Lean University

The Application of Lean thinking for Improving Processes in Higher Education Institutions

Evidence from three UK case studies

Submitted on 15/08/2011 by

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Abstract

**Purpose.** The aim of the dissertation is to analyse if and how principles of Lean thinking can be adapted to a Higher Education (HE) context.

**Methodology.** Based on a comprehensive literature review, a framework for conceptualising Lean implementation is developed that guides the dissertation’s empirical research. Case studies on three UK universities were carried out, using qualitative methods, namely semi-structured interviews and document analysis.

**Findings.** The analysed data suggests that Lean can be applied in HE but with less spectacular results than in manufacturing. This has two main reasons: First, the limited clout of personal leadership and bureaucratic collegial organisational structures make public sector HE a particularly difficult environment for any larger change initiative. Together with low exposure to external pressures, this leads to soft non-quantified targets and only fragmented implementation. Second, the conceptual underpinning of Lean HE is less sophisticated and powerful than Lean production.

**Research implications.** The case study results prompt a rethinking of the concept of Lean services. Contrary to the prevailing opinion in the literature, there might be limits to the transferability of the principles of Lean thinking.

**Limitations.** The small sample size does not allow statistical generalisation. Furthermore, the dissertation does not provide a rigorous independent evaluation of quantitative performance data.

**Originality.** As one of the first empirical accounts on the increasing number of universities experimenting with Lean thinking, the dissertation fills a gap in the academic literature. It develops and tests a conceptual model and brings in the “user perspective” of the managers and staff involved in the actual Lean projects. In order to provide practical advice, an implementation blueprint is proposed.

**Keywords.** Lean thinking, Lean services, Lean implementation, Higher Education.
Declaration

This work is being submitted in partial fulfilment of the requirements for the degree of “MSc Management” and has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

This dissertation is the result of my own work and investigations, except where otherwise stated. Other sources are acknowledged by giving explicit references. A reference list is appended.

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Date

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Signature
Acknowledgements

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This study would not have been possible without the support of a couple of individuals from three anonymous UK universities. Their dedication to improving Higher Education was impressive and inspiring. I sincerely hope that other universities will learn from their examples.

Finally, I dedicate this dissertation to my former professors at the University of Potsdam, Prof. Dr. Thomas Edeling and Prof. Dr. Werner Jann, who profoundly shaped my understanding of organisations.
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<td>Business Process Reengineering</td>
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<tr>
<td>CFO</td>
<td>Chief Financial Officer</td>
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<tr>
<td>COO</td>
<td>Chief Operating Officer</td>
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<tr>
<td>FTE</td>
<td>Full-time equivalent</td>
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<td>HE</td>
<td>Higher Education</td>
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<td>HEI</td>
<td>Higher Education Institution</td>
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<td>IMVP</td>
<td>International Motor Vehicle Programme</td>
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<td>JIT</td>
<td>Just in Time[^a]</td>
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<td>NPD</td>
<td>New Product Development</td>
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<td>New Public Management</td>
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<td>NVA</td>
<td>Non value-adding activities</td>
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<td>PPI</td>
<td>Participatory Process Improvement</td>
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<td>RIE</td>
<td>Rapid Improvement Event[^a]</td>
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<tr>
<td>SDS</td>
<td>Service Delivery System</td>
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<td>TPS</td>
<td>Toyota Production System</td>
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<td>VA</td>
<td>Value-adding activities</td>
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[^a] See glossary in appendix 3 for an explanation.
1. Introduction

Lean and Higher Education. Until recently that meant that business schools all around the world were researching Lean application in other organisations and teaching their findings to students and practitioners. However, over the last couple of years, a small but increasing number of universities have started “self-experimentation” by applying Lean thinking to their own structures and processes. This dissertation takes a closer look at these “Lean Universities”. The introductory chapter starts with a brief description of context and research gap. It then defines the research questions and aims before explaining the structure of the dissertation.

1.1 Context and justification of the topic

Over the last three decades, the organisational environment of Higher Education Institutions (HEI) in the UK has fundamentally changed (Deem et al. 2007; Economist 2005, 2010): First, student numbers have continuously increased since the 1960s and transformed Higher Education (HE) from an exclusive offering for a small elite to a mass product. Consequently, universities had to increasingly deal with operations management issues such as capacity planning and efficiency. Second, in order to enable this expansion and as means to facilitate competition, the funding structure of HEIs was changed. Greater reliance on tuition fees and industry-funded research exposed universities to the forces of the market. The Browne Review (Browne 2010) that recommends removing the cap on the level of fees that English universities can charge was only the next logical step in this direction. Third, the globalisation of HE and research unleashed a fierce competition for international students and academic staff. Especially international postgraduate students paying overseas fees have become an important but contested source of income and most UK universities have set up special marketing departments. Finally, the New Public Management (NPM) reforms of the 1980s and 1990s (Pollitt & Bouckaert 2004) increased the accountability of HEIs through quality standards, external audits and league tables and established a performance-based competition for shrinking government funds.

All in all, growth, commercialisation and managerialism have transformed HEIs from publicly funded cosy elite institutions to large professional service operations with more demanding customers. Consequently, they increasingly look at private sector management practices to deal with the rising performance pressure – an indication for that is the growing number of HE management handbooks (see e.g. McCaffery 2004; Toma 2010). However, so far there has been no dominant approach or “silver bullet”.

For instance, attempts to apply TQM in a university-context have been rather disappointing (Emiliani 2005).

During the last two decades, Lean has received the reputation to be a “silver bullet” for achieving dramatic performance improvements by delivering higher quality at lower costs (Womack & Jones 2003, 2005). From its origins in manufacturing, Lean has spread first to the service sector and is now successfully adopted by an increasing number of public sector organisations (Radnor et al. 2006). Paradoxically, the enthusiasm for Lean in HE has so far been limited. Most business schools seem to prefer giving advice to other organisations rather than applying their Lean competence to their own institutions (Hines & Lethbridge 2008).

Nevertheless, a few pioneering universities have embarked on the Lean journey. Balzer (2010) reports several projects in the US, but his and the few other available accounts remain rather uncritical and descriptive. They are largely based on anecdotal evidence and do not meet academic standards of empirical research. Furthermore, an online research, conducted at the outset of the dissertation project, reveals several cases in the UK that have only very recently started to be subject to first explorative research. An in-depth analysis of these cases is still outstanding.

1.2 Research questions and envisaged contribution

The aim of the dissertation is to develop a better understanding of Lean implementation in HE. From a contingency perspective (Burns & Stalker 1961; Lawrence & Lorsch 1967), it wants to explore if and how principles of Lean thinking can be adapted to a HE context to make “Lean University” a viable concept. Based on the reviewed literature discussed in the next chapter, the dissertation develops a conceptual model for analysing Lean implementation in HEIs and derives the following research questions:

Q1) Motives: Why do universities apply Lean principles to their work?
Q2) Methods: How is Lean defined for the purpose of the universities’ initiatives?
Q3) Scope: Where is Lean implemented in the universities?
Q4) Implementation: Which are the enablers and barriers to Lean implementation in HE? How strong are they?
Q5) Impact: What are the results of the universities’ Lean initiatives?

By answering these questions, the dissertation makes a twofold contribution: First, it fills a gap in the academic literature on a relatively new area of Lean application. As one of the first empirical accounts on the increasing number of universities
experimenting with Lean thinking, it develops and tests a conceptual model that allows exploring the relationship between different variables, e.g. how different levels of leadership support affect the Lean initiative’s scope and impact. Its findings raise interesting implications for future research, most notably a fundamental rethinking of the concept of Lean services. Second, in order to provide practical advice, the dissertation summarises the lessons learned from the case studies and derives an implementation blueprint. This should provide useful guidance for practitioners in other universities who consider “going Lean”.

The empirical research is based on case studies of three HEIs, using qualitative methods, namely semi-structured interviews and document analysis. Consequently, it does not claim completeness in terms of covering all universities applying Lean. Also, the small sample size does not allow statistical generalisation. Finally, the dissertation does neither provide a rigorous independent evaluation of quantitative performance data nor does it compare the performance of the analysed universities with other HEIs that do not apply Lean or use other optimisation approaches.

1.3 Structure of the dissertation

Chapter 2 – literature review. This chapter provides a thorough overview of the key themes in the literature on Lean production and Lean services. It then discusses the literature gap with regards to Lean in HE and outlines a conceptual framework that integrates the research questions and should guide the dissertation's empirical research.

Chapter 3 – methodology. This chapter explains how the dissertation addresses the raised research questions. It starts by outlining the fundamental research philosophy, followed by a description of its case study research strategy and its inductive research approach. After a detailed discussion of the multi-method research design it concludes with an overall assessment of the robustness of the proposed methodology and its limitations.

Chapter 4 – results and discussion. This chapter presents the results of the dissertation’s empirical research and answers the raised research questions. It starts with an in-case analysis for each HEI, before the between-case analysis identifies the overall pattern. Finally, the empirical results are discussed against the existing literature to derive theoretical conclusions and refine the conceptual model.

Chapter 5 – results and discussion. This chapter briefly summarises the dissertation’s findings and discusses their academic implications. Furthermore, in order to provide practical advice, it develops an implementation blueprint for Lean in a HE setting.
2. Literature review

This chapter provides a thorough overview of the key themes in the literature on Lean. It starts by outlining the origin and gradual development of Lean thinking, before discussing its conceptual underpinnings and contingencies. The contingent nature of Lean is then examined in more detail by analysing how Lean can be adapted to service operations and a public sector setting. Next, the research gap with regards to Lean in HE is discussed to define the empirical focus of the dissertation. Finally, a framework for conceptualising Lean implementation is suggested that should guide the dissertation’s empirical research.

2.1 Background: From Lean production to Lean thinking

The concept that is today known as Lean has its origins at the shop floors of Japanese car plants (Liker 2004). After the end of WW2, the Japanese economy suffered from a scarcity of (qualified) labour, capital and raw materials. Even worse, it was threatened by the dominant position of the big US producers, whose sophisticated mass production systems were able to realise significant economies of scale (Cusumano 1985). However, traditional mass production had its own problems, namely poor quality, high (capital) costs and inflexibility regarding product volume and variety (Monden 1983; Ohno 1988). Turning the obstacle of constrained resources into competitive advantage, Toyota developed a production system that was superior to Western mass production as it met demand instantaneously and perfectly, i.e. with less inventory and defects, and that allowed low costs and high product variety already at low volumes (Seddon 2005).

However, it is important to note, that the development of the Toyota Production System (TPS) was not a single-point intervention (Holweg 2007; Liker 2004). As early as 1948, Taiichi Ohno, who is today seen as the intellectual father of Lean, started to experiment with new production concepts in the Toyota engine machining shop, he was managing (Ohno 1988). From there, it took more than a decade to develop an integrated production system and implement it at other Toyota production sites. It was not before the late 1960s that the TPS was rolled out to Toyota’s suppliers and also other Japanese producers started to adopt some of its features (Fujimoto 1999). Also, the extension of the TPS from its original focus on manufacturing processes to other areas of the company such as New Product Development (NPD) and sales did not start until

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For readers new to the field of operations, appendix 1 provides an introduction to the history of production systems by defining and comparing craft production, mass production and Lean production.
the early 1980s (Womack & Jones 2003). All in all, it can be said that the TPS emerged from a process of continuous experimentation and refinement.

The Western world only started to pay attention in the late 1970s, when the superiority of the Japanese automobile producers became threatening for its American and European rivals. The first English journal article on the TPS, published in 1977 by Toyota engineers (Sugimori et al. 1977, hereafter referred to as Sugimori paper), defined its two building blocks as “reduction of cost through elimination of waste” (ibid: 554) by levelling production, slashing inventories and preventing errors to establish a continuous one-piece flow and as making “full use of the workers’ capabilities” (ibid) by entrusting them with the running and improvement of the plant. However, despite the early availability of English literature (see also Shingo 1981; Monden 1983), it took Western business leaders more than a decade to fully embrace the underlying reasons for the widening performance gap. Holweg (2007) ascribes this largely to the highly technical focus and language and weak empirical foundations of these early accounts. But also to the reluctance of many Western companies to accept that their problems were homemade has to be noted (Womack & Jones 2003).

The critical incidence that triggered a sudden and widespread rise in awareness was the publication of the well-known book “The Machine that Changed the World” (Womack et al. 1990). It summarised the findings of a major global benchmarking study of automobile plants that was conducted by the MIT’s International Motor Vehicle Programme (IMVP) since 1985. The high impact of “the Machine” was not only due to the fact that it was based on hard empirical data that clearly showed significant productivity differences between the Japanese producers and their American and European rivals. Its non-technical language and style as well as its comprehensive overview the Japanese production system that for the first time included further aspects such as Supply Chain Management and NPD appealed to a large managerial audience (Holweg 2007). Originally coined by IMVP researcher John Krafcik (1988), the book also popularised the catchy term “Lean production”, as a defining feature of the Japanese plants was that they used less of everything – materials, space, labour and inventory.

However, the concept of Lean production only marked the beginning of the Lean evolution. Hines et al. (2004) describe how the Western perception of Lean has gradually evolved and gained sophistication. Due to the temporary oblivion of the Sugimori paper and its extraordinarily concise and far-reaching definition (New 2007),

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2 See also appendix 2, which provides a detailed analysis of how definitions of Lean in the academic literature have gradually changed over time and confirms Hines et al.’s observation.
the early Lean understanding was relatively narrow and confined to the adoption of a few isolated shop floor tools. The focus then continuously widened to an understanding of Lean as a holistic manufacturing system. This system thinking stressed the strategic alignment of all elements of the production system to better meet customer demand (Seddon 2005). Eventually, the strategic essence of “Lean thinking” (Womack & Jones 1996, 2003) or “Lean behavior” (Emiliiani 1998) was extracted and it was argued from a contingency perspective (Donaldson 1996) that the resulting Lean core principles can be adapted to the specific circumstances of different organisations and industries. These conceptual foundations are discussed in the next section.

2.2 Concept: Three levels of Lean thinking and the critical literature

Due to different translations and academic interpretations and its continuous extension into new sectors, there is no ultimate definition of what Lean actually is and what exactly it encompasses (Shah & Ward 2007). With regards to the TPS, New (2007: 3547) even asserts: “[W]e don’t really understand what the TPS is, and it is possible we never will. Many have attempted to capture the »true essence« of the TPS, but none of the attempts seem to work exactly”. While the dissertation will not completely solve this problem, it tries to shed some light by distinguishing three levels of Lean thinking – the fundamental, strategic and operational level.

Fundamental level: What is the nature of Lean?

Asking for its fundamental character, Lean is probably best defined as a “dynamic learning capability” (Holweg 2007: 422). From a resource-based perspective (Wernerfelt 1984), Lean can be interpreted as a coherent and continuously evolving management system that provides the organisation with the “ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments” (Teece et al. 1997). This has important implications for the diffusion and adaptation of Lean thinking and allows refining the outlined contingency perspective. First, capabilities that rest on complex combination of tacit and idiosyncratic organisational routines are usually built over years, highly path-dependent and difficult to decode and replicate (Nelson & Winter 1982). This explains the absence of a single comprehensive definition of Lean as well as “the widespread inability of organizations to adopt and apply the ideas with anything like the success of Toyota” (New 2007: 3546). Second, organisations that want to implement Lean need to translate and adapt it to suit their own organisational routines and specific environmental context, which can lead to significant mutations (Lee & Jo 2007).
Strategic level: What are the conceptual building blocks of Lean thinking?

Asking for the conceptual building blocks of this complex dynamic capability, one inevitably enters the confusion of competing interpretations. This dissertation applies Womack and Jones’ (2003) five principles of Lean thinking and complements them with two fundamental Lean methods because the analysis of different Lean definitions in appendix 2 suggests that these seven elements are the best conceptual condensation of the comprehensive Lean literature. Furthermore, the five principles have received widespread recognition amongst academics and practitioners and are used as conceptual basis in many case studies on Lean implementation (Hines et al. 2008b; Radnor et al. 2006). In the following, these Lean principles and methods are described.

**Principle 1 – Define value from the customer perspective.** Lean aims at increasing the value of a company’s offering in order to gain larger market share. Thus, it is implicitly based on a growth paradigm and should be distinguished from simple cost cutting and downsizing (Bicheno 2008; Hines et al. 2008b). It is the customers who ultimately define value. Their preferences might be heterogeneous and cannot be addressed with a “one size fits all approach” (Womack & Jones 2003). Lean acknowledges this heterogeneity and stresses product variation and customisation. Seddon (2005) notes that analysing demand is the critical starting point of Lean thinking – without a thorough definition of value, organisations are in danger of optimising products and processes that disregard the customers’ needs.

**Principle 2 – Identify the value stream for each product.** Lean thinking is based on a process-based view of organisations. Thus, by assuming that value is created through end-to-end processes, it challenges silo mentality and departmentalism (Dahlgaard & Østergaard 2000). The notion of the “Lean Enterprise” extends this process-based view with a supply chain perspective and emphasises that end-to-end value streams normally comprise several organisations (Womack & Jones 1994; Liker & Wu 2000). Finally, it is important to understand that the value stream concept is more than just a different notion for process. Value stream mapping (VSM)\(^3\) does not only determine the activities the organisation is carrying out to deliver a product or service. It also distinguishes between value-adding activities (VA) that directly contribute to meet the customers’ needs and non value-adding activities (NVA) (Slack et al. 2010).

**Principle 3 – Make the value stream flow.** While certain NVA are indispensable to enable preceding or subsequent VA, other NVA can be removed to increase process efficiency. They are referred to as “muda”, the Japanese word for waste (Liker 2004). Ohno (1988) defines the seven sources of muda as transportation, inventory, motion,

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\(^3\) A glossary of Lean terms and tools can be found in appendix 3.
waiting, over-processing, over-production and defects. Lean aims at removing all muda to enable a smooth flow of the remaining activities (Bicheno 2008). In a manufacturing environment this means turning away from traditional “batch and queue” techniques by reducing safety buffers and shortening set-up times to approach the ideal state of continuous one-piece flow (Slack et al. 2010).

*Principle 4 – Introduce customer pull for value creation.* Once flow is achieved, pull is the next logical step to remove more muda and maximise value creation. “Pull in simple terms means that no one upstream should produce a good or service until the customer downstream asks for it” (Womack & Jones 2003: 67). This is realised by two concepts: First, Just in Time (JIT) means that all activities of the value stream are carried out on demand, i.e. when they are needed and exactly in the required quality and quantity (Liker 2004). Second, synchronisation and levelled capacity means that all steps of the value stream are conducted with the same cycle time, which is determined by the demand for the ultimate product or service (Slack et al. 2010).

*Principle 5 – Strive for perfection of the first four principles.* The initial implementation of the first four Lean principles usually requires radical change, “kaikaku” in Japanese, as they are a major departure from traditional operations principles. However, at its core, Lean stresses the notion of continuous incremental improvement, expressed by the Japanese word “kaizen” (Womack & Jones 2003; Liker 2004). Kaizen means that a state of perfect “leanness” is rather an ideal to pursue than a concept to be implemented (Karlsson & Åhlström 1996). Finally, kaizen inevitably triggers the pursuit for perfection as it has a self-reinforcing effect: “[T]he four initial principles interact with each other in a virtuous circle. Getting value to flow faster always exposes hidden muda in the value stream. And the harder you pull, the more the impediments to flow are revealed so they can be removed” (Womack & Jones 2003: 25).

Today, these five Lean core principles have become widely accepted common knowledge of operations management and seem to be uncontroversial for new generations scholars. However, at the time of their introduction they were seen as revolutionary and counter-intuitive as they challenged deeply enrooted traditional beliefs of operations theory and practice (Slack et al. 2010). Probably most important, the ideal of one-piece flow with its requirements to abolish inventories and shorten set-up times challenged traditional “batch and queue” thinking and the belief in capital-intensive fully automated production. Economies of scales were replaced by economies of flow. Inventory, usually seen as an asset, was redefined to be waste (Liker 2004).
Lean favours human intelligence over advanced technology (Emiliani 2008). Even though this is more or less implicit in the five Lean core principles, this relationship should be explicated. Therefore, the definition of the Lean’s conceptual building blocks should be complemented by the following two fundamental Lean methods (Dahlgaard & Østergaard 2000).

**Method 1 – Identify and solve a problem’s root cause.** Root cause analysis means that every problem is examined with rational scientific methods to identify its underlying causes and solve it immediately and once and for all, i.e. without workarounds (Spear & Bowen 1999). Introducing root cause analysis is often described as “learning to see” – as it enables for the first time to fully comprehend the sources of muda (Rother & Shook 2003). It is also closely related to the concept of “go and see”, which is expressed in the Japanese word “gemba” (Bicheno & Holweg 2008): Managers should not only manage by numbers but also need to pay more attention to the real tangible processes and activities of their operations.

**Method 2 – Empower staff to take ownership for their work.** The logical consequence of “learning to see” is “see and do”, i.e. eliminate problems as they occur. Employee empowerment encourages and supports every employee to take over ownership for the quality of his work and the entire production system. This includes training as well as team-based problem solving in quality circles (Liker 2004). Womack and Jones (2003: 268) conclude that Lean thinking is “… extraordinarily antihierachical and pro-democratic. Every worker inspects his or her own work, becomes multiskilled, and participates in periodic job redesign through kaizen activities. Layers of management are permanently stripped away. Transparency makes every aspect of the business open for everyone to see.”

**Operational level: How is Lean implemented?**

Over time, several tools were developed to support the implementation of the more fundamental Lean principles and methods at the operational level (see e.g. Bicheno & Holweg 2008; Feld 2001; George et al. 2005). For example, different tools of VSM support the principle of flow, and kanban cards, level scheduling and takt time are used to implement customer pull. Depending on the author, this lean toolbox comprises also techniques that originate from other related improvement approaches such as TQM or Six sigma. The distinction between these approaches is not always clear, though it has been argued that lean focuses more on process flow while the emphasis of Six sigma and TQM is more on reducing variation (Andersson et al. 2006; Antony 2011), e.g. by applying techniques of Statistical Process Control (Nolan & Provost 1990).
Even though the Lean principles and methods are seen as universally applicable, the individual organisation has to interpret and translate them. Consequently, the Lean tools as their operationalization need to be tailored to the specific organisational context (Jones 2004; Bane 2002). The problem is that most Lean tools were developed for a manufacturing environment, i.e. they are more an expression of Lean production than of Lean thinking (Hines et al. 2004). Thus, when applying Lean thinking to other organisational settings, it has to be asked whether or not these tools can be translated in any meaningful way (Seddon 2005). Exhibit 1 summarises the relationship between

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**Exhibit 1: The three levels of Lean Thinking**

**Fundamental level**

*What is the nature of Lean?*

**Strategic level**

*What are the conceptual building blocks of Lean thinking?*

**Operational level**

*How is Lean implemented?*

---

Source: compiled by the author, partly adopted from Hines et al. 2004
the universal Lean principles and methods and the contingent Lean tools, before the next section analyses how to deal with these contingencies in a service environment.

The critical literature: Problems and misperceptions of Lean

Finally, even though the academic reception of Lean is largely positive, it is not free of problems (Radnor et al. 2006; Hines et al. 2004). The most frequently mentioned issues with regards to Lean implementation are increased vulnerability to disruptions, reduced responsiveness to demand variability and falling employee satisfaction due to higher performance pressure. Table 1 provides a more detailed discussion of these critical accounts.

Table 1: Summary of the critical literature – Problems and misperceptions of Lean

<table>
<thead>
<tr>
<th>Issue</th>
<th>Description</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased (supply chain) vulnerability</td>
<td>The elimination of all waste implies a zero-inventory policy that also removes safety buffers (Christopher &amp; Lee 2004)</td>
<td>Real problem – see immediate impact of recent earthquake in Japan on Toyota’s worldwide production system</td>
</tr>
<tr>
<td>“Island optimisation”</td>
<td>Lean places high demands on the organisational environment – a lean company requires lean suppliers and customers (Womack &amp; Jones 2003)</td>
<td>Real problem – the benefits of single-piece flow remain limited when suppliers continue to operate a batch-and-queue system and accumulate large finished goods inventories to enable JIT delivery (Levy 1997)</td>
</tr>
<tr>
<td>Reduced responsiveness to demand variability</td>
<td>If Lean tools such as takt time and level scheduling prevail over the Lean principles of value orientation and customer pull the operation becomes rigid and inward looking, which can lead to over- or underproduction when demand changes suddenly (Cusumano 1994)</td>
<td>Real problem – at the beginning of the 2008 financial crisis Toyota had problems to quickly adapt its production volume to falling demand</td>
</tr>
<tr>
<td>Decreasing staff satisfaction</td>
<td>From a left-wing perspective, Lean is described as rigorous standardisation that increases performance pressure on workers (Williams et al. 1992; Stewart et al. 2009), while the idea of staff empowerment is largely ignored</td>
<td>Misperception – the few cases where staff satisfaction dropped (Carter et al. 2011) were more an issue of incomplete implementation of the Lean principles and methods than an inherent problem of Lean thinking</td>
</tr>
<tr>
<td>Lean is only applicable to mass manufacturing</td>
<td>As the majority of documented cases for Lean implementation is from manufacturing, it is concluded that Lean is only applicable to high-volume, low-variety processes (Bateman 2000)</td>
<td>Misperception – this opinion is based on an understanding of Lean as fixed set of tools and reveals a lack of strategic perspective and contingent thinking (Hines et al. 2004; Rees et al. 1996)</td>
</tr>
</tbody>
</table>

Source: compiled by the author
2.3 Contingencies: Lean services

There is a long debate whether or not manufacturing and service operations can be managed based on the same concepts (Fitzsimmons & Fitzsimmons 2008). While some stress the significance of distinctive service features such as customer involvement and labour intensity (Schlesinger & Heskett 1991; Grönroos 1990), Levitt (1972) argues that this should not be an excuse for avoiding manufacturing concepts as a means of increasing the efficiency of service operations. Somewhere in between, Johnston (1994; see also Åhlström 2004) suggests that services can benefit from operations management’s traditional focus on performance improvement if concepts and tools are adapted to their specific organisational context. This is in line with the contingency perspective on Lean advocated in this dissertation.

There is empirical evidence that Lean thinking can be applied to service companies. Case studies comprise airlines, fast food restaurants, insurances and hospitals (Bowen & Youngdahl 1998; Swank 2003; Åhlström 2004) and report cost savings of 15% to 25% and lead-time reductions (Goland et al. 1998). However, a closer look at these examples for Lean services reveals significant limitations. First, most cases refer to manufacturing-like repetitive service processes that have been described as mass services (Johnston & Clark 2008), with no evidence for Lean implementation in professional services. Second, some case studies are based on ex-post rationalisation. For instance, Bowen and Youngdahl (1998) assert that Southwest Airlines and the Shouldice Hospital – both well known through Harvard Business School case studies – maintain Lean operations. While it might be true that some of their operational principles closely resemble Lean thinking, neither of the both organisations has announced that it pursues Lean implementation. Third, even where service companies deliberately embarked on the Lean journey, their application of Lean principles and methods often remains superficial and fragmented. E.g. Swank’s (2003) case on application processing in an insurance company does not go beyond process standardisation. Fourth and similar, in all reported cases, Lean implementation remained limited to bits and pieces of the company’s value chain.

