT principles.

In Blue communication around lean IT is important, but in difference to the theory they do not communicate everything. Blue only focusses on the successes concerning lean IT, only those are communicated to the environment, failures are not. Blue is worried about the negative consequences, they believe that it will create unnecessary resistance by employees, they have not thought about the learning aspect (lessons learned) of communicating failures. The communication channels used in Blue are the intranet for IT environment wide communication, and visual management for local communication within the teams as shown in figure 12.

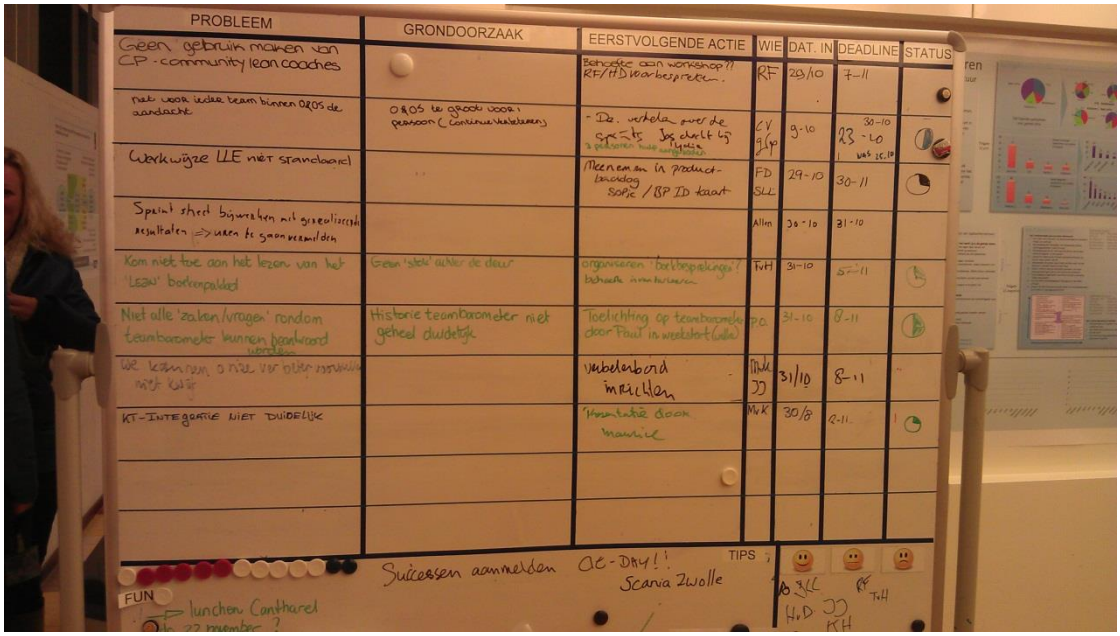


Figure 12 : Visual Management: Improvement panel at Blue IT environment.

Lean IT on the long term

To sustain lean IT in the environment culture is 'a hell of a job', to do so Blue created a lean centre. The lean IT centre consist of 17 full time Blue employees who are trained by McKinsey, each member is responsible for three or four lean tools and can be seen as champion of these tools (note: one tool can have two or three champions). The lean IT centre is the contact point for problems, ideas, etc. for everyone in the IT environment. They also organize lean days for the major lean IT successes, this day is mandatory for all IT employees. Besides that the top management had decided to create a lean IT centre, all teams start every day with a team session of 15 minutes and once a week they have a week session of one hour. These sessions are completely devoted to lean IT principles.

It is impossible for the lean IT centre of Blue to monitor each team and their lean IT behaviour through the size of the IT environment, the team themselves does monitor and document lean IT improvements.

Conclusion/Summary

Lean IT	Using lean IT means that you have to involve third parties from your organisation because IT goes across the IT environment boundaries.
Start of lean IT	Lean IT start from both sides, bottom-up and top-down.
Lean IT combined with ITIL/PRINCE	ITIL and lean IT can be both used in an organisation next to each other.
Implementation route of lean IT	Within Blue there is a standard approach for implementing lean within a team, this is a process of 12 weeks. It starts always with a bootcamp for the involved managers, after the 12 weeks the team works lean and the transformation process ended with a presentation of the results. Then it is to the responsible manager(s) to keep working lean.
Commitment for lean IT	Management commitment for lean IT is essential, therefore the Blue organizes bootcamp.
Communication lean IT initiative	A top manager must communicate the lean IT initiative.
Support/training for lean IT	Basic lean IT knowledge is needful by all the members of the IT organisation.
Enablers and barriers during implementation	Enablers: - clear task description for employees; - start with a small improvement project instead of a big one. Barrier: - the resistance of employees.
Lean IT team	The lean team within Blue consist of cross-functional employees from the IT environment. This team evolves to a lean-centre.
Improvement team	An improvement team consists of employees that have ‘specific’ knowledge about the process to be improved.
Communication (of success/failure)	Lean IT communication is done through intranet, there is a special lean IT blog and page. Communication successes are important, mistakes and/or failures concerning lean IT are not communicated to the IT environment.
Self-awareness of employees	You create self-awareness at employees by repeating – repeating – repeating the lean IT principles.

Continuous lean IT	To lock lean IT in the culture Blue organizes lean-days, every employee must be present at this day. Also there are lean IT bars created in the organisation. Day session (15min), week session (1hour).
Monitoring	On this moment Blue does not save there improvements centrally. The lean it coaches within the lean IT centre are responsible for a number of tools used by the lean IT method.

Case III: Orange

Organisation Orange is an international IT consulting organisation, they gave consult to other organisations that want to make use of lean in their IT environment, and they make use of lean IT in their own environments. They see lean IT as a complementary shape on the lean methodology for production, and in office environments they see also small differences. For example a finance environment works in a fixed process to the month end closing, where in an IT environment processes are chain processes and wastes are often found across these boundaries. They started with lean about four years ago.

Implementation of Lean IT

A conjunction between bottom-up and top-down structure is the best manner of starting with the lean IT initiative. The interviewee named that you do not build a lean IT environment in one year, it is a process of several years. In the beginning you need leadership support (top management commitment), external training, and a couple driven employees with positive attitude to lean IT (lean team). The handover of tools is the easy part of implementing lean in the IT environment, the change in work approach and mentality of the employee thereafter is the hardest part. To make your employees aware of the need for change a top manager has do to the first communication around the lean IT initiative. Thereafter constant and clear communication about lean IT is necessary to create a first mind-set among employees, this communication can be done by the lean team.

For improvements (so not the culture change) via lean IT Orange has a standard implementation route of three months subdivided in four phases (preparation; diagnostic; future state design; implementation). In phase one the commitment and knowledge of the managers is embedded, thereafter in phase two the possible improvements in the teams are listed. The third phase looks at how the selected improvement should be in the future and a

detailed implementation plan is written. In the last phase the actions from the detailed implementation plan are executed by the (lean) team.

Lean IT during operation

A major change in the IT environment is that simultaneously with the organisational change to lean IT the traditional role of the management has to change, from a delegating role in a more advising- and discussing partner role (figure13). As lean team you have to trigger the employees in this phase, this is needed to get the employees thinking about possible improvements, do not just hand the improvements to them.

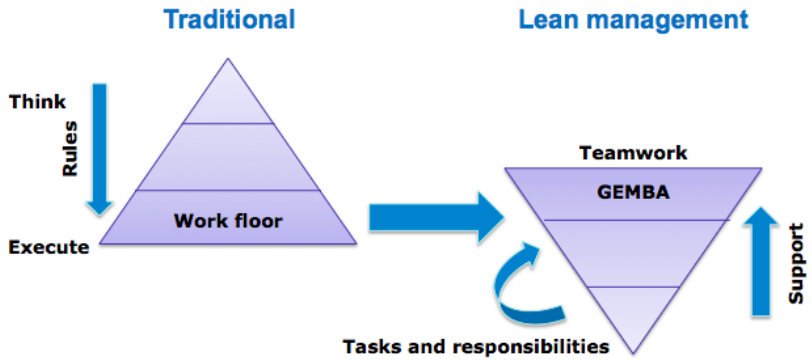


Figure13 : Changing role of the IT management.