Consequently, it still seems to be early days for Lean services and there remains some theoretical groundwork to be done. There is an increasing number of conceptual works and practical guidelines that try to apply Lean thinking to a service environment (see e.g. Bicheno 2008, Seddon 2005, Seddon & O’Donovan 2010a, 2010b). According to these accounts, a context-sensitive Lean implementation needs to address a couple of special features of service operations:
First, value creation depends largely on the customer’s perception of his interactions with the Service Delivery System (SDS) – the so-called “moments of truth” (Normann 2000). This has implications for the distinction between VA and NVA, as value is not only affected by objective service outcomes but also by subjective perceptions (Zeithaml & Bitner 2003). Certain activities that might not seem value adding with regards to service performance might be important for the experience of at least some customers (Åhlström 2004), e.g. face-to-face service as compared to telephone or online service.

Second, due to customer involvement and the intangible character of their offerings, many service operations face higher complexity and variation of customer demand. While manufacturers offer a predefined set of products, service providers often have to deal with unexpected requests (Seddon 2005). Bicheno (2008) proposes to systematically analyse demand patterns and introduces the distinction between “runners”, “repeaters” and “strangers” based on the frequency of a service request. Whereas “strangers” should be dealt with on an ad-hoc basis, the organisation can install dedicated procedures for “runners” and “repeaters”.

Third, Lean needs to understand the different sources of variability in service processes. Usual standardisation approaches might help to tackle internal process variability that is induced by the SDS or staff. However, due to the simultaneity of production and consumption all service processes are also exposed to customer-introduced variability that is difficult to control (Bicheno 2008), e.g. different aptitude levels or different expectations and inquiries. Therefore, Lean in service operations should focus on making the process resilient and capable, rather than pursuing an ideal state of perfect customer compliance (Åhlström 2004; Seddon 2005).

Fourth, employee empowerment is key to improving process capability and resilience. Staff must be enabled to respond spontaneously and adequately while interacting with the customer (Åhlström 2004). Consequently, there should be constraints to the use of standard work in Lean services. While service blueprints and guidelines might be a great support for staff, especially when dealing with “runners” and “repeaters” (Bicheno 2008; Shostack 1984), tight mandatory standard operating procedures can lead to a situation where the system makes it impossible for the individual employee to meet customer demand (Deming 1986), e.g. scripts and time limits that prevent call centre agents from solving a customer problem during a single call.

Finally, as services are always made-to-order because they cannot be stored, the Lean principle of pull has a different meaning. Pull in service operations means avoiding “inventories of customers” waiting for their service (Seddon 2005). It aims at replacing
traditional queue management with a JIT service provision through new innovative ways of capacity management as well a visual management devices that provide the customer with clear information about the current status of the SDS (Bowen & Youngdahl 1998).

To sum up, defining value and managing variability is more difficult in service operations. Moreover, employee empowerment is critical. Regarding the Lean toolbox, most of the process-related techniques such as VSM seem to be applicable in a service environment, while other tools such as kanban pull or standard work are either meaningless or might even be counterproductive (Seddon 2005; Staats & Upton 2007). This might explain why service operations have so far struggled with fully adapting the Lean principles and methods to their organisational routines – most examples for Lean services closely resemble conventional process optimisation.

2.4 Transfer: Lean in the public sector

The NPM reforms of the 1980s and 1990s have increased the public sector’s openness and acceptance towards private sector management techniques (Hood 1998), especially in the US and the UK, where administrative culture has always been more managerial than in continental Europe (Pollitt & Bouckaert 2004; Jann 2003). Furthermore, over the last decade, several government efficiency and spending reviews have continuously increased the pressure on public administration to make significant efficiency improvements (see e.g. Gershon 2004; Green 2010; HM Treasury 2010). Thus, the positive experience with Lean in for-profit service operations makes it an attractive approach for the public sector where most processes have service characteristics (Bhatia & Drew 2006).

With a leading role of health care (de Souza 2009; Poksinska 2010), more and more organisations across the UK public sector have embarked on the Lean journey, with case studies available for government agencies, local authorities, the court system and the military (see e.g. Hines et al. 2008a; Krings et al. 2006; Radnor & Bucci 2007; Zokaei et al. 2010). These accounts and Radnor et al.’s (2006) major evaluation study for the Scottish executive suggest that Lean can be successfully implemented in the public sector with significant improvements in terms of waiting and processing times, quality and cost-efficiency – although they do not provide systematic performance data.

However, similar to the findings for service operations in general, these public sector cases also indicate an unbalanced and incomplete understanding of Lean thinking (Radnor 2010a). By focusing on waste reduction through process optimisation and standardisation, most projects are confined to the Lean principles of value stream and
flow, with some application of the Lean method of root cause analysis. The other Lean principles and methods, especially customer value and employee empowerment are largely neglected. Looking at the flagship Lean project at HM Revenues and Customs, Carter et al. (2011) even recognise “Tayloristic tendencies” (ibid: 121) in terms of rigid task standardisation and concede that “the redesign was top-down, as attempts to make suggestions by staff were not welcomed and any criticism was deliberately framed as unconstructive” (ibid: 117).

These difficulties are partly due to the specific features of service operations and the consequent methodical challenges discussed in the previous section. However, in addition, several characteristics of the public sector make it a particularly difficult environment for Lean implementation (Bhatia & Drew 2006; Scorsone 2008): First, the traditional Weberian bureaucracy model leads to strong departmentalisation and silo-mentality. This hinders process-based thinking and cross-functional collaboration (Schedler & Proeller 2010). As a consequence, optimisation projects in public administration often lead to “island optimisation” that only moves bottlenecks without addressing the real problems that lie cross to organisational boundaries (Radnor 2010a). Second, bureaucracy goes along with rule-bound hierarchy. Paradoxically, this impedes both, strong leadership and employee empowerments as it facilitates a mentality of personal irresponsibility where people hide behind rules (Osborne & Gaebler 1992). As a result, in the public sector, it is much more difficult to facilitate the “can do” attitude that is typical for successful Lean implementation in the private sector. Third, the complex stakeholder relations of most public entities make it difficult to achieve a clear focus on customer value (Rainey & Chun 2005). All too often, these conflicting stakeholder expectations are taken as an excuse to put internal concerns first. Fourth, due to the strong position of trade unions in the public sector, job cuts must often be ruled out from the beginning. This significantly constrains the potential of Lean projects to deliver substantial cost savings (Radnor et al. 2006).

2.5 Research gap: Lean in Higher Education

HE is a very special part of the public sector with its own modus operandi (Allen & Fifield 1999). At least the academic areas of HEIs are characterised by a highly individualistic organisational culture that stresses professional autonomy (Tierney 1988). In addition, especially in older universities, the schools or colleges enjoy a considerable degree of freedom regarding their organisation and often maintain structures that duplicate the university’s administrative directorates and units (Dopson & McNay 1996), e.g. in areas such as student support or marketing. Moreover,
decision-making in HEIs is less hierarchical than in the core administration and often based on collegial consent (Dahlgaard & Østergaard 2000). This facilitates “incrementalism” (Lindblom 1959), i.e. only small changes that largely maintain the status quo. Finally, also the long-standing tradition of many universities preserves anachronistic structures and processes. Even though there are remarkable differences between UK HEIs with regards to organisational culture, e.g. between “pre-1992” and “post-1992” universities (Deem et al. 2007), all this contributes to a remarkable resistance to change (Engelkemeyer 1993).

On the other hand, the increasing environmental pressures on UK universities, described at length in the introduction, force them to embrace large-scale change to improve their competitiveness. Just to recap, due to growing reliance on tuition fees, industry research grants and the global competition for students and academic staff, UK HE is much more exposed to the forces of market than other areas of the public sector. This leads to an interesting situation, in which radical change is both more necessary but also more difficult to achieve as compared to the core administration.

Lean is still a relatively new approach to HE reform. Only during the last 5-8 years universities and colleges began to experiment with Lean principles. The overwhelming majority of cases covered in the literature are from the US where most HEIs always operated in a competitive market environment and thus are more open to private sector management practices (Owlia & Aspinwall 1997). However, the quality of this literature is rather poor. Most of it falls under the category of grey literature, e.g. several online papers with rather anecdotal evidence (Moore et al. n.d.; Alp n.d.; Kusler n.d., see also Jin & Kachroo 2010). In these accounts, which do not meet academic standards of empirical research, the authors praise the success of their own Lean projects but remain very vague with regards to the applied Lean approach and the quantitative outcomes. One conference paper (Barroso et al. 2010) and a monograph (Balzer 2010) do only summarise these accounts in a rather uncritical and naive manner without making their own investigations. The few scholarly articles on the topic remain purely theoretical (Dahlgaard & Østergaard 2000) or put every type of reform activity in HE under the Lean heading (Comm & Mathaisel 2005a, 2005b) – again an example of ex-post rationalisation. Table 2 illustrates the literature gap with regards to Lean in HE.
Table 2: The literature gap – Overview of case studies on Lean implementation in manufacturing, services, public administration and HE

<table>
<thead>
<tr>
<th>Manufacturing</th>
<th>Services</th>
<th>Public admin.</th>
<th>HE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Also several examples from the aerospace industry, e.g. Crute et al. 2003; Leitner 2005; Womack &amp; Jones 2003</td>
<td>Bowen &amp; Youngdahl 1998: Airline, fast food restaurants, private hospital</td>
<td>Hines et al. 2008a: Court system</td>
<td>Radnor &amp; Bucci 2011: five UK cases but weak empirical basis</td>
</tr>
<tr>
<td>Beyond that (only selection):</td>
<td>Delgado et al. 2010: Banking</td>
<td>Krings et al. 2006: Municipality admin.</td>
<td></td>
</tr>
</tbody>
</table>

An exploratory online research, conducted at the outset of this dissertation project in January 2011, found several Lean projects at UK universities that had not yet been subject to an academic evaluation at this time\(^4\) (see table 3). In March 2011, Radnor and Bucci (2011) published an explanatory study on Lean implementation in UK business schools and universities. Their findings are an invaluable first step to develop a better understanding of if and how Lean can be applied in a HE context and will be discussed below. However, they do neither come up with a systematic theoretical model to conceptualise Lean projects from an organisational change perspective nor do they derive recommendations for an implementation framework that is tailored to the specific HE setting – their reflections remain fairly generic. Most important, the

\(^4\) Hines and Lethbridge (2008) briefly describe the Lean initiative at Cardiff University but they do neither elaborate on the chosen Lean approach nor evaluate its impact.
study is based on a rather weak empirical foundation. On average, only one interview was conducted per analysed university. Furthermore, all interviewees were either involved in the initiation of Lean at their university or acted as facilitators of Lean projects and thus have vested interests in a successful evaluation, which raises problems of interviewee bias (Kvale & Brinkmann 2008). The perspective of managers and staff working in the “leaned” processes was not included.

Table 3: Results of preliminary online research on Lean university projects in the UK

<table>
<thead>
<tr>
<th>University</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aston (Business school)</td>
<td>Fearn 2010</td>
</tr>
<tr>
<td>Aberdeen</td>
<td>Fearn 2010</td>
</tr>
<tr>
<td>Cardiff</td>
<td><a href="http://www.cardiff.ac.uk/lean/index.html">http://www.cardiff.ac.uk/lean/index.html</a></td>
</tr>
<tr>
<td>Manchester Metropolitan</td>
<td>Fearn 2010</td>
</tr>
<tr>
<td>Nottingham Trent (Business school)</td>
<td>Radnor 2010b</td>
</tr>
<tr>
<td>Portsmouth (Business school)</td>
<td>Radnor 2010b</td>
</tr>
<tr>
<td>Southampton Solent</td>
<td><a href="http://www.solent.ac.uk/conferences/events/lean-conference">http://www.solent.ac.uk/conferences/events/lean-conference</a></td>
</tr>
<tr>
<td>St. Andrews</td>
<td><a href="http://www.st-andrews.ac.uk/lean">http://www.st-andrews.ac.uk/lean</a></td>
</tr>
<tr>
<td>Warwick (Business school)</td>
<td>Fearn 2010</td>
</tr>
</tbody>
</table>

Source: compiled by the author

Summarising the sparse literature on “lean universities”, and drawing mainly on Radnor and Bucci’s (2011) groundwork, it seems like the conditions for Lean implementation in HE are somehow similar to those in the wider public sector. The understanding of Lean principles and methods as reflected in the reported projects seems to be fragmented. Again the focus is on process optimisation, even though the “human aspect”, i.e. rising performance pressure instead of employee empowerment, seems to be less a problem. However, it is striking that most analysed projects are concerned with support processes (e.g. payroll, procurement, maintenance) or the administrative parts of core processes (e.g. admission and student administration), with only one case reported where Lean was applied to the organisation of academic courses (Emiliani 2004, 2005). Furthermore, most optimisation activities seem to focus on a few isolated (parts of) processes, with little evidence for an integrated overall coordination.

2.6 Conceptual model: A framework for understanding Lean implementation

There is no doubt that more empirical research is needed to gain a better understanding of the role and relevance of Lean in HE management. By looking at several HEIs experimenting with Lean, the dissertation wants to understand the motives and reasons for the project initiation, the applied methods and tools and the scope of Lean activities. Moreover, it is interested in the impact of the initiatives as well
as the mediating effect of critical success factors and barriers to change. To
systemically analyse these aspects, this section develops a framework for
conceptualising Lean implementation (see exhibit 2) that will inform and guide the
dissertation's empirical research and discusses it against the reviewed literature\(^5\) to
refine and operationalize its building blocks (Eisenhardt 1989).