Also Orange tells us that communication is one of the lead factors for the success or failure of lean IT. Visual management is a strong 'tool', but also communication channels like intranet can be used. Through good communication employees keep up to date – maintain a link with lean IT, learn, etc. Orange recommends to communicate successes regarding lean IT, but also failures – lessons learned – regarding lean IT. When employees get the feeling that they are part of the organisation and they contribute to the successes of lean IT their get motivated and their lean IT behaviour will make a start to become standard.

Lean IT on the long term

Becoming the perfect lean IT environment is a route of learning – doing – learning – doing – etc. In the beginning external help is needed, you cannot do it with your own employees. With the time your employees will have the knowledge by themselves you have to say goodbye to your external consultants. From that point you have to build your own lean

centre in the IT environment, employees taking part in this centre has to create an in-house lean program.

Orange advices to capture and monitor all the improvements that are done in the IT environment. A blog for each team is for example a simple manner to do, and it will keep your employees involved. Likewise audits between teams and adding lean IT to employees evaluation are possible options that can be used. This all is to prevent that lean IT is not just an initiative for a short time, but get embedded in the environments culture.

Conclusion/Summary

Lean IT	For offices lean differs from production, and in offices there are also small differences. Wastes, so benefits, in IT are often found across boundaries.
Start of lean IT	A conjunction between bottom-up and top-down.
Lean IT combined with ITIL/PRINCE	Lean can be combined with methods as ITIL, BISL, ASL.
Implementation route of lean IT	You do not create a lean IT culture in one year, it takes years. Orange has a standard approach of 3 months for implementing lean IT within a team.
Commitment for lean IT	Commitment is essential, this commitment must come from top management.
Communication lean IT initiative	First communication must be done by top management, the message will have more impact. Thereafter constant and clear communication about lean IT is necessary to create a first mind-set among employees.
Role of management	Simultaneously with the organisational change to lean IT the role of the manager has to change. From a delegating role to a more coaching role.
Support/training for lean IT	In the beginning you need external experience to help you. With the time your own employees have the knowledge themselves you have to start your own 'lean knowledge centre'.
Enablers and barriers during implementation	Enabler: - Start small, think big; - Do not do only easy, quick win improvements. Barrier: - The mental part (awareness) at workers of the transformation to a lean IT environment .

Lean IT team	Employees that take place in the lean IT team must be broadly educated people from all across the (IT) organisation.
Improvement team	The formation of an improvement team is a mix of specialist and outsiders who can look at the process afresh.
Communication (of success/failure)	Communication is one of the lead factors for the success or failure of lean IT. Visual management is a strong 'tool'. Communicate successes regarding lean IT, but also failures – lessons learned – regarding lean IT.
Self-awareness of employees	Start with supplying the lean IT tools and let them work with it, the workers behaviour will follow slowly. Give them the feeling they are part of the IT environment and they contribute to the successes of lean IT.
Continuous lean IT	To prevent that lean IT is just a innitiative for a short time organisations have to create an in-house lean program. Likewise audits between teams and adding lean IT to someone's evaluation can help to keep lean IT in the organisations culture.
Monitoring	Orange advices to capture every step in de improvement process.

Case IV: Green

Organisation Green is a young organisation that the last decade has grown explosively, nowadays Green has around the 15.000 employees of which 200 are working in the IT environment. In Green there is not much difference between the lean methodology/philosophy in the different office environments. They started with lean in the IT environments about one and a half year ago.

Implementation of Lean IT

Lean IT started bottom-up at Green, they did an improvement project to introduce lean IT at the IT environment. The interviewee mentioned that they get external support during this improvement project, this was necessary for gathering the lean IT knowledge in the beginning. After the improvement project the lean IT initiative came to a halt, this because the fact that there was not enough commitment from top management. Therefor the interviewee states that top management commitment is essential, lean IT at Green resulted only in sub-optimisation.

Because lean IT is still in its infancy at the IT environment at Green they do not have a implementation route for lean IT at the teams, however, it is pointed out that top management commitment, a lean IT 'toolbox', and external help are essential at the start of a lean IT initiative.

Lean IT during operation

The IT environment of Green assumes that they are in the operation phase but they do not behave like an IT environment that really is. Nevertheless they have in their mind how to perform and what is needed. Green do not want to force employees to behave a specific way, by doing several improvement projects according to the lean IT philosophy the employees get in touch with lean IT and going to recognize principles and behaviours that belong to lean IT.

The IT department wants totally transparent communication, this through the use of the intranet and visual management in the specific teams. With transparent communication they try to learn from mistakes, also they want to communicate wins directly because than employees still have the 'good feeling' of the win.

Lean IT on the long term

Lean at the finance environment at Green serves as example for the IT environment, they organise lean days for the whole finance environment, have a lean competition with lean awards for the best improvement project, they can offer a own lean training to their employees and serve as knowledge base. With these methods you ensure that lean IT is keeping alive and sustains.

In the IT environment of Green they monitor whole lean IT, by the size of the environment this is possible. A disadvantage of the 'small' size is that you cannot make enough people full time responsible for lean IT, so your lean IT centre is composed of employees that may spend a limited number of hours for the purpose of the lean IT centre besides their daily work.

Conclusion/Summary

Lean IT	Between offices there is not much difference.
Start of lean IT	Bottom up, they get support from an external party.
Lean IT combined with ITIL/PRINCE	Lean IT can be combined with ITIL and/or PRINCE.
Implementation route of lean IT	At Green there is no standard implementation route.
Commitment for lean IT	Without commitment you cannot create a lean IT environment, this is what happened at Green.
Communication lean IT initiative	As lean IT is not an IT environment 'thing' the sponsor of a specific improvement project communicates the lean IT initiative.
Support/training for lean IT	Training is necessary, you cannot start without knowledge about lean IT.
Enablers and barriers during implementation	Enabler: - communicate your wins directly; - create a lean IT competition for the best leaner. Barrier: - you have to watch out that employees do not gonna see the lean IT initiative as a 'person x' project.
Lean IT team	Start with small select part employees of the IT environment, not with cross functional employees.
Improvement team	An improvement team within Green exists of employees that have the knowledge about the process that is going to be improved, supplemented by a lean IT coach.
Communication (of success/failure)	Communication within Green is totally transparent. They use the intranet for lean IT, everything is visible.
Self-awareness of employees	By doing several improvement projects according to the lean IT philosophy the employees get in touch with lean IT, they are going to recognize principles and behaviours that belong to lean IT.
Continuous lean IT	The finance environment serves as example for the IT environment at Green, they train their own employees for lean. They also have lean awards, for the best improvement project and organizing lean days.
Monitoring	Through the 'small' IT environment of Green they monitor all their lean IT improvement projects.

Case V: Black

Black is an organisation with plus mines 20.000 employees, around the 2.500 of them work in the IT environment. The interviewee at Black sees some difference between lean in an IT environment and lean in other environments, but the similarities are greater than the differences. For example the IT is typified by reticence to some default approach of processes, on the other hand the operational management is almost the same between lean in offices.

Implementation of Lean IT

Within Black there was a conscious choice made to work according to the lean principles, thereon has always been top management commitment. Without this top management commitment an organisation cannot create a lean IT culture. The interviewee tells us that he saw differences between two top managers regarding giving commitment, whereby the current manager gives complete commitment and this can be seen in the results. The initiative of lean IT at Black is told to the employees by their managers.

In the beginning Black hired external help, in the course of time this help leads to an own lean IT approach for Black. Nowadays they have a standard implementation route for implementing lean IT in the teams. In the beginning this route was a process of 18 weeks. After doing this several times Black realizes that 12 to 14 weeks would be enough. Black approach for a single team is: pre diagnosis-, diagnosis-, preparation-, rollout-, and as last a development phase.