**Exhibit 2: Simple linear model of organisational change**

```
<table>
<thead>
<tr>
<th>Motives</th>
<th>Why?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean approach: Methods &amp; Scope</td>
<td>How and where?</td>
</tr>
<tr>
<td>Implementation: Enablers/ barriers</td>
<td>With/ against what?</td>
</tr>
<tr>
<td>Impact</td>
<td>What for?</td>
</tr>
</tbody>
</table>
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Source: compiled by the author

**Motives: Why?**

Decoding the motives of Lean implementation involves three aspects – understanding
the (1) project drivers and (2) objectives as well as the (3) decision for Lean as
optimisation method.

In the private sector, the main *driver* for “going Lean” is usually the desire to improve
competitiveness, often sparked by a crisis (Womack & Jones 2003). Compared to that,
Lean implementation in the public sector is more driven by government efficiency
programmes and budget cuts (Radnor et al. 2006) – an eternal topic.

In manufacturing companies, the tangible *objectives* of Lean initiatives are normally to
reduce inventory and lead times and to boost productivity and quality. In a service
context, the inventory dimension is either meaningless or less important and quality
focuses on customer perception and experience (Seddon 2005). In addition, Lean
initiatives in the public sector often have to put less emphasis on staff reductions.

Regarding the *decision for the optimisation method*, Lean has to compete with
alternative approaches such as TQM, Six sigma or more recently Agile (Hallgren &

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\(^5\) This draws mostly on the findings of the previous sections and references will only be given for new
aspects that have not been mentioned before.
Olhager 2009). However, based on the increasing number of successful examples, Lean is often regarded as a particularly well-proven approach. Drawing on best practice might be appropriate for manufacturing companies. However, service operations in the private and public sector need to consider the contingencies of Lean implementation and the rationale of their decisions to “go lean” is only poorly understood.

Addressing these aspects with regards to Lean implementation in HE, leads to the following research questions:

Q1) Why do universities apply Lean principles to their work?
   a. To which external and internal drivers do their initiatives respond?
   b. What are the initiatives’ key objectives?
   c. Why did they choose Lean as optimisation method?

Approach: How and where?

If Lean thinking is first and foremost a dynamic capability, then developing a context-sensitive interpretation and translation of the generic Lean principles and methods is key to its successful implementation. This implies two central aspects: the (1) applied Lean tools and techniques and the (2) scope or application range.

Lean production provides manufacturers with a fully developed and well-attuned set of tools to implement the five Lean principles and the two Lean methods. While it is widely accepted that Lean services require a different toolbox, it is less clear how exactly the Lean principles and methods should be adapted to the specific service context. The reported cases for Lean implementation in (public) service operations, with their focus on VSM and Rapid Improvement Events (RIE), are hard to distinguish from conventional process optimisation pepped up with some root cause analysis. In its current state, Lean services is not the revolutionary overhaul of classic service management principles that Lean production has been to manufacturing theory.

Scope or application range refers to the question to which of the organisation’s units or processes Lean should be applied, or more precisely where to start using Lean, as full implementation is almost always the ultimate goal. Implementation strategies can vary significantly between organisations. Two contrasting ideal types (Weber 1968) have been described to illustrate the width of the spectrum (Dennis 2006; Bicheno 2008; Radnor et al. 2006): While the emergent bottom-up approach (“Lean Light”) relies on a sequence of a few separate small-scale projects and tries to gradually gain momentum, the holistic top-down approach (“System Lean”) is basically a centrally initiated major change initiative starting at a strategic level by identifying the end-to-end
processes of value creation in order to prioritise areas of improvement (see table 4). Most organisations fall somewhere in between these both extremes and can also change their position over time, i.e. either start small and later make the link to strategy or slowly phase out central coordination once change has become self-reinforcing. However, the available case studies suggest that the more radical “System Lean” strategy is easier to implement in the private sector and that the public sector relies heavily on more or less disjointed pilot projects (Radnor et al. 2006).

Table 4: Comparison of the both ideal types of Lean implementation strategies

<table>
<thead>
<tr>
<th>Description</th>
<th>Emergent bottom-up approach (“Lean Light”)</th>
<th>Holistic top-down approach (“System Lean”)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
<td>One or a few pilot projects with narrow focus, often by picking voluntary innovators</td>
<td>Starts at the strategic level by looking at the customer needs to analyse how value is created</td>
</tr>
<tr>
<td>Projects are usually based on 3-5 day Rapid Improvement Event (RIE) with process mapping and improvement</td>
<td>Targets end-to-end processes that cross organisational boundaries</td>
<td></td>
</tr>
<tr>
<td>Projects are supported by professional lean facilitators</td>
<td>Prioritises areas of improvement coordinates projects</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Works with cross-functional teams</td>
</tr>
<tr>
<td><strong>Strength</strong></td>
<td>Easy to introduce, both politically and in terms of investments</td>
<td>Tackles the organisation’s “real” underlying problems</td>
</tr>
<tr>
<td>Aims at “quick wins” in order to initiate a “snowball effect”</td>
<td>Goes beyond “quick wins”</td>
<td></td>
</tr>
<tr>
<td>More tangible for shop floor staff/front-line workers</td>
<td>Involves all staff and facilitates sustainable cultural change</td>
<td></td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td>Danger of disjointed initiatives and “island optimisation” due to lack of coordination</td>
<td>High resource requirements in terms of cost and time</td>
</tr>
<tr>
<td>MIGHT optimise non-value adding activities as not based on analysis of end-to-end processes</td>
<td>Can trigger significant resistance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Top-down prioritisation might hinder grassroots initiative</td>
<td></td>
</tr>
<tr>
<td><strong>Dynamics</strong></td>
<td>“Start small and scale up”</td>
<td>“Start big and phase out”</td>
</tr>
<tr>
<td>Source: compiled by the author, partly based on Radnor et al. 2006</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Addressing these aspects with regards to Lean implementation in HE, leads to the following research questions:

**Q2) How is Lean defined for the purpose of the universities’ initiatives?**

a. Which of the five Lean principles and two Lean methods are applied?

b. Which tools and techniques are used to implement Lean?
Q3) Where is Lean implemented in the universities?

a. Is Lean only applied to support processes or also to the core processes of teaching and research?

b. Does implementation strategy follow an emergent bottom-up or a holistic top-down pattern?

Implementation: With/ against what?

When analysing the underlying success factors of Lean implementation, most authors (see table 5) point to the usual well-known elements of effective change management (Kotter 1996), namely (1) awareness that change is necessary, the (2) capacity to deal with change and a (3) supportive organisational culture.

Table 5: Success factors of Lean implementation and their determinants

<table>
<thead>
<tr>
<th>Factor</th>
<th>Determinants</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>On-going and visible leadership support, especially when conflicts arise</td>
<td>Achanga et al. 2006; Dahlgaard &amp; Dahlgaard-Park 2006; Nash &amp; Poling 2007; Sohal &amp; Egglestone 1994</td>
</tr>
<tr>
<td>of change necessity</td>
<td>Exposure and responsiveness to customer needs and external pressures</td>
<td>Nordin et al. 2008; Sohal &amp; Egglestone 1994</td>
</tr>
<tr>
<td></td>
<td>Professional communication: explaining Lean, preparing staff (and trade union) for change, announcing quick wins</td>
<td>Karlsson &amp; Ahlström 1996; Scherrer-Rathje et al. 2009; Tracey &amp; Flinchbaugh 2006; Worley &amp; Doolen 2006</td>
</tr>
<tr>
<td>Change capacity</td>
<td>Availability of methodical expertise: Internal Lean facilitators or support from external management consultants</td>
<td>Achanga et al. 2006; Dahlgaard &amp; Dahlgaard-Park 2006</td>
</tr>
<tr>
<td></td>
<td>Formal project structure with dedicated resources (budget and staff)</td>
<td>Achanga et al. 2006; Crute et al. 2003</td>
</tr>
<tr>
<td></td>
<td>Senior and middle management commitment, i.e. number and influence of change agents</td>
<td>Scherrer-Rathje et al. 2009; Worley &amp; Doolen 2006</td>
</tr>
<tr>
<td></td>
<td>Past experience with major change projects</td>
<td>Radnor et al. 2006</td>
</tr>
<tr>
<td>Supportive culture</td>
<td>Pragmatism and openness towards new ideas</td>
<td>Achanga et al. 2006; Recht &amp; Widerom 1998</td>
</tr>
<tr>
<td></td>
<td>Mutual trust and free information flow</td>
<td>Recht &amp; Widerom 1998</td>
</tr>
<tr>
<td></td>
<td>Staff empowerment: authority to make decision and take ownership for improving the workplace</td>
<td>Alukal 2003; Scherrer-Rathje et al. 2009</td>
</tr>
<tr>
<td></td>
<td>Good labour relations</td>
<td>Fairris &amp; Tohyama 2002</td>
</tr>
<tr>
<td></td>
<td>Process-based thinking and customer orientation</td>
<td>Radnor et al. 2006</td>
</tr>
</tbody>
</table>

Source: compiled by the author
In general, an organisation’s awareness of change requirements is a function of its exposure to and dependence on its external environment, e.g. customer needs or expectations of financial markets. Further drivers of awareness are top management involvement and professional internal communication that create a sense of urgency.

Change capacity depends mainly on the resources and capabilities organisations (can) commit to their optimisation projects. This includes internal or external Lean expertise, the availability of a dedicated project management structure as well as senior and middle management commitment. Based on an understanding of Lean as dynamic learning capability, creating this change capacity is not only an enabler to Lean implementation but also an end in itself.

Most important but also difficult to capture and address is the existence of a supportive organisational culture. This comprises general aspects such as openness towards new ideas, mutual trust and staff involvement as well Lean specific issues, e.g. process-based thinking, focus on customer value or continuous improvement.

Radnor et al. (2006) summarise these enablers and barriers to Lean implementation under the concept of “organisational readiness”. All in all, the specific public sector characteristics that have been identified above seem to indicate a lower level of “organisational readiness” within public administration as compared to the private sector (see also Yasin & Wafa 2002).

Addressing these aspects with regards to Lean implementation in HE, leads to the following research questions:

Q4) Which are the critical success factors and barriers to change for Lean implementation in HE? How strong are they?
   a. How strong is the universities’ awareness of change requirements?
   b. How large is their change capacity?
   c. Does the universities’ specific organisational culture support or impede Lean implementation?

Impact: What for?

The impacts of Lean implementation can be structured along two dimensions: Effects can be either (1) quantitative or qualitative and might occur either (2) intended or unintended.

Empirical evidence from the manufacturing sector suggests that Lean production actually delivers on its promises of revolutionary improvements. Based on several case studies, Womack and Jones (2003; see also AME 2008) state that already the initial kaikaku phase of Lean implementation typically doubles labour productivity, cuts lead
times and inventories by 90% and reduces errors, scrap and job-related inventories by half. Furthermore, Lean implementation seems to facilitate cultural change towards continuous improvement. With regards to unintended effects, manufacturers implementing Lean often report substantial cash flow improvements due to lower levels of working capital tied up in inventory.

Table 6: Evidence on the relationship between Lean implementation and performance

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Manufacturing</th>
<th>Services</th>
<th>Public Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quantitative impacts</strong></td>
<td><em>On average:</em> Womack &amp; Jones 2003: productivity +100%, lead times and WIP -90%, defects -50%</td>
<td>Goland et al. 1998: costs -15% to -30%, processing time -20% to -30%</td>
<td>Radnor et al. 2006: customer waiting time -48%, non quantified improvements in lead times, costs and quality</td>
</tr>
<tr>
<td></td>
<td>Case-specific: Crute et al. 2003: lead times -38%, scrap &amp; rework -79%, labour efficiency +20%, stock turns +130%</td>
<td>Staats &amp; Upton 2007: coding productivity +80% (software development), total productivity +10%</td>
<td>Radnor &amp; Bucci 2007: non quantified improvements in quality and to a lesser extent also in productivity and lead times</td>
</tr>
<tr>
<td></td>
<td>Day 1995: lead times -50%, productivity +52%, WIP -85%, factory footprint -28%</td>
<td>Swank 2003: errors -40%, labour costs -26%, application turnaround time (insurance) -70% to -84%</td>
<td>Zokaei et al. 2010: service delivery costs -36%, lead times -36% to -76%</td>
</tr>
<tr>
<td></td>
<td>Leitner 2005: factory cycle time -46%, WIP -55%, factory footprint -21%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lewis 2000: WIP -28% to -60%; on-time delivery +16% to +44%, defects -77% to -97%, NPD lead time -47% to -77%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Qualitative impacts</strong></td>
<td>Womack &amp; Jones 2003, Cusumano 1985: organisation-wide cultural change towards continuous improvement</td>
<td>Swank 2003: business unit-wide improvement of process understanding and cross-functional collaboration</td>
<td>Radnor et al. 2006, Randor &amp; Bucci 2007: “islands of excellence” with better process understanding and team work</td>
</tr>
<tr>
<td><strong>Unintended impacts</strong></td>
<td>Womack &amp; Jones 2003: cash flow improvements</td>
<td>No evidence</td>
<td>Carter et al. 2011: Falling staff satisfaction</td>
</tr>
</tbody>
</table>

Note: This table summarises exemplary anecdotal evidence that might vary with regards to validity (“over the thumb” estimates vs. measurements), process scope (whole value stream vs. isolated process parts) and baseline levels.

Source: compiled by the author

Moving from manufacturing via for-profit services to public administration, the magnitude of the reported quantitative and qualitative impacts is gradually decreasing (see table 6). Also the data basis gets weaker as there seems to be less systematic
quantitative impact assessment. While still significant, performance improvements through Lean implementation in (public) services are less revolutionary compared to those reported for Lean production (see e.g. Radnor 2006). In addition, especially in the public sector, Lean implementation is confronted with unintended negative effects on staff satisfaction, as it is sometimes perceived as a means of rigid standardisation and increased performance pressure.

Addressing these aspects with regards to Lean implementation in HE, leads to the following research questions:

Q5) **What are the results of the universities’ Lean initiatives?**
   a. **What are the quantitative impacts on performance in terms of lead times, quality and cost-efficiency?**
   b. **What are qualitative impacts on terms of cultural change?**
   c. **Did the impacts achieve the original objectives? Which unintended outcomes occurred?**

**Conclusion**

Table 7 summarises the findings of this literature review as well as the derived research questions along the categories of the conceptual model. While it is important to note that in reality every organisation is different, i.e. features a specific set of resources, capabilities and environmental pressures, it still seems possible to make some simplifying generalisation with regards to the organisational context. Put simply and applying the suggested conceptual model, for-profit manufacturing operations applying Lean seem to have the clearest motive structure and can draw on a well-attuned Lean toolkit. Together with a high level of “organisational readiness”, this translates into substantial quantitative and qualitative impacts. On the other end of the spectrum, performance improvements in the public sector are less revolutionary as organisations have to struggle with methodological problems and several barriers to change.
Table 7: Summary of literature review findings and research questions along the dimensions of the conceptual model

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Aspect</th>
<th>Manufacturing</th>
<th>For-profit-Services</th>
<th>Public services</th>
<th>Research question Higher Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) Motives</td>
<td>Drivers</td>
<td>Increase competitiveness (often sparked by critical incidence)</td>
<td>Lead times, productivity, perceived quality, cultural change</td>
<td>Lead times, productivity (w/o job cuts), perceived quality, cultural change</td>
<td>Why do universities apply Lean principles to their work?</td>
</tr>
<tr>
<td></td>
<td>Objectives (dimensions)</td>
<td>Lead times, productivity, quality, inventory, cultural change</td>
<td>Lead times, productivity, perceived quality, cultural change</td>
<td>Lead times, productivity (w/o job cuts), perceived quality, cultural change</td>
<td>To which external and internal drivers do their initiatives respond?</td>
</tr>
<tr>
<td></td>
<td>Lean justification</td>
<td>Best practice: well-proven approach</td>
<td>Rationale not fully understood</td>
<td></td>
<td>What are the initiatives’ key objectives?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Why did they choose Lean as optimisation method?</td>
</tr>
<tr>
<td>Q2) Methods</td>
<td>Principles and methods</td>
<td>Lean production: fully integrated toolbox for applying all Lean principles and methods</td>
<td>Largely limited to “value stream”, “flow” and “root cause analysis”</td>
<td>Similar to conventional process optimisation – largely limited to VSM and RIEs</td>
<td>How is Lean defined for the purpose of the universities’ initiatives?</td>
</tr>
<tr>
<td></td>
<td>Tools &amp; techniques</td>
<td></td>
<td></td>
<td></td>
<td>Which of the five Lean principles and two Lean methods are applied?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Which tools and techniques are used to implement Lean?</td>
</tr>
<tr>
<td>Q3) Scope</td>
<td>Units/ areas</td>
<td>Production, R&amp;D, Sales</td>
<td>Service delivery system, support processes</td>
<td></td>
<td>Where is Lean implemented in the universities?</td>
</tr>
<tr>
<td></td>
<td>Implementation strategy</td>
<td>More holistic top-down approach</td>
<td>More emergent bottom-up approach</td>
<td></td>
<td>Only to support processes or also to the core processes of teaching/ research?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Is implementation strategy rather bottom-up or top-down?</td>
</tr>
<tr>
<td>Q4) Implemen-</td>
<td>Awareness</td>
<td>High, mainly due to exposure to markets (customers, finance, suppliers)</td>
<td>Lower</td>
<td></td>
<td>Which are the enablers and barriers to change for Lean implementation in HE?</td>
</tr>
<tr>
<td>tation</td>
<td>Change capacity</td>
<td>High, mainly due to more personal management commitment</td>
<td>Lower</td>
<td></td>
<td>How strong is the universities’ awareness of change requirements?</td>
</tr>
<tr>
<td></td>
<td>Organisational culture</td>
<td>Supportive (market-driven)</td>
<td>Impeding (bureaucratic)</td>
<td></td>
<td>How large is their change capacity?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>What is the effect of the universities’ specific organisational culture?</td>
</tr>
<tr>
<td>Q5) Impact</td>
<td>Quantitative</td>
<td>Revolutionary performance improvements</td>
<td>Significant impacts but less revolutionary</td>
<td></td>
<td>What are the results of the universities’ Lean initiatives?</td>
</tr>
<tr>
<td></td>
<td>Qualitative</td>
<td>(Organisation-wide) cultural change towards continuous improvement</td>
<td>Islands of excellence w/ better process-view and customer-orientation</td>
<td></td>
<td>What are the quantitative impacts on performance?</td>
</tr>
<tr>
<td></td>
<td>Unintended</td>
<td>Increased cash flow due to inventory reduction</td>
<td>Negative effects on staff satisfaction (performance pressure)</td>
<td></td>
<td>What are qualitative impacts in terms of cultural change?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Did the impacts achieve the original objectives? Which unintended outcomes occurred?</td>
</tr>
</tbody>
</table>

Source: compiled by the author

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3. Methodology

A robust, carefully planned and implemented methodology is the foundation of high-quality research. This chapter explains how the dissertation addresses the raised research questions. First of all, the dissertation’s research philosophy, i.e. its epistemological and ontological position, is described to illustrate the theoretical perspectives taken when interpreting empirical data. Next, the inductive research approach and the comparative case study research strategy are explained, before the actual research design, i.e. case selection, data collection and data analysis, is discussed in detail. Finally, an overall assessment of the robustness of the proposed methodology and its limitations is carried out.

3.1 Research philosophy: A pragmatic perspective on organisational change

The dissertation aims at understanding Lean implementation in a rather new and not yet fully researched organisational setting. This leads to a variety of different research questions (see previous chapter), some of which are more focused on objective aspects and others that are more related to subjective individual perceptions. Consequently, the dissertation takes the epistemological position of pragmatism (Saunders et al. 2009) and analyses the research questions from different theoretical perspectives. More precisely, two contrasting paradigms of organisational change should be applied – economic functionalism and the sociological interpretivism (Edeling 1998; Burrell & Morgan 1982; see also exhibit 3).

Exhibit 3: Research philosophy – two paradigms of organisational change

<table>
<thead>
<tr>
<th>Economic functionalism</th>
<th>Sociological interpretivism</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontological position:</strong></td>
<td><strong>Ontological position:</strong></td>
</tr>
<tr>
<td>objectivism – organisation as independent object</td>
<td>subjectivism – organisation as socially constructed phenomenon</td>
</tr>
<tr>
<td><strong>Logic of consequentiality:</strong></td>
<td><strong>Logic of appropriateness:</strong></td>
</tr>
<tr>
<td>organisational structures as outcomes of purposive actions by instrumentally oriented individuals</td>
<td>organisational structures reflect dominant ideas</td>
</tr>
<tr>
<td><strong>Theories:</strong> Rational choice, contingency approach, new institutional economic</td>
<td><strong>Theories:</strong> Role theory, constructivism, sociological neo-institutionalism</td>
</tr>
<tr>
<td><strong>Research task:</strong> assess effectiveness and suggest improvements</td>
<td><strong>Research task:</strong> understand ambiguity of conflicting subjective meanings</td>
</tr>
</tbody>
</table>

Source: compiled by the author
The economic-functionalist paradigm is based on the ontological position of objectivism that assumes that “there is an external viewpoint from which it is possible to view the organisation, which is comprised of consistently real processes and structures” (Bryman & Bell 2007: 25). It follows the “logic of consequentiality” (March & Olsen 1989) and understands organisational structures as the intended result of decisions made by rational actors (e.g. management) that seek to fulfil certain objectives (Furubotn & Richter 2005). Effectiveness and efficiency of these structures are limited by the actors’ “bounded rationality” (Simon 1945), i.e. imperfect and asymmetric information, the availability of resources, and organisation politics in terms of conflicts of interests with other influential actors. Based on this paradigm, Lean is understood as a solution to practical problems and research wants to assess its implementation to derive success factors and suggest improvements.

The sociological-interpretive paradigm takes the ontological position of subjectivism that conceives reality as “socially constructed” (Berger & Luckmann 1967). The paradigm aims at discovering the ostensible irrationalities of organisational life by decoding the subjective meanings, which individuals within the organisation attribute to structures and decisions (Saunders et al. 2009). Furthermore, the paradigm sees organisations as embedded in a partly institutionalised environment with dominant ideas and beliefs, e.g. best practices. According to the “logic of appropriateness” (March & Olsen 1989) organisations adopt “… structures, processes and ideologies which significant groups in their environment consider to be rational, efficient, reasonable, fair, natural or up to date” (Brunsson & Olsen 1993: 7) in order to gain support and legitimacy (DiMaggio & Powell 1991; Meyer & Rowan 1977). Based on this paradigm, Lean can mean different things to different people and research needs to reconstruct this ambiguity to understand “rational” decisions and unintended outcomes. It also examines how the organisation’s embeddedness in an institutionalised environment might drive Lean implementation.

Like spotlights on a stage (Ritzer & Goodman 2007), both theoretical paradigms illuminate different aspects of the proposed linear model of organisational change, therefore enabling a more comprehensive understanding of its conceptual constructs (see exhibit 4). With regards to the motives for pursuing Lean implementation and the chosen Lean approach, functionalism analyses the organisation’s strategy and management objectives, which are assumed to be translated into tailored organisation-specific solutions, whereas interpretivism stresses the importance of environmental pressures to adopt best practice. When considering enablers and barriers to implementation, functionalism directs attentions to the available (management) resources and capabilities and conflicting interests. On the other hand, interpretivism
looks at the role of organisational culture and diverging perceptions of Lean within the organisation. Finally, the former paradigm focuses more on the intended impacts of management decisions, while the latter emphasises the significance of the intangible and unintended effects of organisational complexity.

**Exhibit 4: The two paradigms applied to the conceptual model of Lean implementation**

![Diagram showing the two paradigms applied to the conceptual model of Lean implementation.]

Through oscillation between both paradigms, the “blinds spots” of each can be overcome (Edeling 1998). This should be illustrated with an example: The functionalist paradigm suggests that organisations adopt certain management practices to improve performance. By contrast, interpretivism points to the non-reflective adoption of best practices to appear modern and efficient to important stakeholders and secure legitimacy. Brunsson (2003) demonstrates that often both explanations need to be applied simultaneously to get the full picture. Torn between contradictory internal and external requirements and expectations, organisations can decouple “talk”, “decision” and “action”, e.g. by proclaiming the implementation of Lean best practices and documenting this in strategy papers and corporate communications, while at the same time applying a more tailored approach to continuous improvement that considers the organisation’s current position and actual needs. There is a strong path-dependency of competence development and not all Lean principles and methods might seamlessly fit to the institution’s organisational routines (Teece et al. 1997; Nelson & Winter 1982).

The outlined research philosophy was used for the design of the data collection instruments, which are described in more detail below. It also guided data analysis and theory development by using the two contrasting perspectives to evaluate the empirical findings along the categories of the conceptual model.
3.2 Research approach and strategy: Case study-based theory development

Lean services in general and Lean HE in particular can be described as undertheorized research areas, especially with regards to the actual Lean implementation. The reviewed literature does not go beyond rather descriptive lists of enablers and barriers to implementation and does neither link them to other conceptual variables nor structure them in any meaningful way. In order to fill this gap, the dissertation combines exploratory and explanatory elements (Robson 2002) and applies an inductive research approach (Saunders et al. 2009). It codes, structures and compares the collected data and uses the emerging patterns to derive conceptual frameworks and taxonomies (Eisenhardt 1989). Aiming at theoretical generalisation (King et al. 1994), this inductive approach refines the arising concepts until they fit in with the collected data and can be tested against further evidence in future research (Voss et al. 2002). However, the proposed research does not exist in a vacuum. By using the outlined conceptual model of Lean implementation as search heuristic, data collection and analysis will be informed by the broader Lean literature, i.e. feature also deductive elements (Bryman & Bell 2007; Meredith 1998).

Regarding the research strategy, the dissertation is based on case studies (Yin 2003; Rose 1991). Analysing three HEIs practicing Lean, it applies a multi case design that allows both, in-case analysis that tries to determine the conceptual model’s different parameters for each HEI and between-case analysis, which focuses on differences and similarities and seeks to identify and conceptualise the relationships between the underlying variables (Eisenhardt 1989). The sample size of three HEIs enables a good trade-off between comprehensive data and feasibility. It is large enough to allow meaningful comparison but can still be carried out under the given time restrictions.

Based on Yin’s (2003) distinction between holistic and embedded cases, each case study comprises two different levels of analysis. The system level analyses the university’s overall Lean initiative in order to understand strategic considerations. The micro level has a more operational focus and looks at 1-2 processes (e.g. library re-shelving, admission) that were improved under the Lean initiative. This strategy addresses two major weaknesses of the empirical Lean services literature: First, going beyond the pure description of intended implementation strategies, it analyses what actually happens “on the ground” when HEIs apply Lean. Second, it overcomes the heavy reliance on the perceptions of “Lean professionals”, e.g. strategists and Lean facilitators, having vested interests in a positive evaluation of the method’s impacts by extending the range of interviewees to managers and staff working in the “leaned”
processes and participating in improvements events. Table 8 illustrates how the research questions were adapted to the two different levels of analysis.

Table 8: Case studies – Levels of analysis and adapted research questions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>System level (university Lean initiative)</th>
<th>Micro level (improved process/area)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) Motives</td>
<td>What started the change initiative? What are its key objectives? How is it linked to strategy and other initiatives? Why did the university go for Lean?</td>
<td>How was the project initiated? What were its key objectives? Had process improvements been considered before?</td>
</tr>
<tr>
<td>Q2) Methods</td>
<td>How is Lean defined for the purpose of the university’s initiative? Which tools are used? How does the Lean team define its role?</td>
<td>What happened during the Lean project? What is the participants’ understanding of Lean? How was the Lean team’s role perceived?</td>
</tr>
<tr>
<td>Q3) Spread</td>
<td>Which processes have been improved? How are projects selected? What comes next? Which areas are less suitable?</td>
<td>How were other units involved in the project? Were there any organisational boundary issues?</td>
</tr>
<tr>
<td>Q4) Imple-</td>
<td>What are the critical success factors and lessons learned regarding Lean implementation? What are the barriers to change?</td>
<td>Were there any practical difficulties during the project? How were they addressed? How was the implementation of suggestions followed up?</td>
</tr>
<tr>
<td>mentation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q5) Impact</td>
<td>What are the initiative’s overall results in terms of cost-efficiency, lead times, quality and cultural change?</td>
<td>What are the project’s results in terms of cost-efficiency, lead times and quality? How did it change actual work practice?</td>
</tr>
</tbody>
</table>

Source: compiled by the author

The outlined case study strategy is best suited for addressing the research objectives and questions derived from the literature review. It has the following advantages: First, case study research allows studying actual management practice in a natural setting, which supports high practical relevance of its findings (Benbasat et al. 1987). Consequently and second, case studies create a detailed understanding of a Lean initiative’s specific context, thus allowing a thorough examination of what, why and how questions (Yin 2003). Third, it is a very flexible strategy because it can combine different research methods and enables greater responsiveness as the research process advances (Eisenhardt 1989). Fourth, inductive approach and methodological flexibility can achieve analytical depth in early investigations where important variables might be still unknown or not fully understood (Meredith 1998).

The case studies use a multi method research design (Tashakkori & Teddlie 2003), combining two different qualitative methods of data collection, namely semi-structured interviews and document analysis, which are described in more detail in the next section. This research design does not only provide rich qualitative data that is the
foundation for building a profound understanding of the analysed Lean initiatives. Using two independent data collection methods also allows triangulation, i.e. corroboration of findings through crosschecking them against different data, which increases validity (Easterby-Smith et al. 2002).

3.3 Research design: Methods and planning of data collection and analysis

This section offers a detailed description of the dissertation’s three-phase research design (see exhibit 5). Initially, case selection is explained. Next, methods and procedures of data collection are outlined. Finally, it is described how the collected data was documented, coded and analysed.

**Exhibit 5: Three-phase research design**

<table>
<thead>
<tr>
<th>Phase</th>
<th>Exploration/ case selection</th>
<th>Data collection</th>
<th>Data analysis</th>
</tr>
</thead>
</table>
| 1     | **Objectives**: Select appropriate number of cases to enable theoretical generalisation within given time constraints  
**Methods**: Exploratory online research; “purposive” sampling | **Objectives**: Provide comprehensive empirical basis for theory development; achieve high levels of reliability and validity  
**Methods**: Semi-structured interviews; document analysis; research protocol; field notes | **Objectives**: Generate new theory and extend existing theory through taxonomies and relational concepts  
**Methods**: Open, axial and selective coding using NVivo; in-case and between-case analysis; “replication logic” |

Source: compiled by the author

**Phase 1: Exploration/ case selection**

As described above (see table 3), an exploratory online research was conducted at the outset of the dissertation project to identify, which UK universities are experimenting with Lean. Even though this list does not claim completeness, it provided a sufficient basis for case selection. Consequently, all identified HEIs were contacted in April 2011 by email and were asked for their willingness to participate in the research project. Five out of nine replied and provided further information about their Lean initiatives. Based on this information, a “purposive sample” (Tashakkori & Teddlie 2003) of three HEIs was drawn by applying the following criteria: First, a case needed to be relevant, i.e. the HEI was actually applying Lean and not another optimisation approach and it could look back at least one year of implementation experience. Second, to control for the
influence of the wider socioeconomic environment and to focus on the effect of more specific and meaningful independent variables, all three cases were taken from the UK HE sector. Third, and more pragmatic, the cases were selected based on the HEIs’ willingness to participate in the research by providing interviews and documents.

In order to encourage participation and to facilitate greater openness during the interviews and access to internal documents all participating institutions were guaranteed full confidentiality. In the following, the three analysed HEIs are referred to as University A, B and C. Short case profiles can be found in the next chapter.

**Phase 2: Data collection**

Data collection for each case study was carried out in four steps (see exhibit 6). First, all participating HEIs were asked for additional not publicly available documents, enabling the researcher to develop a basic understanding of the case and to draw up draft interview guides. Second, during short telephone calls with the contact person for each host site, an appointment for the on-site visit was arranged, 1-2 projects for the micro-level analysis were selected and the interview guides were discussed. Third, the on-site visits took 1-2 days for each participating HEIs and could all be completed in one week, between 20th June and 24th June 2011. During these visits, several interviews were conducted and in many cases additional documents could be obtained. Fourth, all collected data was documented and standardised, i.e. interview recordings were transcribed and documents were summarised and compared in synopsis reports. The researcher’s observations and thoughts during all case study steps were documented in field notes (Saunders et al. 2009).
With regards to the interviews, different target groups were defined to ensure that all research questions at both levels of analysis are covered (see table 9). For each case study, 3–7 interviews of 45–90 minutes were carried out – some of them with two interviewees, so that the actual number of respondents varies between 4 and 8 per university. Moreover, many interviewees fall into more than one target group, e.g. a line manager of an improved process who facilitated an improvement event or staff participating in Lean workshops whose organisational unit can be seen as internal customer of the improved process. Table 10 provides an overview of the number of interviews, interviewees and data points per target group for each analysed HEI. A detailed list of all conducted interviews can be found in appendix 4.

For all interviews a semi-structured approach was applied as it provides the best trade-off between thematic focus and cross-case comparability at the one hand and flexibility and in-depth inquiry at the other hand (Kvale & Brinkmann 2008; Healey & Rawlinson 1994). The categories of the conceptual model were translated into interview questions by applying the both outlined theoretical paradigms. For instance, the category of motives for Lean implementation was operationalized by asking for rational management objectives and the importance of best practices and environmental pressures. Separate interview guide templates were compiled for both levels of analysis and can be found in appendix 5. These templates were slightly adjusted for each interview, e.g. top management interviews focused on background and strategic motives of the Lean initiatives and skipped detailed questions about tools and

Exhibit 6: Case studies – Four-step procedure

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Prioritisation</th>
<th>On-site visit</th>
<th>Documentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Method:</strong> document analysis</td>
<td><strong>Method:</strong> short telephone call of 20 min</td>
<td><strong>Method:</strong> 3-6 semi-structured interviews of 45-90 min over 1-2 days</td>
<td><strong>Method:</strong> transcription of interviews, synopsis report of documents</td>
</tr>
<tr>
<td><strong>Purpose:</strong> develop basic understanding of case; ensure profoundness of interview questions</td>
<td><strong>Purpose:</strong> clarify queries re: documents; select 1-2 projects for micro level analysis; agree on interview guides</td>
<td><strong>Purpose:</strong> collect interview data and if possible additional documents</td>
<td><strong>Purpose:</strong> documentation of collected data in preparation of analysis</td>
</tr>
<tr>
<td><strong>Support host site:</strong> provision of additional documents not available online</td>
<td><strong>Support host site:</strong> scheduling of on-site interviews</td>
<td><strong>Support host site:</strong> spending time on the interviews</td>
<td><strong>Support host site:</strong> validation of transcripts (if required)</td>
</tr>
<tr>
<td><strong>Delivery author:</strong> first draft of interview guides and project suggestions for micro level analysis</td>
<td><strong>Delivery author:</strong> email final interview guides to participants one week before on-site visit</td>
<td><strong>Delivery author:</strong> recorded interviews as mp3</td>
<td><strong>Delivery author:</strong> final transcripts, synopsis report of documents</td>
</tr>
</tbody>
</table>

Source: compiled by the author
techniques. All interviews were recorded and transcribed – an anonymised sample transcript can be found in appendix 6.

Table 9: Case studies – Interview target groups

<table>
<thead>
<tr>
<th>Target group</th>
<th>Target no. of data points</th>
<th>Interview focus: Level of analysis and addressed research questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Lean team/ facilitators</td>
<td>2</td>
<td><strong>System level:</strong> Motives, methods, spread, implementation, impact</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Micro level:</strong> Focus on role of Lean team as process facilitator and competence transfer</td>
</tr>
<tr>
<td>Top management (e.g. Principal’s office)</td>
<td>1</td>
<td><strong>System level:</strong> Focus on motives, esp. link to university strategy and issues regarding organisation politics</td>
</tr>
<tr>
<td>Line managers of improved processes</td>
<td>1-2 (one per micro-level project)</td>
<td><strong>Micro level:</strong> Motives, spread, implementation, impact</td>
</tr>
<tr>
<td>Staff participating in improvement process</td>
<td>1-2 (one per micro-level project)</td>
<td><strong>Micro level:</strong> Methods, implementation, impact</td>
</tr>
<tr>
<td>Process stakeholders (e.g. users)</td>
<td>1-2 (one per micro-level project)</td>
<td><strong>Micro level:</strong> Motives (e.g. initial state – extent of problem), impact</td>
</tr>
</tbody>
</table>

Source: compiled by the author

Table 10: Number of interviews, respondents and data points per target group

<table>
<thead>
<tr>
<th>Case</th>
<th>Number of:</th>
<th>Data points per target group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Interviews</td>
<td>Respondents</td>
</tr>
<tr>
<td>University A</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>University B</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>University C</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>18</td>
</tr>
</tbody>
</table>

Source: compiled by the author

In addition to documents that are available online, all participating HEIs were asked for further non-published internal documents (Bryman & Bell 2007), e.g. project board minutes or memos. All collected documents were checked against Scott’s (1990) quality criteria, namely authenticity, credibility, representativeness and meaning. In total 42 documents with 490 pages were collected and summarised in a synopsis reports for each university – appendix 7 gives a detailed overview. The gathered information was used to prepare the on-site visits and for triangulation with the interview data.
Phase 3: Data analysis

In the style of Grounded Theory (Glaser & Strauss 1999), the collected data was categorised, structured and condensed to enable theoretical generalisations (Eisenhardt 1989). All interview transcripts and synopsis reports were coded using NVivo® (Bazeley 2007). Coding was conducted in three steps (Saunders et al. 2009): First, applying open coding, an interpretative layer was added by going through the documents to identify core themes as they emerged. Second, the presence or absence of key concepts identified in the literature review, e.g. the different Lean principles and methods, were analysed (axial coding). Third, selective coding involved a consolidation and prioritisation of the identified themes and concepts.

After finishing coding, an in-case analysis was performed for each HEI. The thematic codes allowed a structured comparison between interviews and documents as well as between different interview target groups to identify similarities and differences (Voss et al. 2002). Consequently, it was possible to derive case-specific patterns along the categories of the conceptual model, which enabled an in-depth understanding of why and how the HEI is implementing Lean.

Finally, a between-case analysis was carried out. The case-specific findings were compared for each category of the conceptual model in order to identify differences in Lean implementation, its impacts and the underlying reasons. In an iterative process, hypotheses were derived from the emerging patterns, checked against the data and continuously refined. Based on this “replication logic” (Eisenhardt 1989), taxonomies and relational concepts could be developed, e.g. a refined model of Lean implementation conceptualising the effect of environmental factors. These findings were then analysed against the existing Lean literature (Voss et al. 2002).

3.4 Critical assessment: Potential problems, countermeasures and limitations

The described methodology was the most appropriate way to address the outlined research questions. Its key strength is the in-depth analysis of rich qualitative data that allows a multi-perspective understanding of the studied Lean initiatives as well as the derivation of theoretical generalisations, which could not have been provided by deductive-quantitative methodology. However, every methodology has also weaknesses. While some of these potential problems can be avoided through careful planning, others need to be seen as limitations inherent to the chosen research approach and strategy. This section provides a critical assessment of the robustness of the outlined methodology.

NVivo is a computer aided qualitative data analysis software (CAQDAS).
Table 11: Research design – Practical problems and countermeasures

<table>
<thead>
<tr>
<th>Practical problem</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty to get field access due to time restrictions of interviewees</td>
<td>Contact more HEIs than actually required; “customise” data collection (e.g. reduce number and length of interviews); provide incentives (e.g. short feedback report)</td>
</tr>
<tr>
<td>Ethical issues: Compliance with regulations of QUB Management School</td>
<td>Do not collect data before ethical approval form is signed; no hidden data collection; inform all interviewees about the use of their data and let them verify their transcripts if required</td>
</tr>
<tr>
<td>Limited willingness to discuss problems openly</td>
<td>Guarantee full confidentiality of all collected data, i.e. all published data is anonymised and transcripts are not shared with other organisation members; provide research project information sheet and sign consent form</td>
</tr>
<tr>
<td>Interviewee bias: Socially appropriate responses to delicate questions</td>
<td>Triangulation of different independent data collection methods (interviews and documents) and of interview target groups</td>
</tr>
<tr>
<td>Limited construct validity: imprecise measurement of the conceptual model</td>
<td>Operationalize the model’s categories based on the literature review; use accepted and empirically tested definitions</td>
</tr>
<tr>
<td>Subjectivity and low reliability of qualitative research methods</td>
<td>Describe all steps of the data collection and analysis process as detailed as possible; state all assumptions clearly; develop concepts that are falsifiable in future research</td>
</tr>
<tr>
<td>Selection bias: Picking only successful cases or cases that support the desired research results</td>
<td>Explicit justification of case selection; researcher has no personal connection to the analysed HEIs in terms of study or employment (Collier &amp; Mahoney 1996; Geddes 1990)</td>
</tr>
<tr>
<td>Time restrictions: Dissertation had to be finished until 1 September when the author started working</td>
<td>Avoid “waste” cases through rational case selection during exploration phase; contact potential HEIs as soon as possible; concentrate on 3 cases</td>
</tr>
<tr>
<td>Resource requirements: Costs for travelling and literature</td>
<td>Try to schedule on-site visits in a row; future employer agreed to pay for flights; costs for literature are tax deductible in Germany</td>
</tr>
</tbody>
</table>

Source: compiled by the author

A couple of practical research issues were anticipated during the planning stage of the dissertation project and addressed by a range of countermeasures. First, difficulties of getting field access were tackled by contacting more HEIs than actually required and by offering as much flexibility as possible regarding the scheduling of the on-site visits (Saunders et al. 2009). Second, ethical issues were avoided through strict compliance with the university regulations. Full transparency about the use of the collected data was provided at any time. There was no hidden data collection (Bryman & Bell 2007). Also data collection did not start before the dissertation supervisor approved the research design (see appendix 8 for signed ethical approval form). Third, in order to encourage interviewees to discuss problems openly, full confidentiality and anonymisation of all published data were guaranteed. All participants received a research project information sheet, explaining the project context and stating their
rights, and were asked to sign a consent form (see appendix 9). Fourth, triangulation of interview data and analysed documents and comparison between the interview transcripts allowed reducing the impact of interviewee bias (Kvale & Brinkmann 2008). Fifth, using the reviewed literature to operationalize the categories of the proposed conceptual model enhanced construct validity (Eisenhardt 1989). Finally, all qualitative research is confronted with suspicions of subjectivity, as it is usually not possible to perfectly replicate the interview and coding process (Bryman & Bell 2007). While these doubts cannot be completely dispelled, the detailed description of the research design provided in this chapter should increase the reliability of the dissertation’s findings (Voss et al. 2002). Table 11 provides a more detailed account of these and further practical problems together with the applied countermeasures.

Besides these more practical problems, the proposed methodology has limitations that cannot be resolved but should be brought to mind to avoid overstretching and misinterpretation of the results. First of all, the dissertation project does not claim completeness in terms of covering all UK universities conducting Lean projects. Instead, it looks at a sample of carefully selected typical cases. Next, and related, the applied case study strategy does not allow making inferences in terms of statistical generalisations (King et al. 1994). External validity of the findings is achieved through theoretical generalisation, i.e. “... striving to generalise a particular set of results to some broader theory” (Yin 2003: 37), and replication logic, i.e. testing the derived theories and concepts against all three cases. Finally and most importantly, the dissertation is not a rigorous external project audit using quantitative ex ante and ex post performance data. It relies largely on qualitative assessments and perceptions. The little quantitative information analysed was produced and selected by the participating HEIs and might be biased. Thus, the dissertation does not permit conclusions such as “on average Lean leads to a cost reduction of X%”.

4. Results and discussion

This chapter presents the results of the dissertation’s empirical research to answer the raised research questions. It follows the compositional structure for multi-case reports suggested by Eisenhardt (1989) and Yin (2003): First, the results of the in-case analysis for each university are outlined to describe the case-specific pattern along the categories of the conceptual model. Second, by identifying similarities and differences, the between-case analysis illustrates the overall pattern and develops answers to the research questions. Third, the discussion section relates the empirical results to the existing literature as to derive theoretical conclusions and refine the conceptual model. All analyses in this chapter are based on the conducted interviews and reviewed documents if not stated otherwise. To protect anonymity and support readability, reference is only given for direct quotations using the respondent codes and document codes assigned in appendices 4 and 7.

4.1 In-case analysis

This section provides a highly aggregated summary of the data for each analysed HEI. It is based on summary reports that were compiled for each interview based on the coded transcripts (see appendix 10 for a sample). Each analysis is introduced by a short case profile and concludes with table summarising the case-specific pattern along the conceptual model (Voss et al. 2002).

4.1.1 University A

University A is one of the former polytechnics that were granted university status under the provision of the Further and Higher Education Act 1992. It has approx. 21,000 students, 16% of which are enrolled in postgraduate courses. The university takes a mid-position in most UK HE rankings and focuses on business-related subjects such as science, engineering and technology and business studies. The Lean initiative started at the beginning of 2010 in the university’s business school to which it is currently confined.

Motives

Drivers. Lean application in the business school was initiated and is still driven by the personal commitment of two members of support staff, namely the school’s finance managers and the manager of the undergraduate centre, who were later joined by one of the school’s academics from the area of operations managements. The then school
managers encouraged the small team to set up a Lean initiative but shortly afterwards left the organisation.

**Objectives.** All respondents provided relatively broad and unspecified definitions of the objectives of Lean implementation. The focus seems to be on improvement in terms of increased effectiveness and quality as opposed to cost and headcount reductions. The following statement provides a good example:

“Lean aims at finding a better way to do something. For me it’s never about cutting cost – never. This is more a by-product.” (A4)

**Lean justification.** The decision to “go Lean” was largely coincidental. The both initiators went to a HE management conference where they learned about the Lean activities of other universities and consequently decided to give it a try. There was neither a systematic comparison of different improvement methods nor a direct link to the school’s strategy or environmental challenges.

**Methods**

**Lean understanding.** There is considerable variation regarding the respondents’ definitions of Lean. While most of them referred to the Lean methods of root cause analysis and employee empowerment (Dahlgaard & Østergaard 2000), the Lean principles of value, value stream and flow (Womack & Jones 2003) were only noted once and indirectly (see table 12). One respondent did not provide any substantial definition and held a rather opportunistic view, conceding to be primarily interested in using the Lean initiative as “free resource”:

“I simply didn’t have the time for an in-depth analysis. […] But I knew the team was into Lean and I thought: »This might be an opportunity to take things a bit further.«” (A1)

**Table 12: University A – Respondents’ Lean understanding**

<table>
<thead>
<tr>
<th>Lean principle/ method</th>
<th>Respondents</th>
<th>Exemplary quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1:</strong> value</td>
<td>A1 A2 A3 A4</td>
<td>&quot;In my opinion Lean is about getting a better customer focus.&quot; (A1)</td>
</tr>
<tr>
<td><strong>P2:</strong> value stream</td>
<td></td>
<td>&quot;At it’s core Lean is about improving processes by eliminating wasteful procedures – that’s how I see it.&quot; (A2)</td>
</tr>
<tr>
<td><strong>P3:</strong> flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P4:</strong> pull</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>P5:</strong> perfection</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>M1:</strong> root cause analysis</td>
<td>X X X</td>
<td>&quot;It’s giving people the opportunity to improve, asking: »Why are we doing what we’re doing?« And: »Is there a better way to do it?« It is about questioning routines – reflective practice.&quot; (A4)</td>
</tr>
<tr>
<td><strong>M2:</strong> empowerment</td>
<td>X X X</td>
<td>&quot;For me it’s about giving all the employees the opportunity to contribute to the organisational strategy. To give them a platform to come up with new ideas.&quot; (A3)</td>
</tr>
</tbody>
</table>

Source: compiled by the author
Lean techniques. Most Lean projects are carried out as RIEs with the typical sequence of current state analysis, future state design and implementation planning (Rother & Shook 2003). The use of specific Lean tools is limited to VSM and elements of visual management, e.g. boards with performance information, which should increase process transparency.

Scope

Areas and implementation strategy. The both initiators started with streamlining processes in their own area of responsibility, e.g. the production of monthly management accounts, and the organisation of resit assessments. Recently, they tried to scale up and institutionalise their Lean initiative by facilitating a first Lean project for another organisational unit – the postgraduate admission process – and making a request to the school executive for a formal project structure and a dedicated budget. However, both efforts got stuck so that the pursued bottom up approach remains incomplete.

Enablers/ barriers

Organisational culture & structures. There is clear evidence for the negative effect of HE’s specific organisational culture and structures on Lean implementation (Radnor et al. 2006). All respondents reported a strong “silo mentality” and status orientation that are barriers to cross-unit projects. This also includes a “blame culture” were improvement recommendations are often misinterpreted as critique.

Awareness: Against this background, significant organisation-wide change requires clear leadership commitment to tear down barriers and encourage middle managers and staff to participate (Achanga et al. 2006). However, this signal failed to materialise and Lean has largely remained the pet project of its both initiators. The request to formalise the initiative was deferred by the business school’s executive. Consequently, other areas of the school have remained reluctant to engage with Lean.

Change capacity: The lack of a dedicated budget inevitably limits the scope of the Lean initiative – the involved people do it on top of their day jobs. Moreover, even in the single case where the initiative received the mandate to facilitate a project in another area, management support quickly disappeared after conflicts arose.

All in all, the results show a low level of organisational readiness (see table 13) that makes successfully Lean implementation very difficult, if not impossible.
Table 13: University A – Level of organisational readiness: enablers and barriers

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicator</th>
<th>Description &amp; exemplary quotations</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational culture &amp; structures</td>
<td>Academic-administration divide</td>
<td>(Senior) academic staff rejects recommendations from administrative staff: “We are called support staff. We normally don’t get involved in decision-making and planning and those sorts of things. We are just there to do rather than to think and to question.” (A3)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Bureaucracy and silo mentality</td>
<td>Insistence on formal authority: “We were quickly recognising that we didn’t have any authority to change anything in places that we weren’t responsible for. And that it recreated resentment.” (A4)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>“Blame culture”</td>
<td>Improvement is seen as critique: “There were people who felt that they were being picked on. People tend to take things very personal. They didn’t understand that it was about improving the system rather than criticising their work.” (A1)</td>
<td>-</td>
</tr>
<tr>
<td>Awareness</td>
<td>Lack of leadership commitment</td>
<td>No clear top management signal: “You need your leaders behind you and you need their support. And we never really ever had that. It was words only.” (A4)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Limited willingness to invest time</td>
<td>People do not see the benefits of Lean: “The risk of one missed phone call for example was more important than a potential saving of 20 workdays a year.” (A2)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Negative Lean connotation</td>
<td>Initial perception of Lean is often negative: “When Lean came up the initial reaction of most staff was: »Oh my god, they’re gonna cut jobs.«” (A2)</td>
<td>-</td>
</tr>
<tr>
<td>Change capacity</td>
<td>Lack of dedicated resources</td>
<td>Put on top of a day job; “We got to a point where, because we were doing it on top of a day job, the potential was there for a day job to suffer from it.” (A3)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>No management buy-in, esp. in cross-unit issues</td>
<td>Management does not address cross-unit issues: “People sort of liked what we did from a distance but there wasn’t any buy-in from management. As long as other people didn’t have to take part in it, we were tolerated.” (A3)</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>Outside support/ recognition</td>
<td>Lean university network: “What kept us going was that outside recognition – the Association of Business Schools and the other universities applying Lean.” (A4)</td>
<td>+</td>
</tr>
</tbody>
</table>

**Level of organisational readiness**

-  

* The applied scale for the impact assessment ranges from strongly negative “---” to strongly positive “+++”. Brackets express particularly weak impacts.

Source: compiled by the author

Impact

*Quantitative and qualitative.* There is no systematic measurement of project impacts, largely due to the initiative’s early stage. While some ex post estimates were made to support the resource request, they remain highly selective. Most positive impacts reported in table 14 are based on the respondents’ qualitative assessment. Furthermore, the limited application range of the Lean initiative has to be recalled. Consequently, the interviewed representative of the business school’s management remained very sceptical:

“To be quite honest with you: I’m still waiting to see the final outcome of the Lean initiative. I’m not a wavering sceptic. […] But I wanna see the results.” (A1)

It is therefore doubtful whether the school management will provide the support and resources to scale up the project.
Table 14: University A – Impacts of Lean implementation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Impact</th>
<th>Measurement</th>
<th>Figures/ description/ quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency improvement</td>
<td>(+)</td>
<td>Quantitative (some ex post estimates)</td>
<td>Examples: 2 days per month through streamlined accounting process; 600h p.a. through merger of different meetings</td>
</tr>
<tr>
<td>(staff time savings)</td>
<td></td>
<td>and qualitative</td>
<td></td>
</tr>
<tr>
<td>Cost savings</td>
<td>(+)</td>
<td>Quantitative (some ex post estimates)</td>
<td>No headcount reduction but some savings in material costs, e.g. -12,000 GBP through consolidated student handbook</td>
</tr>
<tr>
<td>(“bottom line”)</td>
<td></td>
<td>and qualitative</td>
<td></td>
</tr>
<tr>
<td>Lead time reductions</td>
<td>(+)</td>
<td>Qualitative: perceived improvement</td>
<td>Shorter processes: “What we did was removing all the waste from the process – things go much faster now.” (A2)</td>
</tr>
<tr>
<td>WIP reduction</td>
<td>No</td>
<td>evidence</td>
<td>----</td>
</tr>
<tr>
<td>(queue length in services)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality/ less defects</td>
<td>No</td>
<td>evidence</td>
<td>----</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>(+)</td>
<td>Qualitative: perceived improvement</td>
<td>Perception that students appreciate improved processes, e.g. module selection for international students</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>No</td>
<td>evidence</td>
<td>----</td>
</tr>
<tr>
<td>Cultural change</td>
<td>+</td>
<td>Qualitative: perceived improvement</td>
<td>Improved teamwork and process ownership: “They’re now a really tight unit. Everyone is working together quite well and they come up with own ideas how to improve their work.” (A2)</td>
</tr>
<tr>
<td>Scope</td>
<td></td>
<td>Very narrow: limited to two small areas within the University’s Business School (Finance, Undergraduate Centre)</td>
<td></td>
</tr>
</tbody>
</table>

* The applied scale for the impact assessment ranges from strongly negative “---” to strongly positive “+++”. Brackets express particularly weak impacts.

Source: compiled by the author

Summary

Table 15 summarises the findings of the in-case analysis along the categories of the conceptual model. In the absence of any leadership support and due to a subsequent lack of dedicated resources, University A’s Lean initiative could not gain any momentum and remained limited to a few small areas within the business school. Here, it seems to have brought some improvement, though there is a lack of systematic quantitative performance data.
Table 15: University A – Summary of in-case analysis

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Aspect</th>
<th>Findings University A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) Motives</td>
<td>Drivers</td>
<td>Personal commitment of two members of staff</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Soft non-quantitative targets: Improve quality and effectiveness</td>
</tr>
<tr>
<td></td>
<td>Lean justification</td>
<td>Conference visit: best practice; no systematic comparison with other improvement approaches</td>
</tr>
<tr>
<td>Q2) Method</td>
<td>Understanding</td>
<td>Focus on Lean principles of value stream and flow and Lean methods of root cause analysis and employee empowerment</td>
</tr>
<tr>
<td></td>
<td>Tools</td>
<td>RIE-facilitated projects</td>
</tr>
<tr>
<td>Q3) Scope</td>
<td>Implement. strategy</td>
<td>Bottom-up: got stuck and is limited to initiators’ narrow areas of responsibility (Finance, Undergraduate Centre)</td>
</tr>
<tr>
<td></td>
<td>Areas</td>
<td>Only few processes within the business school</td>
</tr>
<tr>
<td>Q4) Implementation</td>
<td>Orga. culture &amp; structure</td>
<td>Academic-admin divide (-); silo mentality (-); blame culture (-)</td>
</tr>
<tr>
<td></td>
<td>Awareness</td>
<td>Lack of leadership commitment (-)</td>
</tr>
<tr>
<td></td>
<td>Change capacity</td>
<td>Lack of dedicated resources (-); no management buy-in (-)</td>
</tr>
<tr>
<td>Q5) Impact</td>
<td>Quantitative</td>
<td>No systemic measurement and limited application range; some ex post estimates show modest staff time savings and cost savings</td>
</tr>
<tr>
<td></td>
<td>Qualitative</td>
<td>Better team work &amp; process ownership in one unit</td>
</tr>
</tbody>
</table>

Source: compiled by the author

4.1.2 University B

As a member of the Russel Group, University B has a breadth of expertise in research and research-led teaching. With approx. 31,000 students, 25% of which are postgraduates, it is one of the UK’s largest universities. Currently, the university has 27 academic schools and several research institutes, encompassing a variety of subjects from medicine and engineering to social sciences, law and languages. It usually achieves a position in the upper quartile in UK university rankings.

Motives

Drivers. Initially, the university’s Lean initiative was very much driven from the top. It was launched in 2006 by the then new Vice-Chancellor, who probably wanted to make a case for change and improvement. A central Lean team with a dedicated budget was set up. It is part of the Strategic Development Directorate and currently consists of four full-time and one part-time staff. After an initial trial period of three years all positions were made permanent.

Objectives. As one of the first UK universities experimenting with Lean, the initial aim was simply to try out if it can be applied in a HE context. Then a project mission statement was drawn up, which however remained relatively broad and unspecific:
“Then there was the mission statement, which set the objective to become a Lean university where we deliver the best possible experience for students and where people feel they could come up with ideas.” (B2)

Later on, the Lean initiative was put in context of the university’s strategy to become a global top 50 HEI by 2020 and several priority areas for the team were defined. The emphasis remained on “nice” process improvement:

“The message we’ve always been able to push over is: It isn’t about taking people out of the process. It’s about taking out the rubbish to free up these people to do valuable work.” (B2)

However, one of the analysed micro-level projects in one of the university’s institutes illustrates that the objectives can be much tougher if the organisation faces efficiency pressures:

“I came on knowing that the institute had to be radically changed. It was running under severe financial pressure. We realised that if we don’t get it right our funding will try up and we’ll all be out of a job. […] We had to bring down our payroll costs.” (B3)

**Lean justification.** The new Vice-Chancellor had an industry background and previous experience with Lean. Also Lean was a somehow obvious choice as the university has a recognised Lean centre of excellence, which could provide conceptual support and would itself benefit from the initiative:

“The centre was out there saying to organisations: »You need to become Lean.« But you can only do that with credibility if your own organisation is going Lean.” (B2)

**Method**

**Understanding.** The majority of respondents described Lean as “participatory process improvement” (see table 16), emphasising the Lean principles of value stream and flow (Womack & Jones 2003) as well as the Lean method of employee empowerment (Dahlgaard & Østergaard 2000). Looking at the micro level, two respondents conceded that their project utilised Lean largely for marketing reasons and in fact featured only few Lean aspects:

“I’m not sure whether there’s much more Lean in our project other than the process maps. […] There was a coincidence of opportunities: We had decided to look at the program approval process without Lean being there. But bringing in the Lean initiative enabled us to build a very attractive bid to get the 200,000 from XXXX.” (B4)

**Tools.** Improvement projects do not apply the concentrated RIE approach but are facilitated through a series of short workshops over several months. Most respondents report the application of a wider range of standard tools (George et al. 2005), e.g. VSM, 5S, A3s and 5Ys.\(^7\) Furthermore, the Lean team runs a “Lean Skills for Managers”

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\(^7\) The reader is reminded of the glossary in appendix 3 for an explanation of the different Lean tools.