Lean IT during operation

Important factors for Black that come to the front in the operation phase are communication, exemplar behaviour and availability of tools. Communication happens through different channels within Black, so they make use of visual management with day- and week panels. However this panels can be digital as well (figure ..), this is due to the multiple locations of Black's employees. The interviewee states that these digital panels work even better because employees cannot change the standards of a panel easily, with the result that there are fewer discussions. Successes and failures are communicated within Black as TIPS and TOPS, and all the lessons learned are stored by the lean centre.

Next success factor is the exemplar behaviour of managers, in Black much attention is paced on how the managers should behave. All the managers are lean certificated, through exemplar behaviour you create commitment at employees of your team. The interviewee mentioned the importance by saying that 90% of the impact of lean is due to exemplar behaviour.

Short discussed is the availability of lean IT tools, without the availability of lean IT tools members and the environment cannot perform optimal regarding the lean principles. Members should be able to fall back on lean IT tools which support their behaviour.

Lean IT on the long term

Black has 220 lean experts in their IT environment, which are guided by an intern lean centre. Of these 220 the external consultants are less than 5, to create this intern lean IT knowledge in the organisation Black has set up a lean IT training program together with a prominent business school.

Primary manner to expand lean IT knowledge within the teams are lean safari's whereby the manager of a team takes a look in another team, this is supported by the lean centre. Also the lean centre has made a tool available for the monitoring of improvements through the lean principles in the teams. In addition each team has to deliver a monthly report about lean IT in their team, and started black since 2013 with assessing employees on their lean IT behaviour in their biannual evaluation.

Conclusion/Summary

Lean IT	The similarities of lean IT in comparison with 'normal' lean are greater than the differences. Lean IT differs on unique IT processes, but for example operational management is the same.
Start of lean IT	Lean IT start from both sides, bottom-up and top-down. First own IT processes, thereafter processes across IT boundaries.
Lean IT combined with ITIL/PRINCE	Black combined lean IT with HBPTO, whereby HBPTO is leading. This because Black cannot deviate from some processes, however that process can be 'more lean'.
Implementation route of lean IT	Within Black there is a standard approach for implementing lean within the teams, in the beginning this was a process of 18 weeks. After doing this several times Black realizes that 12 to 14 weeks would be enough.

	Black approach for a single team is: pre diagnosis-, diagnosis-, preparation-, rollout-, and as last a development phase.
Commitment for lean IT	Commitment is needed for successful lean IT. This commitment is needed in the line-management and by the CEO of the IT environment.
Communication lean IT initiative	Communicate the lean IT initiative to the managers in your IT environment beforehand, what is going to happen and what do you expect from them. Thereafter the managers communicate to their employees.
Support/training for lean IT	Lean knowledge is needed, therefore Black hired external help in the beginning. Now they have set-up a lean training in association with a prominent business school for their employees.
Enablers and barriers during implementation	Enablers: - exemplar behaviour of managers, - clear communication about 'why' the change to lean IT is needed prevents much resistance. Barrier: - optimizing one process in a team can have adverse effects in a other team.
Formation of a lean IT team	The lean team within Black consist of 40% original IT employees (cross-functional), so not necessary all members need an IT background.
Formation of an improvement team	The standard teams within the IT environment in Black serve as an improvement team, in the beginning supplemented with a lean IT coach.
Communication (of success/failure)	Black's communication is open, they communicate TIPS and TOPS. Premier manner is through verbal communication. Besides the communication is done through the intranet, but this should be improved. Within the teams Black use day- and week panels (visual management).
Self-awareness of employees	Crucial in the gaining of self-awareness is exemplar behaviour of managers, 80% of the success is determined by this.
Continuous lean IT	To sustain lean IT in the culture Black set up an intern lean centre. They take care of the tools and training/workshops for employees. Likewise every team starts every day with a team session (15min), and every week with a week session (30min).
Monitoring	Black monitors their lean IT activity digital. They monitor all improvements, also all the team must deliver monthly reports concerning lean IT in their team. As well lean safari's (watching at other teams) are an important way of monitoring and learning for Black.