training programme to disseminate Lean thinking within the organisation. Based on an action learning approach (Pedler 2008), a sequence of training sessions supports participants in mastering a small change project in their area of responsibility.

Table 16: University B – Respondents’ Lean understanding

<table>
<thead>
<tr>
<th>Lean principle/method</th>
<th>Respondents</th>
<th>Exemplary quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B1</td>
<td>B2</td>
</tr>
<tr>
<td>P1: value</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>P2: value stream</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>P3: flow</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>P4: pull</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P5: perfection</td>
<td></td>
<td>(X)</td>
</tr>
<tr>
<td>M1: root cause analysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2: empowerment</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

"For me the big thing about Lean was the customer-focused approach – starting to get the team to take a customer eye view." (B3)

"Lean provides some very simple and useful tools to streamline processes. It’s easy to use and something everybody can buy into." (B3)

"Lean is the application of common sense where common sense isn’t that common." (B6)

"I’ve done BPR and all that kind of stuff before. I think the difference with Lean is that it’s the people working in the process making the change." (B2)

Source: compiled by the author

Scope

Implementation strategy. From the beginning, the Lean initiative applied a mix of bottom-up and top-down elements (Dennis 2006). However, the latter element, which was based on the selection of certain crosscutting end-to-end processes as priority areas proved very difficult to pursue. Besides organisational barriers discussed below, the complexity of these projects was probably too high for the early days of the initiative. Facilitated by the training programme, the bottom-up element, i.e. projects initiated in the schools, institutes and units, was more successful:

"Lean Skills for Managers offered us the opportunity to set lots of little lean fires far and wide and start an organisational revolution on a much bigger scale." (D-B5: 7)

The importance of the management trainings for building the critical groundswell was also confirmed by the micro-level respondents.

Areas. Major end-to-end projects were started in the areas of procurement, HR, research funding, curriculum design and assessment. The most recent attempt of central prioritisation is a student life cycle model that should help to identify strategic gaps for future Lean interventions. The Lean activities in the schools and institutes range from major strategic re-alignments to more small-scale process improvements.
Noticeable in all analysed micro-level projects was the merely sporadic involvement of the Lean team, which was also lamented by one of its representatives:

“I would prefer to do more devolved working with the teams rather than jumping in and out.” (B1)

Enablers/ barriers

Organisational culture & structures. All respondents referred to specific features of HE organisations (Dopson & McNay 1996) as barriers to Lean implementation, especially the limited clout of leadership and the silo mentality in bureaucratic structures. The latter is particularly important as the Lean team itself is locked in into one of these silos within the central university administration, making it difficult for it to resolve conflicts and act as neutral facilitator in projects involving other directorates.

Awareness. The initial leadership commitment overcame many of these barriers and led to the institutionalisation of a formal project structure. However, this did not translate into continuing active leadership support as the Vice-Chancellors attention quickly shifted to other priorities. The micro-level analysis shows, that the awareness of the necessity to change varies throughout the organisation but is relatively high in areas with exposure to environmental pressures, e.g. NHS-related schools, and where managers participated in Lean trainings.

Change capacity. A well-resourced Lean team with support from the Lean research centre constitutes a significant change capacity. Even though there is no universal management buy-in, the Lean trainings created a substantial groundswell that further increased this capacity – especially in the schools and institutes.

All these factors contribute to a medium level of organisational readiness (see table 17).
### Table 17: University B – Level of organisational readiness: enablers and barriers

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicator</th>
<th>Description &amp; exemplary quotations</th>
<th>Impact†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational culture &amp; structures</td>
<td>Rule-bound hierarchy with little individual authority</td>
<td>No clout to make far-reaching decisions: “People simply don’t have the clout to make changes. You know this just do it. There are so many layers for permissions to do things. The actual process of change is slow.” (B1)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>“Academic freedom” in organisational issues</td>
<td>Also in purely admin matters: “People are very autonomous. They worry that their creative freedom and that their operational freedom will be limited by systems and procedures Lean puts in place.” (B6)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Silos mentality within central university administration</td>
<td>Lean is locked in its silo: “We have a kind of governance issue which makes it very difficult. Lean has been brought in to a part of the university, which has responsibility for strategy and planning. It’s difficult for the team to have any control over other areas because they are in a parallel directorate rather than kind of above it.” (B6)</td>
<td>-</td>
</tr>
<tr>
<td>Awareness</td>
<td>Initial leadership impulse</td>
<td>The Lean initiative was established by the Vice-Chancellor</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Lack of ongoing leadership attention</td>
<td>Quickly fading attention: “When I joined the university, because it was kicked off by the Vice-Chancellor, I assumed that it would have huge senior backing – which it didn’t really. It was more a case of: ‘Go make us Lean! And the team was left to it.” (B2)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Exposure to environmental pressures</td>
<td>Varying in degree: “Our health care schools are quicker to pick it up because they were exposed to it before in the NHS. They are far more economically savvy and they know that things have to change. While there are other schools that have no link with the outside world.” (B2)</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Increasing participation in training programme</td>
<td>“Lean Skills for Managers” as an eye-opener: “Once I’ve gone through all the training and understood what it was all about, I was then in a position that I could apply this way of working to everything I did.” (B6)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Limited willingness to invest time</td>
<td>“Because the senior people don’t fully understand it, they give you three hours to do a change. Whereas you really need three hours only to talk to people what it’s all about.” (B1)</td>
<td>-</td>
</tr>
<tr>
<td>Change capacity</td>
<td>Lean team</td>
<td>Dedicated team that engages as neutral facilitator, advisor/ coach and Lean trainer</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Lean centre of excellence</td>
<td>Provides conceptual and methodological advice as well as additional staff for projects</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>On-going mgt. support in some areas</td>
<td>No universal buy-in: “Lean came with great fanfare. But it has not been something that has met with universal buy-in across different areas of the university.” (B5) But increasing groundswell: “I think there’s been a tipping point. We trained people in Lean, we’ve scattered these seeds, thinking that everything would flourish. And in pockets it really has. There we have good access and support. And they understand what Lean is about.” (B1) Also supported by micro-level analysis: “We’ve been very clear here saying: »These are tools that we’re using but this is us doing it. This isn’t Lean doing it to us or for us.« We take the ownership of the change process.” (B3)</td>
<td>+</td>
</tr>
</tbody>
</table>

Level of organisational readiness: +

† The applied scale for the impact assessment ranges from strongly negative “---” to strongly positive “+++”. Brackets express particularly weak impacts.

Source: compiled by the author
Impacts

Quantitative. Due to the minimal direct involvement of the Lean team in many projects, a central measurement is difficult. All respondents reported a lack of systematic impact assessment. Quantifications were only made ex post on an ad hoc basis (see table 18). Where available, these results can be quite significant, for example a reduction of staffing costs as percentage of total budget from 87% to 60% in the case of the strategic re-alignment of one of the university's institutes.

Qualitative. System and micro-level analysis show that the Lean initiative led to the creation of an increasing number of “islands of excellence”, independently carrying out improvement activities. These schools and institutes experienced a cultural change towards increased collaboration and continuous improvement (see table 18).

Table 18: University B – Impacts of Lean implementation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Impact*</th>
<th>Measurement</th>
<th>Figures/ description/ quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency improvement (staff time savings)</td>
<td>+</td>
<td>Quantitative (some ex post estimates) and qualitative</td>
<td>Several respondents noted that in some cases project impacts were quantified in terms of staff time savings but did not provide any figures</td>
</tr>
<tr>
<td>Cost savings (“bottom line”)</td>
<td>(+)</td>
<td>Quantitative (some ex post estimates) and qualitative</td>
<td>Example: reduction of staffing costs as percentage of total budget from 87% to 60% in one institute</td>
</tr>
<tr>
<td>Lead time reductions</td>
<td>+</td>
<td>Quantitative (some ex post estimates) and qualitative</td>
<td>Examples: Reduction in turnaround time of international student applications from 40 to 15 days, library re-shelving processing time reduction from 12 to 0.5 hours</td>
</tr>
<tr>
<td>WIP reduction (queue length in services)</td>
<td>No evidence</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>Quality/ less defects</td>
<td>No evidence</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>(+)</td>
<td>Qualitative: perceived improvement</td>
<td>Perception that students will benefit from some projects: “The ultimate beneficiaries of our project are clearly the students. […] The new program approval process and the improved curriculum design will enable the university to better meet their expectations.” (B4)</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>(+)</td>
<td>Qualitative: perceived improvement</td>
<td>All micro-level respondents reported that Lean implementation created a supportive working environment that increased staff satisfaction</td>
</tr>
<tr>
<td>Cultural change</td>
<td>++</td>
<td>Qualitative: perceived improvement</td>
<td>Cultural change towards more empowerment, increased collaboration and continuous improvement: “It’s promoted a team culture, an understanding of what other people do within their role – and the feeling that people can be heard and that their recommendations are of value.” (B6)</td>
</tr>
<tr>
<td>Scope</td>
<td>Several “islands of excellence” (esp. schools and institutes) as change drivers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* The applied scale for the impact assessment ranges from strongly negative (---) to strongly positive (++++). Brackets express particularly weak impacts.

Source: compiled by the author
Summary

Table 19 summarises the findings of the in-case analysis along the categories of the conceptual model. The initial leadership impulse and subsequent generous funding created a capable project structure. Consequently, the Lean team was able to combine top-down and bottom-up elements in its implementation strategy, though working on end-to-end processes proved difficult as the leadership support necessary to tackle cross-functional issues quickly faded. Due to soft qualitative targets, there is again a lack of systematic quantitative impact assessment.

Table 19: University B – Summary of in-case analysis

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Aspect</th>
<th>Findings University B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) Motives</td>
<td>Drivers</td>
<td>Initiated by the new VC and Lean Centre of Excellence</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Non-quantified objectives: test Lean in HE; improve services; create supportive working environment</td>
</tr>
<tr>
<td></td>
<td>Lean justification</td>
<td>Lean centre of excellence: Utilise existing resources &amp; capabilities; closely tied to method</td>
</tr>
<tr>
<td>Q2) Method</td>
<td>Understanding</td>
<td>Focus on the five Lean principles (esp. value stream and flow) and Lean method of employee empowerment</td>
</tr>
<tr>
<td></td>
<td>Tools</td>
<td>Projects with sporadic Lean team involvement; “Lean Skills for Managers’ training</td>
</tr>
<tr>
<td>Q3) Scope</td>
<td>Implement. strategy</td>
<td>Mix of bottom-up (smaller projects in schools and institute) and top-down (end-to-end processes) elements; the latter proved to be difficult</td>
</tr>
<tr>
<td></td>
<td>Areas</td>
<td>Academic schools/ institutes and a few support processes</td>
</tr>
<tr>
<td>Q4) Implement.</td>
<td>Orga. culture &amp; structure</td>
<td>Rule-bound hierarchy (-); academic freedom in admin matters (-); silo mentality (-)</td>
</tr>
<tr>
<td></td>
<td>Awareness</td>
<td>Initial leadership impulse (+) but quickly fading attention (-); Lean management trainings (+)</td>
</tr>
<tr>
<td></td>
<td>Change capacity</td>
<td>Lean team (+); Lean centre of excellence (+); supportive “islands of excellence” (+)</td>
</tr>
<tr>
<td>Q5) Impact</td>
<td>Quantitative</td>
<td>No systemic measurement; some ex post estimates show significant staff time savings, cost savings and lead time reductions</td>
</tr>
<tr>
<td></td>
<td>Qualitative</td>
<td>“Islands of excellence” (esp. some schools) with improved team work, better process understanding and continuous improvement</td>
</tr>
</tbody>
</table>

Source: compiled by the author

4.1.3 University C

As one of the oldest universities in the English-speaking world, University C is characterised by highly traditional governance and administrative structures. The university has an international reputation to deliver excellent research and teaching with a focus on arts and humanities – 30% of its students are from overseas. With approximately 9,000 students, 22% of which study postgraduate courses, it is one of the smaller HEIs in the UK. According to the QS World University Ranking, it is one of the world’s top 100 universities and it usually ranks in the top 10 in UK rankings.
Motives

*Drivers.* Having been dissatisfied with organically grown, inefficient processes for a longer time, in 2006, the Head of the University’s Business Improvement Unit came across Lean at a conference. After discussing the potentials with the then Quaestor and Factor, the senior manager in the Principal’s Office responsible for Finance, Residences and Estates, who now is the university’s Chief Operating Officer (COO) and Chief Financial Officer (CFO), the both decided to give it a try. With the initial support of an external management consultant, an internal Lean team was recruited and trained, currently comprising two permanent full-time staff and one part-time staff.

*Objectives.* The Lean initiative’s overall aim was loosely defined as facilitating improvement with a clear emphasis on long-term cultural change, while at the same time ruling out short-term job cuts. Initially, the focus was clearly on the university’s central support units:

“The university’s strategic objective is excellence in teaching and research – Lean is the third pillar that extends that to the administration.” (C3)

More specific objectives are defined on a project-to-project basis and usually include cutting lead times and freeing up resources.

*Lean justification.* While there was no systematic comparison of different improvement approaches, the initiators felt that Lean fitted best with the university’s objective of “soft” long-term improvement:

“I think what appealed about Lean were the respect for people and continuous improvement elements. The university is fairly considerate in terms of the way it does things. Lean permits the university to continue to be considerate. It has this softly-softly approach.” (C1)

Method

*Understanding.* Asked for the most important features of Lean, most respondents – managerial and non-managerial staff alike – made reference to process analysis and optimisation, employee empowerment and root cause analysis in terms of reflective practice (see table 20). Several interviewees emphasised that this participatory and reflective impetus did not imply naïve cosy discussions. The following quotation is exemplary:

“Respect in this context means to fully engage with people – especially where the relationship is tense. It means asking critical questions and giving honest feedback.” (C3)
Table 20: University C – Respondents’ Lean understanding

<table>
<thead>
<tr>
<th>Lean principle/method</th>
<th>Respondents</th>
<th>Exemplary quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1: value</td>
<td>C1 C2 C3 C4 C5 C6 C7 C8 C9</td>
<td>&quot;Lean created an understanding of the whole process, of what the other units involved were exactly doing and which inputs they needed to improve their work.&quot; (C6) &quot;These Lean events provide you with a truly cross-functional and comprehensive understanding of the process.&quot; (C8)</td>
</tr>
<tr>
<td>P2: value stream</td>
<td>X X X X X X</td>
<td>&quot;Lean gives you an opportunity to look at a process and get away with all the unnecessary steps. Lean it down to what is really required.&quot; (C6) &quot;For me it’s a time and money saving operation – reducing unnecessary waste basically.&quot; (C5)</td>
</tr>
<tr>
<td>P3: flow</td>
<td>X X X X X</td>
<td>&quot;Lean raises one question: Why don’t we try to be the best that we can? That means also not worrying about what other people are doing. Not worrying about benchmarks.&quot; (C1)</td>
</tr>
<tr>
<td>P4: pull</td>
<td>---</td>
<td>&quot;Lean is about understanding an area – understanding the problems that this area creates for the system and how to eliminating them once and forever.&quot; (C2) &quot;Only when you reflect on your practice, then you’re able to improve – eliminating the behavioural root causes.&quot; (C3)</td>
</tr>
<tr>
<td>M1: root cause analysis</td>
<td>X X X X X X</td>
<td>&quot;Lean allows those who do the job to design their job within control parameters and with the full support of their management.&quot; (C2) &quot;It encouraged us all to use our initiative, to have new ideas and not being frightened to say what our ideas are.&quot; (C4)</td>
</tr>
<tr>
<td>M2: empowerment</td>
<td>X X X X X</td>
<td></td>
</tr>
</tbody>
</table>

Source: compiled by the author

Tools. Most improvement projects apply a sophisticated and highly refined RIE approach (Rother & Shook 2003) with different tools for each phase (see table 21), which is documented and available for all staff in the university’s official Lean manual. As the following respondent, most interviewees described this approach of freeing up staff from their day jobs to focus on improving the process as an important success factor:

"The major benefit of Lean is that it actually takes the owners of a process and tries to organise and set up and few days off to sit in the background and look at things with a fresh view." (C8)
Table 21: University C – Lean project approach and tools

<table>
<thead>
<tr>
<th>Step</th>
<th>Time</th>
<th>Description</th>
<th>Tools/ templates*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Request</td>
<td>1-2 h</td>
<td>An area of work is identified</td>
<td>----</td>
</tr>
<tr>
<td>2 Scoping</td>
<td>½ day</td>
<td>Management agrees on goals, project team and resources</td>
<td>Draft Quad of Aims</td>
</tr>
<tr>
<td>3 Planning</td>
<td>½ day</td>
<td>Project team reviews goals, determines required data and stakeholder involvement and agrees approach</td>
<td>Reworked Quad of Aims, BOSCARD, SIPOC</td>
</tr>
<tr>
<td>4 Training</td>
<td>½ day</td>
<td>Lean training is undertaken if required</td>
<td>Case studies, simulation games</td>
</tr>
<tr>
<td>5 Redesign</td>
<td>3-5 days</td>
<td>New process and action plan are created:</td>
<td>Demand analysis/ run charts, VSM, runners repeaters strangers, 8 wastes, 5Ys, nominal grouping techniques</td>
</tr>
<tr>
<td>(RIE - Rapid improvement event)</td>
<td></td>
<td>- Current state analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Blue sky thinking: generation of improvement ideas</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Future state design</td>
<td></td>
</tr>
<tr>
<td>6 Implementation</td>
<td>on-going</td>
<td>New process put in place</td>
<td>Action plans</td>
</tr>
<tr>
<td>7 Review</td>
<td>½ h</td>
<td>Progress in monitored – meetings after 15, 30, 60 and 90 days</td>
<td>Issue lists</td>
</tr>
<tr>
<td>8 Feedback</td>
<td>1-2 h</td>
<td>The project is signed off and feedback is taken</td>
<td>Evaluation sheets</td>
</tr>
</tbody>
</table>

* See the glossary in appendix 3 for an explanation of the different Lean tools.

Source: compiled by the author, adapted from D-C7

Scope

Implementation strategy. University C provides a good example for a bottom-up approach (Dennis 2006) – start small, create groundswell and gradually scale up. However, where necessary, this is complemented by soft pressure from the top as the following quotation from a senior manager illustrates:

"We’ve allowed units to identify themselves. Where they haven’t identified themselves, we either had a quiet word: »You need to do something.« Or if that didn’t work we said openly: »There is an issue, you need to work on it.«" (C2)

Areas. Altogether, the Lean team has carried out approximately 60 bigger improvement projects since 2006 and worked with most central support units. It is notable that the focus has been on units in the COO/ CFO’s sphere such as Finance, Estates and Procurement. Only very recently, the initiative has started to take a closer look at the academic administration, including the schools. The following quotation outlines the rationale behind this pattern:

"It was important to put our own house in order first. We had to be self-critical – expose and fix things that weren’t working in the support processes. Only this allowed us to create an exposure to the academic administrative side of the business." (C2)
Enablers/ barriers

Organisational culture & structures. Several respondents pointed to specific HE features that were impeding change such as an excessive interpretation of academic freedom that prevents any standardisation. However, the impact of bureaucratic structures seems to be mitigated by the informality of a small university:

"It's about getting people around the table, establishing those crucial relationships. So we're trying to utilize the informality of this small place as an asset." (C1)

Awareness: Visible continuous leadership support is probably the most important change driver (Nash & Poling 2007). Because of its direct access to the COO/ CFO, many perceive the Lean team as part of the principal’s office, which it is actually not. It makes Lean an organisation-wide priority and generates pressure to actively cooperate with the Lean team. Moreover, staff participation in successful Lean projects has created a substantial Lean understanding in many of the central service units that facilitates future projects.

Change capacity. Managers and staff involved in the analysed micro-level projects described the Lean team as an important change capacity. In particular, respondents valued its close and continuous project involvement and its profound knowledge of the organisation. Also, the team can build on an increasing number of managers that became Lean promoters and actively drive change in their areas.

To sum up, the analysis reveals a medium to high level of organisation readiness (see table 22).
**Table 22: University C – Level of organisational readiness: enablers and barriers**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Indicator</th>
<th>Description &amp; exemplary quotations</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisational culture &amp; structures</td>
<td>“Academic freedom” in organisational issues</td>
<td>People revert to academic freedom to block off critique: “Academic freedom is used as a knockout argument against any kind of being challenged on how you do things.” (C2)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>“Blame culture”</td>
<td>Improvement is seen as critique: “Often if you say to a manager ‘you can make that better’, he’ll take that as criticism.” (C2)</td>
<td>-</td>
</tr>
<tr>
<td>Awareness</td>
<td>Initial leadership impulse</td>
<td>The Lean initiative was set up by top management: “The whole Lean thing was initiated by the Quaestor and Factor – it comes directly from the principal’s office.” (C6)</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>On-going leadership attention</td>
<td>Lean can activate leadership support if required: “Also everybody knows that we have a direct line to [the COO/ CFO]. And he’s the moneyman. He’s the power in the university in terms of all that admin stuff. So people know we can go to him and they know that we will tell him what we think the situation is.” (C1)</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This relationship was also confirmed in the micro level analysis: “The [COO/ CFO] was enthusiastic from the start. And he gave us the money to make the necessary investments to implement the improvements. He was the one to push it through after that with Lean keeping an eye on us to make sure it wasn’t forgotten.” (C5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increasing No. of managers and staff with Lean experience</td>
<td>More and more people with basic Lean understanding: “When you see people working out how long the current state of their process takes and they compare it to the future state they want to implement and you see the smile on their face and they think: ‘Wow, we can go from that to that!’ That’s fabulous because you can see the lights come on, the pennies drop. I’m not saying everyone turns out waving the banner. But for some people it does.” (C3)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Limited awareness in academic units</td>
<td>So far improvement potentials in the academic administration, especially in the schools, have been largely ignored</td>
<td>-</td>
</tr>
<tr>
<td>Change capacity</td>
<td>Lean team</td>
<td>Close involvement in projects: “We really felt that the guys from the Lean team were behind us all the time – 100%. Very supportive, very enthusiastic. […] They never really left until it was up and running fully.” (C5)</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Initial support from external consultants</td>
<td>Familiar with the organisational context: “Also he brought in his accumulated knowledge from previous projects – he knew what was going on at places within the universities, which gave us invaluable inspiration.” (C6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>On-going management support in some areas</td>
<td>Facilitated capacity building: “Their task was to build up internal Lean capacity and then act as kind of a father figure and slowly drift of into the sunset.” (C1)</td>
<td>+</td>
</tr>
<tr>
<td>Level of organisational readiness</td>
<td></td>
<td>No universal buy-in: “Managers who have a psychological investment in the status quo are a huge barrier.” (C3)</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td></td>
<td>But increasing groundswell: “I would say I have a couple of pockets of real excellence. I’ve got some larger pockets of acceptance and understanding. And we still have some laggards.” (C2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Also supported by micro-level analysis: “I assumed that whatever we came up with would be implemented unless it was completely off the wall. I assumed management support for any system that would really fix the problems.” (C4)</td>
<td></td>
</tr>
</tbody>
</table>

* The applied scale for the impact assessment ranges from strongly negative “---” to strongly positive “+++”. Brackets express particularly weak impacts.

Source: compiled by the author
Impact

Quantitative. Based on estimates made by the project teams during the RIEs, the Lean team records the realised staff time savings for every project. In total, 5419 recurring staff days, which corresponds to 24.63 Full Time Equivalents (FTE), have been saved between 2006 and 2010. Usually, this did not translate into short-term head count reduction but on the long run some areas required less staff:

"Most of the savings we have achieved are in freeing up people’s time and making services to students and other staff better. […] But the teams were getting more efficient and when people left the organisation, we simply didn’t fill their positions.” (C2)

Most respondents reported further positive impacts but were not able to provide quantitative performance data (see table 23).

Table 23: University C – Impacts of Lean implementation

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Impact</th>
<th>Measurement</th>
<th>Figures/ description/ quotations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency improvement</td>
<td>++</td>
<td>Quantitative: systematic</td>
<td>5419 recurring staff days between 2006 and 2010, which corresponds to 24.63 FTE</td>
</tr>
<tr>
<td>(staff time savings)</td>
<td></td>
<td>measurement</td>
<td></td>
</tr>
<tr>
<td>Cost savings</td>
<td>(+)</td>
<td>Qualitative: perceived</td>
<td>On the long run some staff time savings can be translated into headcount reductions: “This saved time is usually used by the Unit concerned to provide more effective and efficient services but may result in a headcount reduction in either temporary staff or permanent staff who leave and are not replaced.” (D-C10: 3)</td>
</tr>
<tr>
<td>(*&quot;bottom line&quot;)</td>
<td></td>
<td>improvement/ no systematic</td>
<td></td>
</tr>
<tr>
<td>Lead time reductions</td>
<td>+</td>
<td>Quantitative (some ex post estimates) and qualitative</td>
<td>Examples: Book drop to shelf time reduced from up to three month to less than one hour; increased share of invoices paid within 5 working days</td>
</tr>
<tr>
<td>WIP reduction</td>
<td></td>
<td>No evidence</td>
<td>-----</td>
</tr>
<tr>
<td>(queue length in services)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quality/ less defects</td>
<td></td>
<td>No evidence</td>
<td>-----</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>(+)</td>
<td>Qualitative: perceived</td>
<td>Perception of improved customer orientation: “More importantly than the time or money that may be saved is that processes are now able to meet the needs of the customers, and staff are able to add more value.” (D-C11: 9)</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>(+)</td>
<td>Qualitative: perceived</td>
<td>All micro-level respondents reported that Lean implementation created a supportive working environment that increased staff satisfaction</td>
</tr>
<tr>
<td>Cultural change</td>
<td>++</td>
<td>Qualitative: perceived</td>
<td>Cultural change/ shift in mindset: “So it’s how people respond to you. That’s one clear indicator that there’s a shift in mindset. When you hear first hand that people that you’ve worked with defending the job that you do and explain it to other people in the university who might be more hesitant about working with Lean. That’s really good. We’ve heard that more often.” (C1)</td>
</tr>
<tr>
<td>Scope</td>
<td></td>
<td>Several ‘islands of excellence’ (esp. central units) as change drivers</td>
<td></td>
</tr>
</tbody>
</table>

* The applied scale for the impact assessment ranges from strongly negative (---) to strongly positive (+++). Brackets express particularly weak impacts.

Source: compiled by the author
Qualitative. While the impact of Lean is clearly limited to certain areas in the central administration, all respondents that were involved in the analysed micro-level projects noted that exposure to Lean has transformed their unit’s operations in several ways, which are best summarised by the following quotation:

“... The feedbacks that we got from the people involved in our projects – that it has changed their way to see things, that it has encouraged them to come up with to make things better, that is has improved team work in their units, that it has facilitated cross-functional collaboration. I take that as an indicator that our work has indeed changed organisational culture.” (C3)

Summary

Table 24 summarises the findings of the in-case analysis along the categories of the conceptual model. On-going top management support and a gradual bottom-up approach created a substantial self-reinforcing momentum for Lean implementation. Driven by soft qualitative objectives, the Lean initiative’s focus is on long-term cultural change. Nevertheless, the Lean team’s systematic impact assessment shows significant efficiency improvements – though the scope of Lean activity has so far largely been limited to the university’s central administration.

Table 24: University C – Summary of in-case analysis

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Aspect</th>
<th>Findings University C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) Motives</td>
<td>Drivers</td>
<td>Improve organically grown support processes; COO/CFO backing</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Non-quantified targets: Long-term cultural change to facilitate improvement</td>
</tr>
<tr>
<td></td>
<td>Lean justification</td>
<td>Conference visit: “proven” best practice; soft approach (“empowerment rather than job cuts”)</td>
</tr>
<tr>
<td>Q2) Method</td>
<td>Understanding</td>
<td>Focus on Lean principles of value stream and flow and Lean methods of root cause analysis and employee empowerment</td>
</tr>
<tr>
<td></td>
<td>Tools</td>
<td>RIE-facilitated projects with close on-going Lean team involvement</td>
</tr>
<tr>
<td>Q3) Scope</td>
<td>Implement. strategy</td>
<td>Bottom-up (RIE-based projects) with some soft top management pressure to engage with the Lean team</td>
</tr>
<tr>
<td></td>
<td>Areas</td>
<td>Central support units, e.g. Finance, Estates, Procurement</td>
</tr>
<tr>
<td>Q4) Implemen-</td>
<td>Orga. culture &amp; structure</td>
<td>Academic freedom in admin matters (-), blame culture (-) but: mitigated by informality of small university</td>
</tr>
<tr>
<td>tation (enables (+) barriers (-))</td>
<td>Awareness</td>
<td>On-going leadership support (+); increasing No. of staff with Lean experience due to RIE participation (+)</td>
</tr>
<tr>
<td></td>
<td>Change capacity</td>
<td>Lean team (+); initial consultancy support (+); supportive “islands of excellence” (+)</td>
</tr>
<tr>
<td>Q5) Impact</td>
<td>Quantitative</td>
<td>Systematic measurement of one impact dimension: Staff time savings of 24.63 FTE between 2006-2010</td>
</tr>
<tr>
<td></td>
<td>Qualitative</td>
<td>“Islands of excellence” (within central university administration) with improved team work, better process understanding and continuous improvement</td>
</tr>
</tbody>
</table>

Source: compiled by the author
4.2 Between-case analysis

This section compares the case-specific findings to identify the overall pattern (Eisenhardt 1989) and derive answers to the research questions. A summary of the analysis is provided in table 28 at the end of this section.

Q1) Motives: Why do universities apply Lean principles to their work?

None of the Lean initiatives was triggered by a critical incidence (e.g. internal crisis) or urgent environmental pressures (e.g. budget cuts). Consequently, in all three cases, the universities relate Lean to “feel-good” objectives such as improving service and pursuing cultural change and distance themselves from cost cutting and head count reduction. An exception is one of the micro-level projects at University B described above: The institute that is funded separately from the university block grant faced severe financial pressures so that the strategic re-alignment had to include job cuts. This underlines the effect of the organisation’s exposure to environmental pressures (Nordin et al. 2008), which seems to be low for HEIs in general.

However, at least at the beginning, University B’s Lean initiative was also highly method-driven:

"Initially, it was a three-years project. And it was purely a project to see: »Can we apply Lean thinking in Higher Education?«“ (B2)

Due to the existence of its Lean centre of excellence, the university had an incentive to utilise existing resources and capabilities and consequently developed a high commitment to the method. The initiatives of University A and C had a different point of departure. Here, the initiators were looking for a systematic approach to facilitate improvement and (cultural) change and came more or less coincidentally across Lean. These cases highlight the importance of conferences and professional networks for providing conceptual inspiration (DiMaggio & Powell 1983). Both universities did not systemically compare Lean to alternative approaches but opted for legitimate “proven” best practice. Not having made any larger specific (material or psychological) investment in Lean, both initiatives are less committed to the method itself than to the general idea of having a systemic improvement framework:

"Lean is just a label – a name. It doesn’t matter if it’s Lean or any of the others ones, for example six sigma. At the moment it’s fashionable but it could also be something else. What is important is to have a coherent systematic framework to pursue continuous improvement.” (A4)

"And Lean, I’m sure, will evolve. [...] So it may end up with a different name. The university may bring something else in that’ll take elements of Lean from it." (C1)
Q2) Method: How is Lean defined for the purpose of the universities’ initiatives?

Regarding the respondents’ Lean understanding, two commonalities are striking. First, their statements refer more to Lean methods, i.e. how Lean should be applied, than to Lean principles, i.e. what Lean prescribes organisations to do (Dahlgaard & Østergaard 2000). While, in terms of content, it does not really get more specific than that Lean is about improving cross-functional processes, there is an elaborated understanding of employee empowerment and root cause analysis as the both methods by which the improvement process should be governed. Second, and as a consequence, Lean is more seen as a facilitation approach than as a management concept. Especially during the micro-level interviews there were only few mentions of specific Lean solutions such as JIT, standardisation or levelling processes but extensive discussions about different aspects of the change process, e.g. the right level of stakeholder involvement and the facilitating role of the Lean team. This is in line with the soft objective of cultural change. However tougher targets might require another approach. In the case of the restructured institute at University B, employee involvement started only after the more radical redesign of staff roles and the resulting redundancies had already been worked out by the institute director and the Lean team.

With regards to the operational level, there seems to be agreement that the RIE format is probably the best approach to structure Lean projects as the concentrated work in cross-functional teams can create significant momentum. While University A and C rely on this approach, the Lean team at University B found it difficult to free up project teams for 3-5 days periods and switched to a series of shorter workshops. However, the interviewed Lean facilitators conceded that they preferred closer and on-going operational involvement and they liked to go back to RIEs after Lean had become more accepted in the organisation.

A similar agreement seems to exist with regards to the potentials of Lean-based management development. While the respondents from University B described “Lean Skills for Managers” as major catalyst for disseminating Lean thinking throughout the institution and especially to the academic schools, the senior manager interviewed at University C admitted that their Lean initiative needed to do more to facilitate supportive management behaviour:

“I think if I had to do it again, I would combine Lean with a leadership program around change management and organisational development – facilitating good management behaviour, which is a premise to Lean implementation.” (C2)

The data for University B does slightl differ from this pattern as the respondents made more reference to some of the five Lean principles, which is probably due to the already discussed higher commitment to classic Lean (production) ideas.
Q3) Scope: Where is Lean implemented in the university?

In all three cases, Lean implementation started with a bottom-up approach, optimising a couple of largely unrelated bits and pieces of the university’s overall value chain as to create the necessary groundswell to gradually scale up the number and scope of further projects. While implementation at University A got stuck and remained limited to the Lean initiators’ workplaces, University B and C were creating a growing number of “islands of excellence”. Since neither of the two universities provided a complete project overview it is not possible to exactly list all areas that have been subject to Lean implementation. However, the collected data clearly shows different patterns of Lean dissemination: So far, University C has largely focused on central service units such as Finance, Estates or the Library, which are under the COO/ CFO’s direct or indirect control. Also University B’s Lean team looked at some of these central support processes, e.g. procurement and HR, but also touched the administrative side of the core processes of teaching and research, primarily by engaging with the academic schools. Projects in this area range from central standards for administering research projects to more school-specific processes such as postgraduate admission.

Respondents from University B and C noted that starting small was crucial to enable the internal Lean facilitators to practise their Lean skills, accumulate organisational knowledge and develop an internal network of Lean supporters. But there was also agreement that this needed to be complemented by a top-down element later on in order to coordinate Lean activity, identify strategic gaps and initiate larger cross-functional projects (Dennis 2002). Respondents from University C conceded that their initiative lacked top-down prioritisation and that adding a strategic layer should probably be the next step:

“Looking back I think we should have been more prescriptive. Push Lean in more.” (C2)

“You could try to systematize it. To follow something through like the student life cycle. So that we continue doing the bits and pieces, keep people engaged, but get some structure going.” (C1)

At the same time, University B struggled with the strategic end-to-end element of its Lean initiative. While it was probably phased in too early, this also points to an important trade-off that was highlighted by respondents from all three universities. Looking at comprehensive end-to-end processes promises huge potentials but it also increases the project complexity (Randor et al. 2006), primarily because the number of process stakeholders that need to be involved rises:

“Obviously, the less stakeholders you have, the bigger the chance that you can make a change.” (A3)
“Nobody owns these big value streams. We have different bits of it owned in different parts of the organisation. That structurally is a problem in the university.” (B2)

“Something that we started looking at was the end-to-end process of undertaking research. And we drew out a high-level process map of what it is to undertake research. When we did that exercise, this chart was too big and too complicated to manage in one chunk – too many stakeholders involved.” (C3)

**Q4) Implementation: Which are the enablers/ barriers to Lean implementation in HE?**

Even though they emphasised different aspects, all respondents referred to the impeding effect of public sector organisational culture and structures in general and HE features in particular (Tierney 1988). Consequently, it can be seen as a constant barrier across all three cases, though its effect is somehow weakened by University C’s high level of informality. This structural barrier makes rapid radical change unlikely as layers of rules, collegial decision making structures and academic freedom/ autonomy constrain the clout of leadership.

There are significant differences with regards to the resources and capabilities the three universities (can) provide to overcome this barrier. University A’s Lean initiative cannot draw on any dedicated resources and is more a matter of voluntary work. At the same time, University B and C operate Lean teams of 4.5 FTE and 2.5 FTE respectively. In both cases, virtually all micro-level respondents stressed the importance of having the support of this specialised change capacity. However, table 25 illustrates that the roles of the both Lean teams differ slightly. University C’s Lean team focuses on neutral facilitation of micro-level projects with close on-going guidance of the project teams. At University B, the Lean team’s primary target group is managerial staff and it has more an advisory, training and coaching role with less operative micro-level involvement. Interestingly, there seems to be agreement that both roles are important. Asked for future priorities the interviewed Lean facilitators from University B noted that they wanted more operational involvement while their colleagues from University C saw their future in management training and coaching.

Probably the most important factor with regards to Lean implementation is the role of leadership – it can act as either enabler or barrier (Achanga et al. 2006). The case of University A clearly shows that a complete lack of leadership support is a knockout criterion. At the same time, at University B and C, initial backing from the top was crucial for establishing formal project structures with dedicated resources. While leadership attention for University B’s Lean initiative quickly faded, on-going top management involvement explains why the Lean team at University C was able to engage intensively with an increasing number of central support units. Soft pressure from the top facilitated management buy-in throughout the organisations and made it
easier to pursue cross-unit projects. However, the problem with leadership support is that it is closely tied to specific individuals. And so University C’s Lean team has no illusion about the life span of its high profile backing:

“We’re kind of [the COO/ CFO]’s baby. If he goes, what’s gonna happen to Lean? […] There needs to be a champion at the principal’s office level. Otherwise it’s just not going to continue because if we hadn’t [the COO/ CFO] championing Lean it would be an awfully hard slog because there wouldn’t be the pressure to buy in to engage with us.” (C1)

Table 25: Functions of the Lean teams at University B and C

<table>
<thead>
<tr>
<th>Current roles</th>
<th>University B</th>
<th>University C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management training</td>
<td>“Once I’ve gone through all the training and understood what it was all about, I was then in a position that I could apply this way of working to everything I did.” (B6)</td>
<td>Neutral broker: “It is very helpful to have someone who hasn’t any stakes in the process, who is not involved in the day to day running of the process.” (C7)</td>
</tr>
<tr>
<td>Management advise/ coaching</td>
<td>“When you’re trying to drive some change in the team and to get everyone on board, they were a good source of advice.” (B3)</td>
<td>Fresh view: “The facilitators bring in a fresh, somehow unbiased perspective on things. They challenge routines.” (C8)</td>
</tr>
<tr>
<td>Organise operational support</td>
<td>“They provided a network of other people to share experience which was invaluable.” (B3)</td>
<td>Structure discussions: “The facilitators give you quite a structure to follow and keep you within that structure because it’s quite easy to go off the track.” (C9)</td>
</tr>
<tr>
<td>Strategic prioritisation</td>
<td>“They’re also in charge of the big institutional projects. The kind of stuff that involves several units across the university.” (B6)</td>
<td>Guide problem solving: “They didn’t prescribe anything. They asked the right questions which helped us to find the answers and make progress.” (C4)</td>
</tr>
<tr>
<td>Close on-going involvement</td>
<td>“I would prefer to do more devolved working with the teams rather than jumping in and out. I think we should stay with the project right until the very end.” (B1)</td>
<td>Close on-going involvement: “We really felt that the guys from the Lean team were behind us all the time. They never really left until it was up and running fully.” (C5)</td>
</tr>
</tbody>
</table>

Finally, besides these high-level structural aspects, all respondents mentioned a wide range of further more situation-specific factors that can either act as enablers or barriers. While interesting for practitioners, these factors are highly idiosyncratic and less relevant for the purpose of generalisation. The most frequently named are summarised in table 26.
Table 26: Further situation-specific enablers and barriers

<table>
<thead>
<tr>
<th>Description</th>
<th>Enabler/ Barrier</th>
<th>Frequency of mention</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Lack of) involvement of all relevant process owners and stakeholders</td>
<td>Both</td>
<td>6</td>
</tr>
<tr>
<td>Work with intermediate state scenario to start implementation as soon as</td>
<td>Enabler</td>
<td>5</td>
</tr>
<tr>
<td>possible to make the change process irreversible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Lack of) comprehensive performance data for the current state process</td>
<td>Both</td>
<td>4</td>
</tr>
<tr>
<td>(Not) having the right people in the room: project team should consist of</td>
<td>Both</td>
<td>4</td>
</tr>
<tr>
<td>people who have knowledge of Lean and the process and the authority to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>make decisions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Informal communication to build networks throughout the university</td>
<td>Enabler</td>
<td>3</td>
</tr>
<tr>
<td>(Lack of) Lean experience in the project teams from previous projects</td>
<td>Both</td>
<td>3</td>
</tr>
<tr>
<td>IT changes that are time-consuming and expensive</td>
<td>Barrier</td>
<td>2</td>
</tr>
<tr>
<td>(Lack of) upfront communication of project objectives, management</td>
<td>Both</td>
<td>2</td>
</tr>
<tr>
<td>expectations and available resources</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: compiled by the author

Q5) Impact: What are the results of the universities’ Lean initiatives?

The lack of systematic quantification at University A and B makes it difficult to develop a clear answer to that question. Nevertheless, University C’s impact assessment and the few available figures for University A and B suggest that Lean led to efficiency improvements in terms of staff time savings and lead time reductions – within certain closely confined areas. Less clear are the bottom-line effects, i.e. cost savings, and the results on the effectiveness and quality side, e.g. in terms of customer satisfaction. Table 27 summarises and compares the evidence on the impact of Lean implementation.

The patchy impact assessment – also University C measures only staff time savings – is largely due to the Lean initiatives’ soft qualitative targets. If you do not aim at cost reductions, there is no real incentive to measure them. Instead the focus in all three cases was on long-term cultural change. It is difficult to evaluate the scale and sustainability of qualitative impacts as to say conclusively whether or not Lean has delivered on these objectives. But the micro-level interviews at University B and C suggest that it has at least created certain “islands of excellence” with improved teamwork, better process understanding and staff ownership for the continuous improvement of their workplace.
Table 27: University A, B and C – Comparison of Lean impacts

<table>
<thead>
<tr>
<th>Dimension</th>
<th>University A</th>
<th>University B</th>
<th>University C</th>
<th>Conclusion: UK HE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measurement</td>
<td>Measurement</td>
<td>Measurement</td>
<td>Measurement</td>
</tr>
<tr>
<td>Efficiency improvement (staff time savings)</td>
<td>Quant &amp; Qual (+)</td>
<td>Quant &amp; Qual (+)</td>
<td>Quant (+)</td>
<td>Quant &amp; Qual (+)</td>
</tr>
<tr>
<td>Cost savings (&quot;bottom line&quot;)</td>
<td>Quant &amp; Qual (+)</td>
<td>Quant &amp; Qual (+)</td>
<td>Qual (+)</td>
<td>Quant &amp; Qual (+)</td>
</tr>
<tr>
<td>Lead time reduction</td>
<td>Qual (+)</td>
<td>Quant &amp; Qual (+)</td>
<td>Quant &amp; Qual +</td>
<td>Quant &amp; Qual +</td>
</tr>
<tr>
<td>WIP reduction (or queue length in services)</td>
<td>No evidence</td>
<td>No evidence</td>
<td>No evidence</td>
<td>No evidence</td>
</tr>
<tr>
<td>Quality/ less defects</td>
<td>No evidence</td>
<td>No evidence</td>
<td>No evidence</td>
<td>No evidence</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>Qual (+)</td>
<td>Qual (+)</td>
<td>Qual (+)</td>
<td>Qual (+)</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>No evidence</td>
<td>Qual (+)</td>
<td>Qual (+)</td>
<td>Qual (+)</td>
</tr>
<tr>
<td>Cultural change</td>
<td>Qual +</td>
<td>Qual ++</td>
<td>Qual ++</td>
<td>Qual ++</td>
</tr>
<tr>
<td>Scope</td>
<td>Very narrow (small areas within business school)</td>
<td>“Islands of excellence” (central admin)</td>
<td>“Islands of excellence” (schools/ institutes)</td>
<td>Bits and pieces of the value chain</td>
</tr>
</tbody>
</table>

a The following abbreviations are used: “Quant” – based on systematic quantitative impact assessment, “Quant & Qual” – based on some ex post estimates and interviewee perceptions; “Qual” – solely based on interviewee perceptions.

b The applied scale for the impact assessment ranges from strongly negative (---) to strongly positive (+++). Brackets express particularly weak impacts.

Note: Data/ assessments for University A, B and C are taken from tables 14, 18 and 23.

Source: compiled by the author

To sum up this section, table 28 recaps the findings of the between-case analysis and the derived answers to the research questions before the next section discusses them against the backdrop of the reviewed literature.
Table 28: Summary of case study findings and answers to the research questions

<table>
<thead>
<tr>
<th>Research question</th>
<th>Aspect</th>
<th>University A</th>
<th>University B</th>
<th>University C</th>
<th>Answer to research question/ between-case pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) <strong>Motives</strong>: Why do universities apply Lean principles to their work?</td>
<td>Drivers</td>
<td>Personal commitment of two members of staff</td>
<td>Initiated by the new VC and Lean Centre of Excellence</td>
<td>Improve organically grown support processes; COO/CFO backing</td>
<td>Lack of urgent environmental pressures leads to “feel-good” objectives such as improving services and pursuing cultural change</td>
</tr>
<tr>
<td></td>
<td>Objectives</td>
<td>Improve quality and effectiveness</td>
<td>Test Lean in HE; improve services; create supportive working environment</td>
<td>Long-term cultural change to facilitate improvement</td>
<td>Lower commitment to Lean as a method where organisations were not tied to existing Lean resources/capabilities</td>
</tr>
<tr>
<td></td>
<td>Lean justification</td>
<td>Conference visit: best practice; low commitment to method</td>
<td>Utilise existing Lean resources &amp; capabilities; closely tied to method</td>
<td>Conference visit: best practice; soft approach; low commitment to method</td>
<td></td>
</tr>
<tr>
<td>Q2) <strong>Method</strong>: How is Lean defined for the purpose of the universities’ initiatives?</td>
<td>Understanding</td>
<td>Participatory process improvement: value stream, flow, root cause analysis, employee empowerment (University B: less emphasis on root cause analysis and more on the 5 principles)</td>
<td>RIE-facilitated projects with close on-going Lean team involvement</td>
<td>Facilitation approach to Lean: focus more on how (Lean methods) than on what (Lean principles)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tools</td>
<td>RIE-facilitated projects</td>
<td>Projects with sporadic Lean team involvement; “Lean Skills for Managers” training</td>
<td>Best combine RIE-facilitated projects with management training</td>
<td></td>
</tr>
<tr>
<td>Q3) <strong>Scope</strong>: Where is Lean implemented in the universities?</td>
<td>Implement. strategy</td>
<td>Bottom-up; got stuck and is limited to initiators’ narrow areas of responsibility</td>
<td>Mix of bottom-up and top-down, the latter proved to be difficult</td>
<td>Bottom-up with some soft top management pressure</td>
<td>Lean implementation remains limited to bits and pieces of the value chain Bottom-up element created “islands of excellence”, top-down element to link them has not yet been fully developed</td>
</tr>
<tr>
<td></td>
<td>Areas</td>
<td>Only few processes within the business school</td>
<td>Academic schools and a few support processes</td>
<td>Central support units, e.g. Finance, Estates</td>
<td></td>
</tr>
<tr>
<td>Q4) <strong>Implementation</strong>: Which are the enablers (+) and barriers (-) to successful Lean implementation in HE?</td>
<td>Organ. culture &amp; structure</td>
<td>Academic-admin divide (-); silo mentality (-); blame culture (-)</td>
<td>Rule-bound hierarchy (-); academic freedom in admin matters (-); silo mentality (-)</td>
<td>Academic freedom in admin matters (-); blame culture (-) but mitigated by informality</td>
<td>Public sector/HE organisational culture and structures as structural barrier in all cases (On-going) leadership support as most important enabler as it also determines investments in dedicated Lean capacity and management buy-in throughout the organisation</td>
</tr>
<tr>
<td></td>
<td>Awareness</td>
<td>Lack of leadership commitment (-)</td>
<td>Initial leadership impulse (+); but quickly fading attention (-); Lean mgt. training (+)</td>
<td>On-going leadership support (+); increasing no. of staff w/ Lean experience (+)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Change capacity</td>
<td>Lack of dedicated resources (-); no management buy-in (-)</td>
<td>Lean team (+); Lean centre of excellence (+); supportive “islands of excellence” (+)</td>
<td>Lean team (+); initial consultancy support (+); supportive “islands of excellence” (+)</td>
<td></td>
</tr>
<tr>
<td>Q5) <strong>Impact</strong>: What are the results of the universities’ Lean initiatives?</td>
<td>Quantitative</td>
<td>No systemic measurement, staff time savings and lead time reductions</td>
<td>some ex post estimates show time reductions</td>
<td>Staff time savings of 24.63 FTE between 2006-2010</td>
<td>“Island optimisation”: Efficiency improvements and cultural change within certain closely confined areas – scope varies with leadership support</td>
</tr>
<tr>
<td></td>
<td>Qualitative</td>
<td>Better team work &amp; process ownership in one unit</td>
<td>“Islands of excellence” with improved team work, better process understanding and continuous improvement</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: compiled by the author
4.3 Discussion

Detailed answers to the research questions were developed in the previous section. The remainder of this chapter focuses on the theoretical conclusions, discussing the case study findings against the reviewed literature (Eisenhardt 1989). For this purpose, six propositions are introduced.

**P1)** Leadership support is the crucial independent variable to explain success or failure of Lean implementation. Without any top management backing, Lean implementation is determined to fail. Furthermore, the level and sustainability of leadership support affects also the other determinants of “organisational readiness” such as the provided resources and management buy-in throughout the organisation. This is in line with the literature on change management in general and Lean implementation in particular (see e.g. Dahlgaard & Dahlgaard-Park 2006).

**P2)** The organisational environment matters – it affects the clout of leadership, provides justification for Lean implementation and shapes its objectives. First, bureaucratic culture and structures were a constant factor in all three cases, impeding rapid widespread change. This is not surprising as all three organisations are embedded in the same industry environment. In public sector HE leadership is weaker and more fragmented as compared to a private sector setting. Second, this industry environment is traversed by professional networks and communities, continuously identifying and disseminating best practice. This provides both inspiration as well as legitimacy for organisational change initiatives. Third, HE and the public sector depend on the material and political support of the wider socio-economic environment. However, in none of the three cases, this dependency translated into any considerable efficiency pressure. As a result, Lean implementation in HE seems to focus on soft inward-looking targets. While the literature recognises the relevance of environmental factors it does often not specify how they affect Lean implementation (see e.g. Achanga et al. 2006).

**P3)** Lean HE is less distinctive than Lean production – it is best described as participatory process improvement (PPI). While the contingency perspective on Lean implementation acknowledges that a direct transfer of the Lean production approach to other organisational settings is not possible (Hines et al. 2004), it is notable that there is clearly a lack of new (public) service-specific Lean tools and techniques. Similar to many examples of Lean services described in the literature (see e.g. Swank 2003), Lean application in all three analysed HEIs resembled conventional process analysis and optimisation approaches. But there was also strong emphasis on staff participation and reflective practice, which has not been mentioned for other (public) service cases.
and is probably due to the focus on long-term cultural change. Nevertheless, this PPI approach is not the revolutionary overhaul of classic service management principles that Lean production has been to manufacturing theory.

\( P4 \) **So far Lean HE has operated in a facilitation mode that fits to the objective of continuous improvement but is less suitable for more radical changes.** Neutral facilitation of empowered cross-functional teams is a great approach to support continuous improvement. This facilitation mode is very similar to the kaizen phase in Lean production. However, in a manufacturing environment Lean implementation usually starts with a kaikaku phase, i.e. a rapid and radical overhaul of the old production system (Womack & Jones 2003). As this often includes job cuts in anticipation of savings and major changes in staff roles, it is very much driven from the top. Here, Lean operates more in a consultancy mode by providing substantial advise to management on how to restructure the organisation (see table 29). Consequently, in its current mode, Lean HE is clearly not able to deliver on more painful targets such as short-term cost reductions as they might arise from growing environmental pressures such as the latest Government plans to further cut the HE budget and unleash competition for undergraduate places.

**Table 29: Comparison of consultancy and facilitation mode to Lean implementation**

<table>
<thead>
<tr>
<th></th>
<th>Consultancy mode</th>
<th>Facilitation mode</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td>Gain significant short-term bottom-line improvements</td>
<td>Institutionalise continuous improvement; cultural change</td>
</tr>
<tr>
<td><strong>Direction</strong></td>
<td>Top-down: management enforces process blueprints</td>
<td>Bottom-up: empowered employees improve “their” processes</td>
</tr>
<tr>
<td><strong>Role of Lean experts</strong></td>
<td>Act as management consultant: design new process blueprints</td>
<td>Act as neutral facilitator: help staff to come up with improvement ideas</td>
</tr>
<tr>
<td><strong>Pros</strong></td>
<td>Rapid system-wide change of structures/ processes; quant. impact</td>
<td>Sustainable cultural impact: changes behaviour</td>
</tr>
<tr>
<td><strong>Cons</strong></td>
<td>Requires high degree of personal leadership; less sustainable</td>
<td>Slow incremental improvement with little immediate bottom-line impact</td>
</tr>
</tbody>
</table>

Source: compiled by the author

\( P5 \) **Though still notable, Lean HE delivers less impressive impacts in terms of scale and scope than Lean production.** In all three analysed HEIs Lean implementation changed things for the better – without the unintended negative effects that were found in other public sector cases (Carter et al. 2011). However, when compared to the revolutionary impacts reported for the manufacturing environment (see table 30), these results appear almost disappointing. Though the available data does not allow a direct quantititative comparison, it is obvious that the analysed HE cases do not unfold the same system-wide impact as Lean production (Seddon 2005) – they remain limited to
bits and pieces of the universities’ overall value streams. Besides numerous other factors, this performance gap is mainly due to the limited exposure to environmental pressures, higher barriers to change and probably also the limited methodological originality and potential of the Lean services approach.

Table 30: Comparison of Lean impacts in manufacturing, services, public administration and Higher Education

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Manufacturing Impact</th>
<th>Services Impact</th>
<th>Public sector Impact</th>
<th>HE Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measure Impact a</td>
<td>Measure Impact a</td>
<td>Measure Impact a</td>
<td>Measure Impact a</td>
</tr>
<tr>
<td>Efficiency improvement (staff time savings)</td>
<td>Quant +++</td>
<td>Quant +</td>
<td>Qual +</td>
<td>Qual +</td>
</tr>
<tr>
<td>Cost savings (“bottom line”)</td>
<td>Quant +++</td>
<td>Quant ++</td>
<td>Qual &amp; Quant</td>
<td>Qual (+)</td>
</tr>
<tr>
<td>Lead time reduction</td>
<td>Quant +++</td>
<td>Quant ++</td>
<td>Qual &amp; Quant</td>
<td>Qual +</td>
</tr>
<tr>
<td>WIP reduction (or queue length in services)</td>
<td>Quant +++</td>
<td>No evidence</td>
<td>Quant +</td>
<td>No evidence</td>
</tr>
<tr>
<td>Quality/less defects</td>
<td>Quant +++</td>
<td>Quant ++</td>
<td>Qual ++</td>
<td>No evidence</td>
</tr>
<tr>
<td>Customer satisfaction</td>
<td>Quant c +++</td>
<td>Quant c ++</td>
<td>No evidence</td>
<td>Qual (+)</td>
</tr>
<tr>
<td>Employee satisfaction</td>
<td>No evidence</td>
<td>No evidence</td>
<td>Qual --</td>
<td>Qual (+)</td>
</tr>
<tr>
<td>Cultural change</td>
<td>Qual +++</td>
<td>Qual ++</td>
<td>Qual +</td>
<td>Qual ++</td>
</tr>
<tr>
<td>Scope</td>
<td>System-wide, i.e. entire operation</td>
<td>Bits and pieces of the value chain</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following abbreviations are used: “Quant” – based on systematic quantitative impact assessment, “Quant & Qual” – based on some ad hoc quantifications and qualitative assessment; “Qual” – solely based on qualitative assessment.

b The applied scale for the impact assessment ranges from strongly negative “---” to strongly positive “+++”. Brackets express particularly weak impacts.

Note: Data for manufacturing, services and public administration is taken from table 6 in chapter 2. The assessments for HE were derived in table 27.

c Table 6 did not cover the impact of Lean on customer satisfaction. However, Womack and Jones (2003) and Bowen and Youngdahl (1998) report that Lean implementation in manufacturing and services led to increasing revenues as customer satisfaction improved.

Source: compiled by the author

P6) A revised conceptual model should include environmental factors and consider that enablers and barriers affect both, the chosen Lean approach and its impacts. Based on the previous propositions, two amendments to the proposed conceptual model should be made: First, three environmental factors are added to the model to better reflect the organisation’s external context. Second, the enablers and barriers are conceptualised as intermediating variable at two stages of the model because a low level of organisational readiness does not only mitigate the impact of Lean implementation.
Prior to that it also confines the choice of the Lean approach in terms of application range and conceptual breadth. Exhibit 7 shows the revised conceptual model and applies it to contrast the features of Lean production and Lean HE.

**Exhibit 7: Revised conceptual model with application to Lean production and Lean HE**

Source: compiled by the author
5. Conclusion

This chapter briefly summarises the dissertation’s findings and discusses their wider implications. First, it relates the case study results to the initial research objectives and examines the dissertation’s contribution to the academic literature, its limitations and the consequences for future research. Detailed answers to the research questions were developed in the previous chapter and are summarised in appendix 11, which also compares them to the findings of the literature review. Second, in order to provide practical advice, the managerial implications section summarises the lessons learned from the three case studies and derives an implementation blueprint for Lean in a HE setting.

5.1 Academic implications

The aim of this dissertation was to research if and how Lean thinking can be applied in HE. Based on the evidence provided by the case study analysis, the answer to the first part of the question is that Lean can be applied in HE but with less spectacular results than in manufacturing. The reason for this is contained in the more complex answer to the second part of the question, the “how”. Simply put, Lean HE is very different to Lean production. First, public sector HE is a particularly difficult environment for any larger change initiative. Bureaucratic collegial decision making and strong organisational silos restrain the cloud of personal leadership. Together with low exposure to environmental pressures, this leads to rather soft non-quantified targets and only fragmented implementation. Second, the conceptual underpinning of Lean HE is less sophisticated and powerful than Lean production, which could be a more fundamental problem of Lean services in general as will be argued below.

The dissertation contributes to the sparse and so far largely anecdotal literature on a relatively new area of Lean application. Together with Radnor and Bucci’s (2011) study, it is one of the first empirical accounts on the increasing number of universities experimenting with Lean thinking. Unlike them, it develops and tests a conceptual model that allows exploring the relationship between different variables, e.g. how different levels of leadership support affect the scope and impact of Lean implementation. Furthermore, by adding a micro level of analysis, the dissertation scrutinises the substance of the actual projects behind the more programmatic Lean initiatives. It shows that most of them are relatively small, focusing on bits and pieces of larger value streams, and that some are Lean in name only. Finally, it is the first study on Lean in HE that brings in the “user perspective” by interviewing managers and staff, none of which are Lean experts, on their experience with the method.
With regards to the dissertation’s limitations, it has to be noted that its small sample size does not allow statistical inferences (King et al. 1994). Thus, the theoretical generalisations derived from the case study analysis should be tested in future empirical research. Next, certain parts of the study are closely tied to the UK HE system. The circumstances in other countries might be different, especially with regards to exposure of HE to market competition. However, the most problematic point is the limited availability and quality of quantitative performance data, which reduces the clarity of the findings as it prevents a direct comparison of the Lean initiatives’ costs and benefits. Even in the case of University C, where the Lean team systematically measures staff time savings, it remains unclear how this translates into bottom-line cost reductions or output and quality increases.

Despite these limitations, the dissertation raises interesting questions for future research and has also implications for the wider field of management theory. First of all, it remains to be seen, how the anticipated increase in external performance pressure on UK HEIs will affect the role and objectives of Lean. Will it lead to tougher quantified targets and trigger a shift to a new consultancy mode to Lean implementation that relies more on pressure from top than on employee empowerment? And how would this affect the role of the Lean teams and staff perceptions of Lean? Or would it be the end of Lean HE as universities switch to conventional cost cutting? All these questions could be examined with a longitudinal research approach (Saunders et al. 2009), analysing how the Lean initiatives’ focus might change after the latest HE reforms will be fully implemented.

Second, the case study results prompt a fundamental rethinking of the concept of Lean services. Based on most respondents’ only rudimentary reference to the five Lean principles, it could be argued that the analysed HEIs did not apply Lean and that the author was blinded by their assertions that they did. However, the real problem is the lack of a sophisticated and widely accepted definition or concept for Lean services, so that it remains unclear how exactly a meaningful adaption of the Lean principles to the service context should look like. All too often, the existing accounts on Lean services simply replicate the conventional wisdoms of service management (see e.g. Golland et al. 1998). A good example is the pull principle, which is either meaningless in true services as they are always made-to-order or simply points to the importance of sophisticated queue management to minimise customer waiting times. Contrary to the prevailing opinion in the literature (Womack & Jones 2003), there might be limits to the transferability of the five Lean principles. Rather than criticising (public) service organisations for their limited Lean understanding (see e.g. Radnor et al. 2006, Radnor
& Bucci 2011), operations research should scrutinise if Lean services can be more than a compilation of principles of good services management – PPI, if you like. If Lean is first and foremost a dynamic learning capability (Holweg 2007), than PPI might be an appropriate translation to the service context, given that it increases the organisation’s responsiveness and flexibility – the dissertation provided some early evidence for that.

Third, leaving management research’s dominant ontological position of objectivism (Edeling 1998) reveals an alternative explanation for the popularity of the Lean services concept. A sociological-interpretive perspective (Brunsson & Olsen 1993) on the collected data provides useful insights why service organisations continue referring to Lean principles even though they rather do conventional process optimisation. The two universities that learned about Lean at a conference were more committed to the general idea of having a systematic improvement framework than to the specific method. Nevertheless, relating to “proven” best practice and management fashion granted their change projects legitimacy as they moved with the times (Meyer & Rowan 1977). At the same time, by decoupling talk and action (Brunsson 2003), they implemented only those elements that relate to their specific objectives and organisational routines. This is not objectionable and should be seen as appropriate rational behaviour. In this context, Lean provides a useful label to legitimise change and to create a burning platform. But like most management fashions that do not introduce radically new ideas, it has probably a limited shelf life.

5.2 Managerial implications

Based on the premise that Lean services is best understood as a fashionable legitimate label for more conventional principles of good service management, this section outlines which managerial implications can be drawn from the case studies for the successful implementation of PPI. However, prior to this, it is helpful to briefly recap the standard implementation approach for Lean production (Womack & Jones 2003): Here, a management-driven radical overhaul of the old production system (kaikaku) is followed by staff-driven continuous improvement (kaizen). These phases represent the two different modes to Lean implementation, consultancy mode and facilitation mode, described above (see table 22).

Translating the two-phases implementation model to a service context implies beginning with Business Process Reengineering (BPR), where management introduces new process blueprints for strategically important end-to-end processes (Hammer 1990), followed by PPI. However, starting by addressing major cross-functional issues inevitably challenges the organisation’s power structure. This requires
a high degree of personal leadership to overcome (middle) management resistance, which for the given reasons is very unlikely in HEIs – at least with the currently low exposure to external pressures. Consequently, all three analysed HEIs did solely operate in a facilitation mode with plans to phase in some strategic prioritisation, i.e. consultancy mode elements, at a later stage once the initiative has created sufficient groundswell. ⁹ Exhibit 7 compares the classic Lean production implementation approach with both variants for Lean services. In the following, an implementation blueprint for the last variant is outlined.

**Exhibit 8: Comparison of Lean implementation approaches**

![Comparison of Lean implementation approaches diagram]

The between-case analysis provides valuable evidence with regards to the critical success factors for PPI implementation. On this basis, it is possible to draw up a four-step implementation blueprint for achieving sustainable cultural change within a five-year period. Exhibit 8 provides an overview of the blueprint before its different steps will be discussed.

---

⁹ In parts, University B’s Lean initiative has already reached this stage. However, the interviewed Lean facilitators conceded that it would have been better to get more experience before starting the larger cross-functional projects.
**Exhibit 9: Four-step PPI implementation blueprint**

1. **Initiation/ set up project structures (in preparation of initiative)**
   - **Objectives:** Send strong signal to the organisation (change awareness); provide the required resources and capabilities
   - **Measures:** Set up project structure with dedicated resources (change team); customise RIE approach; design systematic impact assessment framework

2. **RIE-based projects (starts immediately)**
   - **Objectives:** Build a core/critical mass of managers and staff that understand and support the initiative; develop the change team’s experience
   - **Measures:** Pilot projects with most supportive units (under control of leadership sponsor); gradually extend scope; set annual targets (No. of projects, savings)

3. **Management training (phased in after one year)**
   - **Objectives:** Spread PPI to non-core areas; facilitate supportive management behaviour; create “islands of excellence” implementing PPI independently
   - **Measures:** Action learning-based management training (see University B), practitioner community with meetings and online support

4. **Strategic prioritisation and coordination (phased in after three years)**
   - **Objectives:** Initiate cross-functional projects; identify strategic gaps and areas w/o improvement activity; coordinate the units’ and schools’ projects
   - **Measures:** High level end-to-end process mappings (research process, student life cycle); cross functional project teams; task forces for problematic areas

Source: compiled by the author

The first step of PPI implementation is to establish a capable project structure. This does not only provide the necessary resources but also sends a strong signal to the whole organisation that top management is serious about the change initiative. Second, an increasing number of small RIE-based projects prove the method’s potential and create a critical mass of supportive managers and staff understanding its benefits. It also enables the change team to grow its experience and internal reputation. These grassroots projects should start with the most supportive units under direct control of the initiative’s leadership sponsor – the COO/ CFO in University C’s case – to build a strong progressive core and be gradually extended to related areas. Third, after the first year, the change team should be ready to run a regular training program for senior and middle management to spread supportive management behaviour throughout the organisation. The trainings should be based on University B’s action learning approach (Pedler 2008), and could be complemented by a practitioner community, i.e. follow-up meetings and an online platform facilitating the exchange of best practice. Fourth, after general acceptance has been achieved, the last step is to systematically link the different “islands of excellence” by phasing in a strategic coordination and prioritisation element, looking at the university’s important value streams in teaching and research. Exhibit 9 visualises the pattern of PPI dissemination.
Some final remarks: It is worth to recap that continuous leadership support it the most important success factor, especially for the initialisation stage and the introduction of a strategic layer. This should include setting annual objectives for the change team and demanding a systematic reporting of the achieved impacts. Though probably of limited shelf life, for the time being, Lean provides leaders in HE with a powerful platform to
drive cultural change to make their organisations more responsive to an increasingly dynamic environment – this opportunity should be used by more universities.
References


Ålkul, G. 2003, “Create a lean, mean machine”, *Quality Progress*, vol. 36, no. 4, pp. 29-34.


Dennis, P. 2006, Getting the Right Things Done, Lean Enterprise Institute, Cambridge.


Osborne, D. & Gaebler, T. 1992, Reinventing government: how the entrepreneurial spirit is transforming the public sector, Plume, New York.


## Appendices

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</table>
Appendix 1: Introduction to the history of production systems

In order to understand a concept’s novelty, one needs to see the difference from the status quo. This requires a pointed comparison of contrasting ideal types (Weber 1968). In their seminal book “The Machine that Changed the World”, Womack et al. (1990) illustrated the features of the production system they had observed in Japanese factories and termed “Lean production” by contrasting it with the two traditional production systems the Western world was familiar with at this time – pre-industrial revolution “craft production” and post-industrial revolution “mass production”. Though others have questioned the accuracy of this historical periodization (see e.g. Williams et al. 1992), it is still a useful device to highlight the revolutionary overhaul that Lean production has been to traditional Western manufacturing theory. The following table summarises Womack et al.’s (1990) comparison of craft production, mass production and lean production:

<table>
<thead>
<tr>
<th>Description</th>
<th>Craft production &lt;br&gt; pre-industrial revolution</th>
<th>Mass production &lt;br&gt; post-industrial revolution</th>
<th>Lean production &lt;br&gt; Japan: after WW2; Western world: after 1990</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>High variety, customised output with one skilled worker responsible for an entire unit of output</td>
<td>High volume of standardised output; capitalises on division of labour, specialised equipment, interchangeable parts and assembly lines</td>
<td>Moderate to high volume with more variety; fewer mass buffers such as extra workers, inventory or time; smaller more flexible equipment</td>
</tr>
<tr>
<td>Examples of goods and services</td>
<td>Traditionally all crafts and trades; today: portrait painting</td>
<td>Automobiles, computers, industrial machines</td>
<td>Similar to mass production</td>
</tr>
<tr>
<td>Focus</td>
<td>Internal: task</td>
<td>Internal: product</td>
<td>Continuous flow, synchronised by customer pull</td>
</tr>
<tr>
<td>Operations</td>
<td>Single item</td>
<td>Batch and queue; Economic order quantity (EOQ)</td>
<td>Increase customer value by reducing waste</td>
</tr>
<tr>
<td>Overall aim</td>
<td>Mastery of craft</td>
<td>Reduce cost and increase efficiency</td>
<td>Prevention through staff empowerment; built in by product and process design</td>
</tr>
<tr>
<td>Quality</td>
<td>Integrated (part of craftsmanship)</td>
<td>Separate from worker; inspection at the end of the production line</td>
<td></td>
</tr>
<tr>
<td>Business strategy</td>
<td>Customisation</td>
<td>Economies of scale and automation</td>
<td>Economies of flow and flexibility</td>
</tr>
<tr>
<td>Improvement</td>
<td>Master-driven continuous improvement</td>
<td>Expert-driven periodic improvement initiatives</td>
<td>Workforce- and process-driven continuous improvement</td>
</tr>
<tr>
<td>Advantages</td>
<td>Output tailored to customer needs</td>
<td>Low unit cost; requires only low-skilled workers</td>
<td>Volume and product flexibility; variety; high quality of goods</td>
</tr>
<tr>
<td>Disadvantages</td>
<td>Slow; requires skilled workers; high costs and low standardisation</td>
<td>Inflexible regarding changes in volume, product or process design; low quality</td>
<td>Vulnerable to disruptions (no buffers); more worker stress</td>
</tr>
</tbody>
</table>

Source: Stevenson 2002: 27; Potter 2010
Appendix 2: Analysis of Lean definitions

Defining what Lean actually is and which conceptual elements it compasses is a difficult undertaking. The only agreement in the comprehensive Lean literature is that there is no universally accepted definition (see e.g. Dahlgaard & Dahlgaard-Park 2006; Lewis 2000; Pettersen 2009; New 2007). Shah & Ward (2007) point to three reasons for that: First, before the IMVP coined the term “Lean production”, there was a lack of a unifying name for the novel Japanese production system described by many observers. Consequently, different headings were used to describe one and the same phenomenon, e.g. TPS, JIT, pull production or Kanban. Second, even worse, there is also substantial disagreement about what exactly comprises Lean. Third, it has to be noted that the academic discussion about Lean takes place on different analytical levels. While some focus Lean practices, tools and techniques, i.e. discuss on an operational level, others take a more strategic perspective and try to capture Lean’s guiding principles and conceptual building blocks. This dissertation has added a third level – the question for the fundamental nature or essence of Lean. It is crucial to distinguish between these three levels when comparing different Lean definitions (Pettersen 2009; Hines et al. 2004).

The table below provides a chronological overview of selected definitions of Lean and related concepts (TPS and JIT) from a couple of popular journal articles and books. While this list is not exhaustive and some definitions might be divorced from their context, an overall pattern emerges that confirms Hines et al. (2004) observation that the understanding of Lean has evolved over time. Most of the earlier definitions focus narrowly on waste reduction and mention specific practices such as JIT, TQM or autonomation. Post-1990 definitions add a value stream perspective by bringing in suppliers and customers. The more recent accounts are very general, describing Lean as an integrated management or production system and focussing on the system outcomes. Finally, Holweg (2007), drawing on the resourced-based view literature, changes from the strategic to the fundamental level and defines Lean as a dynamic capability that enables the organisation to adapt to changing environmental conditions. His definition is applied as fundamental level definition of Lean throughout this dissertation.
<table>
<thead>
<tr>
<th>Source</th>
<th>Definition/quotation</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugimori et al. 1977: 554</td>
<td>“Toyota is planning and running its production system on the following two basic concepts. First of all, the thing that corresponds to the first recognition of putting forth all efforts to attain low cost production is »reduction of cost through elimination of waste«. This involves making up a system that will thoroughly eliminate waste by assuming that anything other than the minimum amount of equipment, materials, parts, and workers (working time) which are absolutely essential to production are merely surplus that only raises the cost. The thing that corresponds to the second recognition of Japanese diligence, high degree of ability, and favoured labour environment is »to make full use of the workers’ capabilities«. In short, treat the workers as human beings and with consideration. Build up a system that will allow the workers to display their full capabilities by themselves.”</td>
<td>Waste reduction; employee empowerment</td>
</tr>
<tr>
<td>Monden 1983: 2</td>
<td>“The basic idea in TPS is to produce the kind of units needed and in the quantities needed such that unnecessary intermediate and finished product inventories can be eliminated. Three sub-goals to achieve the primary goals of cost reduction (waste elimination) are quantity control, quality assurance, and respect for humanity. These are achieved through four main concepts: JIT, autonamation, flexible workforce, and capitalizing on worker suggestion and 8 additional systems.”</td>
<td>Waste reduction; quality; JIT; root cause analysis; employee empowerment</td>
</tr>
<tr>
<td>Hall 1987</td>
<td>“JIT philosophy is associated with three constructs: total quality, people involvement, and JIT manufacturing techniques.”</td>
<td>JIT; employee empowerment; TQM</td>
</tr>
<tr>
<td>Ohno 1988</td>
<td>“The basis of TPS is the absolute elimination of waste. The two pillars needed to support the TPS are JIT and autonamation.”</td>
<td>Waste reduction; JIT; root cause analysis</td>
</tr>
<tr>
<td>Krafcik 1988: 45</td>
<td>“The Lean production management policy presents higher risks – any hiccup will stop production totally. Thus, Lean operations can be considered as high-risk/ high-return ventures. Much of the risk can be neutralised given an experienced, well-trained workforce, responsive suppliers and good product design.”</td>
<td>Lean as production system/ policy; supplier involvement; product design</td>
</tr>
<tr>
<td>Womack et al. 1990: 11</td>
<td>“Lean production is »lean« […] because it uses less of everything compared with mass production – half the human effort in the factory, half the manufacturing space, half the investment in tools, half the engineering hours to develop a new product in half the time. Also, it requires keeping far less than half the needed inventory on site, results in many fewer defects, and produces a greater and ever growing variety of products.”</td>
<td>Holistic perspective on system outcomes; NPD; product variety</td>
</tr>
<tr>
<td>Flynn et al. 1995</td>
<td>“JIT is based on the notion of eliminating waste through simplification of manufacturing processes such as elimination of excess inventories and overly large lot sizes, which cause unnecessary long customer cycle times.”</td>
<td>Waste reduction; customer orientation</td>
</tr>
<tr>
<td>Spear &amp; Bowen 1999</td>
<td>“TPS includes standardization of work, uninterrupted work flows, direct links between suppliers and customers, and continuous improvement based on the scientific method.”</td>
<td>Standardisation; supplier involvement; customer orientation; continuous improvement; root cause analysis</td>
</tr>
<tr>
<td>Womack &amp; Jones 2003: 15</td>
<td>“In short, lean thinking is lean because it provides a way to do more with less – less human effort, less equipment, less time, and less space – while coming closer and closer to providing customers with exactly what they want.”</td>
<td>Holistic perspective on system outcomes; waste reduction; continuous improvement; customer orientation</td>
</tr>
</tbody>
</table>
At the strategic level, the listed definitions name different principles, methods and approaches as conceptual building blocks of Lean thinking. However, it is problematic to use a quotation of a few lines to make conclusions about which concepts the author ascribes to Lean. This clearly requires a more in-depth analysis of the original texts on Lean and related concepts (Shah & Ward 2007). Since especially the earlier academic publications and the practitioner accounts discuss Lean mostly on an operational level, such an analysis has to identify the described practices, tools and techniques and relate them to the more fundamental underlying conceptual ideas.

Based on a screening of the wider Lean literature, this dissertation applies Womack and Jones’ (2003) five Lean principles – value, value stream, flow, pull and perfection – complemented with the two Lean methods of employee empowerment and root cause analysis (Dahlgaard & Østergaard 2000) as strategic level definition of Lean. The carried out analysis that is described in the following suggests that these seven elements are the best conceptual condensation of the comprehensive Lean literature and also cover Sugimori et al.’s (1977) original definition.

The analysis is based on secondary data from two journal articles. Shah and Ward (2003) and Pettersen (2009) carried out comprehensive literature reviews. They conducted an empirical analysis of the selected journal articles and books by identifying and coding the mentioned Lean practices and tools. In the following table, these
practices and tools are mapped against the five Lean principles and two Lean methods.

The analysis has significant limitations that need to be noted when interpreting its results. First, both papers use different categories to capture the tools and techniques described in the literature, though it was tried to match them (e.g. “setup time reduction” was equated with “quick changeover techniques”). Second, as none of the articles provides definitions of the applied categories, the allocation to the Lean principles and methods is based on the author’s interpretation and might be imprecise in some cases. Third, it is not possible to complete assess the quality of the original research and coding processes. However, already a brief look reveals flaws. For instance, Shah and Ward (2003) overlooked that Sugimori et al. (1977) describe staff empowerment as an essential element of the TPS (this point was added to the table by the author).

Despite these limitations, the analysis presented in the table below provides some interesting insights. First, the principles of flow and pull are clearly at the core of Lean – they were mentioned in all papers and books. Second, some of the earlier publications cover neither the principles of value stream and perfection nor the methods of staff empowerment and root cause analysis. Third, the focus on customers and the purpose of the system entered the Lean literature quite late – the principle of value can only be found in the more recent texts. Fourth, the value stream principle was gradually extended from an organisational focus to a supply chain perspective. Fifth, in general, as the newer literature is more comprehensive, there seems to be increasing convergence with regards to the practices, tools and techniques ascribed to Lean. Finally and most important, the analysis clearly shows that the five principles and two methods are an appropriate condensation to describe Lean’s conceptual building blocks.
<table>
<thead>
<tr>
<th>Lean principle/method</th>
<th>Items Pettersen 2009</th>
<th>Items Shah &amp; Ward 2003</th>
<th>Sources in chronological order</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>P1) value</strong></td>
<td>Customer focus</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
|                       | Policy deployment/    | X                      | X                          | Hoshin kanri
|                       | Focused factory      | X                      | X                          | production
| **P2) Value stream**  | Supplier involvement | X                      | X                          | Cross functional workforce
|                       | Value stream mapping  | X                      | X                          | X
| **P3) Flow**          | Setup time reduction | X                      | X                          | Quick changeover techniques
|                       | Small lot production | X                      | X                          | Lot size reductions
|                       | Layout adjustments    | X                      | X                          | and Cellular manufacturing
|                       | Standardised work     | X                      | X                          |
|                       | Waste elimination     | X                      | X                          |
|                       | Inventory reduction   | X                      | X                          |
|                       | Lead time reduction   | X                      | X                          |
| **P4) Pull**          | JIT production        | X                      | X                          | JIT/ flow production
|                       | Kanban/pull system    | X                      | X                          | Pull system/ kanban
|                       | Process synchronisation | X                    | X                          |
|                       | Production levelling/ | X                      | X                          | heijunka
|                       | Takted production     | X                      | X                          |
| **P5) Perfection**    | Kaizen/Continuous     | X                      | X                          | Improvement (CI)
|                       | 100% inspection       | X                      | X                          |
|                       | 5S Housekeeping       | X                      | X                          |
| **M1) Empowerment**   | Team work             | X                      | X                          | Self-directed work teams
<p>|                       | Improvement circles   | X                      | X                          |
|                       | Andon/visual control  | X                      | X                          |
|                       | Education/training    | X                      | X                          |
|                       | Employee involvement  | X                      | X                          |</p>
<table>
<thead>
<tr>
<th>Lean principle/ method</th>
<th>Items Pettersen 2009</th>
<th>Items Shah &amp; Ward 2003</th>
<th>Sources in chronological order</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1  2  3  4  5  6  7  8  9  10 11 12 13 14 15 16 17</td>
</tr>
<tr>
<td>M2) Root cause analysis</td>
<td>TPM/ preventive maintenance</td>
<td>Maintenance optimisation and preventive maintenance</td>
<td>X X X X X X X X X X</td>
</tr>
<tr>
<td></td>
<td>Statistical process control</td>
<td>Process capability measurements</td>
<td>X X X X X</td>
</tr>
<tr>
<td></td>
<td>Time/ work studies</td>
<td></td>
<td>X X X X X</td>
</tr>
<tr>
<td></td>
<td>Jidoka/ autonomation</td>
<td></td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>Poka yoke</td>
<td></td>
<td>X X X X</td>
</tr>
<tr>
<td></td>
<td>5 whys</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td>Unsorted</td>
<td>Work force reduction</td>
<td>New process equipment technologies</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Work force reduction</td>
<td></td>
<td>X X X</td>
</tr>
<tr>
<td></td>
<td>Multi manning</td>
<td></td>
<td>X X</td>
</tr>
<tr>
<td></td>
<td>Safety improvement programs</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>


Remarks: Not all studies analysed by Pettersen (2009) and Shah & Ward (2003) were included in this table. The objective was to construct a continuous timeline. Also studies not directly related to Lean production, TPS or JIT were deselected.

Note: An explanation of the different Lean tools can be found in appendix 3.

Source: Pettersen 2009 and Shah & Ward 2003, sorted by the author
Appendix 3: Glossary of Lean terms and tools

Please note: The following explanations are taken verbatim from Radnor and Bucci (2011), Radnor et al. (2006), University C (D-C7, see appendix 7) and Womack and Jones (2003). For a more detailed introduction into Lean tools and techniques, the reader is referred to Bicheno and Holweg (2008), Feld (2001) or George et al. (2005).

3Cs
The 3Cs document – Concern, Cause, Countermeasure – is a way of capturing day-to-day problems or issues. Problems are highlighted on a performance board (see “visual management”) and short team discussions are held to define the cause and to determine and implement a solution. Thus, 3Cs can be considered as a tool to apply root cause analysis.

5S
This approach summarises five terms beginning with S utilised to create a workplace suited for Lean production. (1) “Seiri” means to separate needed tools, parts and instructions from unneeded materials and to remove the latter. (2) “Seiton” means to neatly arrange and identify parts and tools for ease of use. (3) “Seiso” means to conduct a clean-up campaign. (4) “Seiketsu” means to conduct “seiri”, “seiton” and “seo” at frequent, indeed daily, intervals to maintain a workplace in perfect condition. (5) “Shitsuke” means to form the habit of always following the four first Ss.

5Whys
Solving a problem at its root cause is one of the principals of Lean. Asking “why” until the root cause of a problem is identified, typically five times, is one simple technique and was first described by Taiichi Ohno.

A3s
These are project definition documents highlighting issues to be addressed, key activities to undertake to resolve issues and the key indicators to measure performance (see also BOSCARD, SIPOC and Quad of Aims).

Andon
Andon is a visual control device in a production area, typically a lighted overhead display, giving the current status of the production system and alerting team members to emerging problems (see also “visual management”).

Autonomation
Autonomation is also known as “jidoka” and is about transferring human intelligence to automated machinery so machines are able to detect the production of a single defective part and immediately stop themselves while asking for help. This permits the operator to oversee many machines and to intervene immediately when problems occur.

BOSCARD, SIPOC, Quad of Aims
Often a list or grid of key prompt words is helpful in ensuring that the discussion is focused on relevant areas at the early stages of a project. BOSCARD, SIPOC and the Quad of Aims are three such tools that can be used during the scoping phase of Lean project to do the initial analysis and goal setting. BOSCARD stands for background, objectives, scope, constraints, assumptions, risk and deliverables and the tool is helpful to get the broad picture of a situation. SIPOC analysis – Supplier, inputs, process, outputs and customers – is useful for identifying a high level process, key stakeholders and data requirements. The Quad of Aims – with the categories purpose, stakeholders, deliverables and measures – is a clear and simple statement of goals, and is best used as a point of reference during a project to ensure that the project team remains focused.

Heijunka
“Heijunka” – also referred to as level scheduling – involves the creation of a “level schedule” by sequencing orders in a repetitive pattern and smoothing the day-to-day variations in total orders to correspond to longer-term demand. For example, if customers during a week order 200 of Product A, 200 of Product B and 400 of Product C in batches of 200, 200 and 400 respectively, level scheduling would sequence these products to run in the progression A, C, B, C, A, B, C, A, C... Some type of level scheduling is unavoidable at every producer, mass or lean, unless the firm and all of its suppliers have infinite capacity and zero changeover times. However, lean producers tend to create
excess capacity over time as they free up resources and to work steadily at
reducing changeover times so the short-term discrepancy between the
“heijunka” schedule and actual demand is steadily minimised.

**Hoshin kanri**

“Hoshin kanri” is also referred to as policy deployment and is a strategic
decision-making tool for a firm’s executive team that focuses resources on the
critical initiatives necessary to accomplish the business objectives of the firm.
By using visual matrix diagrams, three to five key objectives are selected while
others are clearly deselected. The selected objectives are translated into
specific projects and deployed down to the implementation level of the firm.

**Jidoka**

See “autonomation”.

**Just-in-Time (JIT)**

JIT is a system for producing and delivering the right items or services at the
right time in the right amounts. JIT approaches just-on-time when upstream
activities occur minutes or seconds before downstream activities, so single-
piece flow is possible. JIT can be applied to the production processes of a
single operation (micro perspective) as well as throughout the entire supply
chain (macro perspective).

**Kaikaku**

“Kaikaku” means radical improvement of an activity to eliminate waste, for
example by reorganising processing operations for a product so that instead of
traveling to and from isolated “process villages”, the product proceeds through
the operations in single-piece flow in one short space.

**Kaizen**

“Kaizen” needs to be distinguished from “kaikaku” and means continuous,
incremental improvement of an activity to create more value with less waste.

**Kanban**

Kanban is an approach to implement pull-production. Basically, it is a signal –
often a card attached to supplies or equipment – that regulates pull by
signalling upstream operation and delivery.

**Level scheduling**

See “heijunka”.

**Nominal grouping technique**

This technique is a decision-making method for use among groups of many
sizes, which want to make their decisions quickly and take everyone’s opinion
into account. First, every member of the group gives their view of the solution.
Then, duplicate solutions are eliminated from the list of all solutions and the
members proceed to rank the solutions 1st, 2nd, 3rd and so on. Some
facilitators encourage the sharing and discussion of reasons for the choices
made by each group member allowing the creation of hybrid ideas, often better
than those ideas being initially considered.

**Muda**

See “waste”.

**Pokayoke**

“Pokayoke” is a mistake-proofing device or procedure to prevent a defect
during order taking or manufacturing. An order-taking example is a screen for
order input developed from traditional ordering patterns that questions orders
falling outside the pattern. The suspect orders are then examined, often
leading to discovery of inputting errors or buying based on misinformation. A
manufacturing example is a set of photocells in parts containers along an
assembly line to prevent components from progressing to the next stage with
missing parts. In this case “poka yoke” stops the movement of the component
to the next station if the light beam has not been broken by the operator’s hand
in each bin containing a part for the product under assembly at that moment.

**Rapid improvement event (RIE)**

Synonymous with Rapid improvement workshop and Kaizen blitz, these events
usually focus on departmental and organisational issues and processes, with a
view to resolving issues and coming up with improvements within the
timeframe of the workshop (generally three to five days). The workshops are
facilitated by internal or external staff. The facilitator manages the process of
the workshop in the preparation phase, during the event itself and in the follow-
up phase.
**Root cause analysis**

Root cause analysis is a problem solving method aimed at identifying the root causes of problems. The method is predicated on the belief that problems are best solved by attempting to correct or eliminate root causes, as opposed to merely addressing the immediate or obvious symptoms. By directing corrective measures at root causes, it is hoped that the likelihood of problems recurring will be minimised.

**Runners, repeaters, strangers**

Runners, Repeaters and Strangers, or RRS-analysis is a tool for identifying which tasks in a process should have effort dedicated to their improvement, and which tasks are best dealt with on an ad-hoc basis. Runners are tasks that are constantly underway, and are of sufficient quantity to justify the effort required to put in place a dedicated solution. Repeaters are tasks that occur on a regular basis, but are not a constant part of the workflow. For these, it may well be worth putting in place a standard process. Strangers are tasks that occur infrequently, and are best addressed as they occur. Strangers may well need special attention that a Runner would not merit, and often over-processing can come from applying the same process to a Runner and a Stranger. Separating these three levels of activity can help focus improvements so maximum benefits can be realised.

**Standard work**

The concept of standard work involves a precise description of each work activity specifying cycle time, takt time, the work sequence of specific tasks for each team member, and the minimum inventory of parts on hand needed to conduct the activity.

**Takt time**

Take time is the available operations time divided by the rate of customer demand. For example, if customers demand is 240 widgets per day and the factory operates 480 minutes per day, takt time is two minutes. Takt time sets the pace of the operations (or process) to match the rate of customer demand and becomes the heartbeat of any lean system.

**Total productive maintenance (TPM)**

TPM is an umbrella term for a series of methods, originally pioneered by Nippondenso (a member of the Toyota group), to ensure that every machine in a production process is always able to perform its required tasks so that production is never interrupted.

**Value stream**

A value stream is an end-to-end business process, which delivers a service to a customer. The process steps along the way may use and produce intermediate services and information to reach that primary end. Analysis may suggest the removal of intermediate process steps, services and information that do not move the value stream forward to its primarily target, provided they do not serve important secondary ends such as compliance, quality control or employee loyalty.

**Value stream mapping (VSM)**

VSM is a technique used to analyse the flow of materials, services and information required to bring a service to the customer. It uses process mapping tools and is most effectively applied during a RIE in a group, by the people who do the work. Process mapping software exists but for simplicity and to facilitate the active involvement of all of the project team, the map is often more useful when it is hand drawn or completed using Post-It notes and uses simple flow chart conventions.

When mapping the current state, it is important that every step is included, no matter how small. Revealing a complete picture of how things really are rather than how things should be or how people think things are. Once a current state map has been produced, value adding, wasteful and non-value adding steps can be identified. Data regarding the number of times the process is run, the number of items coming through the process, or the number of defects in the process can be useful to add. Finally, adding timing data, the number of times each step takes and the waiting time between each step makes this a simple value stream map.

Value stream maps can assist the project team in identifying areas to target for process improvement, and the potential benefits of doing so. After the data has been reviewed and ideas have been generated, a future state map can be
created. This map uses the same principles as the current state map but to outline the new way of working. The map acts as an easy way of building a shared understanding of the new process, and is usually simpler to follow than written documentation. It is often a good idea, though, to write accompanying procedure documentation for completeness.

**Visual management**

Visual management is an umbrella term for different tools that enable anyone entering a work place, even those who are unfamiliar with the detail of the process, to very rapidly see what is going on, understand it and see what is under control and what is not. Essentially, the current status of the operation can be assessed at a glance.

**Waste**

Waste, also referred to as “muda”, is anything that does not add value to the final product or service, in the eyes of the customer, i.e. an activity the customers would not want to pay for if they knew it was happening. The reduction of waste is an effective way to increase profitability. The seven manufacturing wastes are: Transport, Inventory, Motion, Waiting, Overproduction, Over-processing and Defects. The seven service wastes are: Delay, Duplication, Unnecessary Movement, Unclear Communication, Incorrect Inventory, Opportunity Lost and Errors. A further waste that can be added to both manufacturing and service is “not using the minds of the employees”.
## Appendix 4: Overview of all conducted interviews

<table>
<thead>
<tr>
<th>No.</th>
<th>Case</th>
<th>Date</th>
<th>Duration</th>
<th>No. of respondents</th>
<th>Respondent code</th>
<th>Position</th>
<th>Level of analysis</th>
<th>Project (only for micro level)</th>
<th>Target groups</th>
<th>Process stakeh.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University A</td>
<td>20/06/11</td>
<td>45min</td>
<td>1</td>
<td>A1</td>
<td>Assistant Dean</td>
<td>System</td>
<td>-----</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>University A</td>
<td>20/06/11</td>
<td>60min</td>
<td>1</td>
<td>A2</td>
<td>Deputy Manager of Undergraduate Centre</td>
<td>Micro</td>
<td>Module enrolment international students</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3</td>
<td>University A</td>
<td>20/06/11</td>
<td>90min</td>
<td>2</td>
<td>A3</td>
<td>Faculty Finance Manager</td>
<td>System</td>
<td>-----</td>
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Appendix 5: Interview guide templates

Please note: Paragraphs in *italics* are internal remarks and were not distributed to the interviewees.

A. Interview guide system level (overall Lean initiative)

Dissertation project: ‘Lean University’ – The Application of Lean Thinking for Improving Processes in Higher Education Institutions

Researcher: Tobias Langer, Queen’s University Belfast

I. Introduction

Thank you for agreeing to participate in this research project on Lean in Higher Education, which wants to contribute to a better understanding of how principles of Lean Thinking can be applied in a university context.

Regarding this interview, I am particularly interested in your view and evaluation of your university’s Lean initiative. Therefore, I want to discuss with you questions about the motives, methods, spread, implementation and impact of the Lean initiative. The interview will last approximately 60 minutes.

I would like to tape record the interview as to enable later transcription and analysis. I guarantee full confidentiality. Transcripts or recordings will be neither published nor passed on except to my dissertation supervisor. Moreover, the interview transcript will only be cited anonymously to protect your identity (e.g. ‘senior manager, University A’). Finally, you can verify the interview transcript if you wish to do so.

We will sign an informed consent form at the beginning of the interview to agree on these principles.

II. Background information

I will begin the interview by recording the interview site and date.

Before we start looking at the questions, could you please tell me your full name and position and briefly describe your current job and your working experience.

III. Interview questions

Background and motives

Q1) When did the university start with its Lean initiative? What were the main drivers at this time?

*Pick-ups: Was there any particular critical incidence or crisis that sparked the initiative? Who were the initiators?*
Q2) What are the Lean initiative’s key objectives? To which internal and external challenges and problems does it respond?

Q3) How is the Lean initiative linked to the university’s strategy and other initiatives?

Q4) Why did the university go for Lean? Did you consider alternative optimisation approaches? If so, which?

*Pick-ups: Has the university previous experience with alternative optimisation approaches?*

Q5) Were you in contact with organisations or individuals during the initial stage of the Lean initiative that provided you with inspiration or advise?

**Methods and tools**

Q6) Regardless of the university’s initiative: What is your personal understanding of Lean? How would you define its key objectives and principles?

*Pick-ups: How would you distinguish Lean from other optimisation approaches such as BPR, Six sigma or TQM?*

Q7) What would you describe as the main challenges when adapting Lean to the public sector in general and Higher Education in particular?

Q8) How is Lean defined for the purpose of the university’s initiative?

*Pick-ups: Which organisation-specific adjustments were made? Which Lean elements were not adopted? Did you draw on best practice from other organisations?*

Q9) Which methods and tools are used to implement Lean?

*Pick-ups: Can you briefly describe the process of a typical Lean project?*

**Spread/ application range**

Q10) How are new Lean projects selected? Which selection criteria do you apply?

*Pick-ups: Is there any strategic analysis, prioritisation or coordination at central level?*

Q11) In total, how many improvement projects have already been undertaken as part of the Lean initiative? Please name the (most important) areas or processes that have been streamlined.

Q12) Which areas or processes of the university shall be included in the future? Which other areas and processes are less suitable for Lean?

*Pick-ups: Have you ever considered applying Lean to (the organisation of) teaching or research?*
Implementation

Q13) How does the overall Lean initiative contribute to facilitate, coordinate and sustain (cultural) change throughout the university?

*Pick-ups: In particular, what is the role of a) the central project management or Lean team, b) external consultants and c) Lean trainings?*

Q14) Which elements of the Lean initiative and which projects have been most successful? Which critical factors ensured this success?

Q15) Which elements of the Lean initiative and which projects have been problematic or difficult? Which factors contributed to these issues?

*Pick-ups for Q14 & 15: In particular, how do you assess the role of a) leadership, b) problem awareness and communication, c) the availability of resources and capabilities and d) organisational culture?*

Impact

Q16) What has been the quantitative impact of the Lean initiative on performance? How has this been measured?

*Pick-ups: In particular, how do the realised impacts compare to the initial objectives?*

Q17) What qualitative outcomes have occurred as a result of the Lean initiative?

*Pick-ups: In particular, do you note any changes in organisational culture with regards to process view, customer orientation and continuous improvement?*

*Pick-ups for Q 16 & 17: Were there any unexpected outcomes?*

Q18) How would you assess the acknowledgement of these achievements within the organisation?

*Pick-ups: In particular, to which degree do perceptions of the Lean initiative vary? Why?*

Q19) Is there any systematic procedure for a continuous monitoring of the quantitative and qualitative impacts?

Q20) Which recurring and non-recurring costs have incurred due to the Lean initiative?

*Pick up: Have you ever compared these costs with the benefits of the Lean initiative?*

Closure

Q21) How would you assess the future of Lean within your organisation? Is it a fashion with limited shelf life or does it have the potential to become an eternal topic?

*Pick-ups: If you think Lean has a future in your organisation, how will Lean implementation have to change over time?*
Q22) Is there any aspect, which you feel is important for the topic and that we have not yet covered?

B. Interview guide micro level (single improvement project)

Dissertation project: ‘Lean University’ – The Application of Lean Thinking for Improving Processes in Higher Education Institutions

Researcher: Tobias Langer, Queen’s University Belfast

I. Introduction

Thank you for agreeing to participate in this research project on Lean in Higher Education, which wants to contribute to a better understanding of how principles of Lean Thinking can be applied in a university context.

Regarding this interview, I am particularly interested in your view and evaluation of the Lean project, in which you were participating. Therefore, I want to discuss with you questions about the motives, methods, spread, implementation and impact of this project. The interview will last approximately 60 minutes.

I would like to tape record the interview as to enable later transcription and analysis. I guarantee full confidentiality. Transcripts or recordings will be neither published nor passed on except to my dissertation supervisor. Moreover, the interview transcript will only be cited anonymously to protect your identity (e.g. ‘senior manager, University A’). Finally, you can verify the interview transcript if you wish to do so.

We will sign an informed consent form at the beginning of the interview to agree on these principles.

II. Background information

I will begin the interview by recording the interview site and date.

Before we start looking at the questions, could you please tell me your full name and position and briefly describe your current job and your working experience.

III. Interview questions

Background and motives

Q1) When was the project initiated? What were the main drivers at this time?

Pick-ups: Was there any particular critical incidence or crisis that sparked the project? Who were the project initiators?

Q2) What were the project’s key objectives? To which internal and external challenges and problems did it respond?
Q3) Had the realised improvements/changes already been considered before the Lean project?

Pick-ups: If improvements were considered before, why had they not been implemented? How did the university’s overall Lean initiative change the situation?

Application range, methods and tools

Q4) Which processes or activities were subject to the Lean project?

Pick-ups: What is the relative importance of these processes or activities for your organisational unit?

Q5) Can you describe the main project steps and milestones in chronological order?

Pick-ups: How were you involved in the different project activities?

Q6) Who participated in the project? What were the roles of the different participants?

Pick-ups: In particular, which other organisational units were involved? Why?

Q7) Based on the project, what is your understanding of Lean as an improvement method? How would you define its key objectives and principles?

Pick-ups: Do you remember any specific Lean tools and techniques that you applied during the project?

Q8) Have you participated in previous improvement projects where other optimisation methods were used? If so, with which other methods are you familiar?

Pick-ups: How is Lean different from these other methods?

Q9) During the project, did you define the internal and external “customers” of the analysed processes or activities? Did you try to specify their needs and expectations?

Pick-ups: If so, who are your “customers” and what are their needs and expectations? How did you determine them?

Q10) During the project, did you look at preceding, parallel and subsequent processes and activities that are important to meet the customers’ demand?

Pick-ups: If so, which related processes and activities did you consider and how did you try to incorporate them in your project?

Implementation

Q11) Can you briefly compare the old and the new state of the improved processes and activities and point out which changes have been recommended as a result of the Lean project?
Q12) How was the implementation of the project recommendations followed up?

Q13) How did the university’s central Lean initiative/Lean team facilitate the implementation of your Lean project?

*Pick-ups: In particular, what was the role of a) the central project management or Lean team, b) external consultants and c) Lean trainings?*

Q14) Which elements of the project have been most successful? Which critical factors ensured this success?

Q15) Which elements of the project have been problematic or difficult? Which factors contributed to these issues?

*Pick-ups for Q14 & 15: In particular, how do you assess the role of a) leadership, b) problem awareness and communication, c) the availability of resources and capabilities and d) organisational culture?*

**Impact**

Q16) What has been the quantitative impact of the project on performance? How has this been measured?

*Pick-ups: In particular, how do the realised impacts compare to the initial objectives?*

Q17) What qualitative outcomes have occurred as a result of project?

*Pick-ups: In particular, do you note any changes with regards to cross-unit collaboration, customer orientation and continuous improvement?*

*Pick-ups for Q 16 & 17: Were there any unexpected outcomes?*

Q18) How have the implemented project recommendations changed your unit’s day-to-day work?

*Pick-ups: In particular, have you noted any changes in your and your colleagues’ workload and job satisfaction after implementing the changes?*

**Closure**

Q19) Do you think that Lean was the most appropriate method for streamlining the analysed processes and activities? Would you consider using Lean for future improvement projects?

Q20) Is there any aspect, which you feel is important for the topic and that we have not yet covered?
Appendix 6: Anonymised sample interview transcript

Please note: The transcript provides a full and unedited documentation of the interview recording. In order to protect the identity of the interviewee and his institutions certain parts of the transcript were blackened.

The transcript uses the following abbreviations:
- R: Interviewing researcher – put in italics to facilitate reading
- I: Interviewee

Interviewee: Lean facilitator, University C
Date of interview: 22/06/2010
Interview length: 95 min

R: When did the university start with its Lean initiative? What were the main drivers at this time? Was there any specific incidence that triggered the initiative?

I: I joined the team at the end of 2007, start of 2008. So I only know that from others. [Name] the director of Business Improvements, was at a conference. I think it was around late 2005, early 2006. A university management conference somewhere down south. One of the speakers talked about Lean and [Name] as director of Business Improvements thought Lean sounds really good and is perhaps something we could do at the university. So when she came back from the conference, she had a chat with [Name] the Quaestor and Factor – you will talk to [Name] tomorrow – and said: “[Name] that sounds like a good idea.” So it all started from there. There was no external or internal driver to introduce Lean to the university. So [Name] heard about it, thought it sounded really good and then got the ball rolling at the university.

R: Do you know which conference that was, where she went? Was it a conference about Lean in general or in the public sector?

I: I think it was a UCISA conference. They have an annual conference. But I’m not 100% sure. I could find out from [Name] if you want me.

R: No, it’s not that important. I was just wondering if it was a specific conference on Lean in Higher Education.

I: No, no. Definitely not. Maybe it was only a consultant delivering a keynote speak at this conference. But I’m not 100% sure. [Name] might know more about, when you talk to him tomorrow, because he was around right from the start.

R: Okay, now I understand how it all started. What were the next steps from there? How did you formalize it? When did the idea come up to set up a Lean team?

I: There’s always been two or three full-time staff in the Lean team. We are actually three at the moment – [Name] is a summer intern. One team member has been of ill for a while. So there has always been a core of three. In the early days everybody was seconded to the Lean team. Calls were put out through the internal advertisement system: Who would be interested? Set out the job description. How it was defined that we needed three people? I’m not entirely sure. Anyway that’s how it started. In the early stages of Lean in the university there was a project board that the team reported to. That went by the wayside after about a year. The person the Lean team was reporting at was at this stage leaving the organisation. Then a new reporting structure was introduced. The Lean team then reported to [Name] who reported to [Name] the Vice Principal for Governance. That’s the formal line. Also there are other intermediate steps between [Name] and [Name] now. But informally, as discussed earlier, we report directly to [Name], the Quaestor and Factor. That’s the informal structure – that’s the power line.
R: Has there ever been a clear definition of the Lean team’s objectives? Or was there any informal agreement about what you should do?

I: The objectives of the Lean team are formally defined in our booklet that you can find on our website. It’s cultural change, effectiveness and efficiency.

R: Have you ever tried to operationalize these rather broad objectives? For example, have you tried to set quantified targets for efficiency improvements?

I: Well, broadly speaking, we defined our main objective as doing things better than we are doing them now. This year it’s the university’s [redacted] birthday. So this institution has been around for a long time. As far as we know, no one has ever done Lean before or any equivalent approach to pursue systematic improvements. So it’s a lot of lifting stones and seeing what’s there. There was no idea of how much things could be improved. If there was the idea of improvement at all. But the suspicion was that there were some significant savings that could be made once people started to have a look at how they were doing things.

R: Let’s maybe go one step back. When [redacted] had this initial idea to implement Lean in the university, was there any external challenge or problem that needed to be addressed? Was there something like a feeling that things have to improve?

I: The people in the business improvement unit are largely software developers and project managers and I guess they were finding that people were coming to them wanting software written for particular problems but had not actually looked at the processes behind the need for that software: “Do we really need a piece of software or a widget or is there something more fundamental that is wrong with the current process?” So it’s about unpacking what people wanted. “Why do you want that?” The “five Whys” thing. These software requests were a symptom for processes that were not as optimal as they could be. And instead of building workarounds the idea was to look at the first time at the underlying problems. So the question was why hadn’t that happened before? The staff at business improvement at the time didn’t have the time and expertise to be able to unpack and redesign processes – their skillset lay elsewhere.

R: Another question about the background: How is your Lean initiative linked to the university’s overall strategy? For example, is the initiative somehow linked to the university’s mission statement [redacted]?

I: Not really. My understanding of Lean at the university is to use the services that the Lean team can provide – it’s not compulsory. The way that we work at the moment is that we try to engage with every administrative unit in the university. So there is no coherent plan. The way we are approaching things here is making people comfortable with the idea of Lean – comfortable with the idea of change – comfortable with spotting opportunities. Like I said, no coherent structure, like looking at the student life cycle from start through to graduation, the staff life cycle or the building life cycle. Yes, we also have that university motto [redacted]. We use that quite often in our Lean sessions to try to get people to think outside their own little work group or unit or whatever may be constraining their own thinking. So if there is something like a strategy, then it’s emergent – spread the idea of improvement and create a self-sustaining momentum. We are not here to pick up the university by the scruff of the neck and head off in a certain direction. That’s certainly not our role.

R: We already touched that but let’s still look at that question: Why did the university go for Lean and not something else?

I: I think what appealed about Lean were the respect for people and continuous improvement elements. The university jealously guards its name and its reputation. So it’s not going to be introducing something that is going to impose a structure that is not ordinarily there. The university is fairly considerate in terms of the way it does things. Lean permits the university to continue to be considerate. It has this softly-softly
approach. We talk about cultural change. We talk about respect for people. We talk about continuous improvement. It involves the people that we got. We are here in the east corner of [ ]. Lots of the staff are related. You’ve either got a solid core of – and this is very broadly speaking – the admin staff, who are from [ ] and you’ve got a lot of academic staff which are not from [ ]. So you’ve got kind of two different groups of people. The university has a very good relation to the local community. So what you want to do is you don’t want to start alienating people. Because it would quickly spread through the rest of the workforce. We want to bring them on gently so that they can see that Lean is not a threat. It’s there to help. And it’s there to make their life easier at the same time providing better service to the students of university or whoever stakeholders we’re dealing with. I don’t know if any analysis was actually done. But from what I understand of other process improvement techniques Lean simply fits with the way the university currently does things. An organisation that is more commercially focused probably needs something more directive.

R: *Is there any strong trade union at the university? And if so, did they play any role in the initial phase of the initiative?*

I: Not really that I can remember. I remember when the jobs in the Lean team were advertised and I thought to myself: “Wow, there is no point in applying for that because that’s never gonna work here at the university.” But little over a year later, when I was approached and asked if I want to join the Lean team, I said “yes”. So I had no great hopes for the Lean team myself. I’ve been involved in some significant changes for an organisation that I’ve been worked with before and I just didn’t see this kind of things happening here.

R: *Did you have the feeling at this early stage that the people around you in the university administration had any opinion about or perception of Lean?*

I: Why I didn’t apply was I was thinking that’s going to be a hard job to do in this university because people aren’t going to engage because they’re not going to change their work. For the dealings I had with people in this organisation. I was responsible for introducing the new Freedom of Information Act. The difficulties I had to getting people to understand that they needed to change. And this happened to be the law that was wanting them to change rather than merely the university adopting an idea! I was thinking that Lean would have really a hard job because the university has been here for [ ] years and ranks quite highly academically. There was no measure for administrative excellence. People were quite comfortable and idiosyncratic in the ways that they worked. The university might say that you should use this particular email client but people would use whatever they wanted. So there was no consistency and there was so much academic freedom in the administrative staff. So I thought it would just be such an awful job – why bother.

R: *I understand that you were one of the first UK universities experimenting with Lean. However, where there any other organisations inside or outside the public sector that provided you with inspirations?*

I: It was more other universities that came along to see what we were doing. A guy from [ ] University came around to have a chat, or [ ] University visited us, too. Even a mayor from the [ ] Brigade in [ ] came along to find out whether or not we could help them to do something with one of their processes. So we spent a couple of days working with them.

R: *Okay, so these people approached you. How about the other way round?*

I: Well, to a lesser extent. I mean there was a conference in [ ] in 2008. We went down there. Met a few people. But really what we were doing was relatively new. Of course, we also have an on-going relationship with the Lean team at [ ] University. But all in all, people were more coming to us than we going out.

R: *Where did you get your initial Lean competence? Was there any external involvement? I remember I read that you had some consultants involved at the beginning.*
I: Yes, Group.

R: What was their role?

I: They were one of two groups of Lean consultants that were approached by the university. Two consultancy firms that pitched for working with the University to create a Lean team. The other group was But Group was successful. They spent I think it was something like about 3 month on building the initial Lean team and then on an as needed basis. Again, was on the team at this time. He can tell you more tomorrow. Anyway, their task was to build up internal Lean capacity and then act as kind of a father figure and slowly drift of into the sunset.

R: So much about the background of your initiative. The next topic would be Lean methods and tools. First, I would be interested in your personal understanding of Lean regardless of the university's Lean initiative?

I: If I compare Lean with the major change initiatives I used to work with around 15 years ago: How draconian, how horrific in terms of human costs, people having to leave. Lean is all about involving people. It's about cultural change. It's about asking difficult questions. And it’s about the customer or client – so that they get good service. Because what I have noticed happening to me on a personal level as a consequence of working in the Lean team, is that I get very disgruntled these days when I get poor service from any organisation that I’m dealing with. I always think: “You can do better! You don’t have to leave me waiting on the telephone for 20 rings!” The problem is lots of people work in a bubble. People are too polite. They don’t really say: “I’m not happy with your service.” So altogether it’s three principles: respect for people, improvement by challenging routines and focus on customers.

R: How is that different from conventional process improvement approaches? You mentioned before that you experienced more draconic change initiatives in your old job.

I: Despite the fact that there was consultation with staff, and I was on the panel for staff consultations as an elected staff representatives, there was always a model that was going to be imposed on the organisation as to how it was going to work, how many staff was needed etc. So people were not in control of their destiny. So it’s that sort of having something imposed on you. Lean’s idea of respect for the people is fundamentally different.

R: Would you then say that Lean does per definition exclude radical change?

I: Well, not necessarily. You might have to do a selling job to convince people. But if you’re asking them the right questions so that they can find the conclusions themselves they might also come up with far reaching suggestions. That’s what respect for people is all about. You don’t respect the person by not asking those hard questions. Because if you don’t ask the hard questions you leave them in the same situation as they were before. You’ve not gonna change anything if everybody is just nice to everybody.

R: If you now take your personal understanding of Lean, what are the main challenges of transferring that to the public sector in general and Higher Education in particular?

I: I worked in the public sector and went through massive change from 1984 to 1995. The organisations were overstaffed. Productivity was low: It was a job for life – heavily unionized. You’ve got an increment every year. To turn around an organisation like this is very difficult. Lean, I guess, wouldn’t have worked because you need the buy-in of the staff. Come to a place like the University is not like the public sector before the reforms. But you need to get the buy-in from the staff. And the way we do Lean here is to establish these personal relationships to get that buy-in, so the people come willingly to the table and they trust you and you kind of build up a relationship where you can be trusted and you just engage staff in informal relationships.
R: Is that specific to a university setting or would you say in general to successfully implement Lean you need to build trust?

I: Well, in a well-established organisation like the University [reddacted] where the whole management structure is sort of nebulous and informal, trust and personal relationships are very important. That’s the way to get things done here. For example, if you’re working on a cross-functional project and you have people from registry and finance, HR and Estates, they are reporting to different people in the principal’s office. And if those people in the principal’s office aren’t on the same wavelength, it’s very difficult to get everybody to buy into the outcome.

R: Have you ever faced problems in your projects with regards to the collaboration between academics and administrative staff?

I: That’s interesting. Some heads of schools don’t see the need for Lean. They think that the best thing to do for the university would be to get rid of the Lean team. I know that people quite well. We’re still doing work in the schools – so that’s not a problem. So we’re working with academics. The biggest problem working with academics is trying to fit in with their timetable. We get the best outcomes when we work in a solid chunk of time rather than half a day here, half a day there. The way I like to deal with people, whether it is the guy who cleans the rubbish bin in the morning or someone in the principal’s office, is to treat them all the same. But that’s not a problem with our academics. It is really mostly the problem to get them on the table for a longer period of time.

R: Another typical aspect of university organisation is the conflict between central administration and decentralized and partly autonomous schools and institutes? Did you come over those issues in your projects?

I: Well, we’re a small university. We’ve got around 20 admin units and 20 schools. All the schools have got their own admin hub to a greater or lesser extend. And some of these hubs have got staff that’s been in them for a long time and do things in certain ways. This means there is duplication going on. Getting them to change is difficult because the school admin reports to the head of school. And if you’re a new head of school you might not know what’s going on. So you’re quite happy when things take on quiet, nice and comfortably. Or if you’ve been head of school for a while you might think: “Well, it’s easier life for me if I don’t upset the secretaries and just let them get on with doing what they are doing.” So there’s lots of “it’s working, let’s just leave it”. There’s also the central admin units saying to the schools: “Why are you doing that? Provide us with the right information.” And the schools saying: “Well, if you did your job properly, we wouldn’t need to keep this information on the students as well.”

R: So you’re saying that it’s a small organisation with a lot of informal structures and you don’t really have these over-bureaucratic silos?

I: Well, we do have silos – definitely. But what we find is that the more we are working with those people form the different silos the more communication there is happening. A couple of times I’ve heard something along the lines and I was most amazed to hear at the first time that somebody sitting there and been in the university for 10 or 15 years, somebody else walked in the door to work on the project, and the person sitting there says: “Oh, hello, Jim. You don’t look like that”. And the other person said: “What do you mean I don’t look like that?” “Well, from all the times I’ve been speaking to you on the phone, I’ve imagined you were much taller with dark hair.” And I’m thinking: It’s a small town. How can you’ve never encountered each other before?! So it’s about getting people around the table, establishing those crucial relationships. So we’re trying to utilize the informality of this small place as an asset.

R: The next question is how you have defined Lean for the purpose of the university’s initiative? I know you defined that in your Lean booklet. But if you had to break it down to a few core principles – what would that be?
I: The message that we’re trying to get across to people is that Lean is about effectiveness and efficiency. That’s kind of the strapline. Things like the 5 principles we use all the time. We modify them slightly based on our thinking at the moment, which is that these slight modifications seem to make more sense in a university context.

R: Can you give an example for that?

I: Well, let’s take adding value. We kind of emphasize that in terms of removing waste. Because what does adding value really mean to some of the people here at the university? So, stop doing things that you don’t need to do.

R: Do you use all 5 principles with the same intensity? Do you often use pull, for instance?

I: Not very often. Making a process flow — people can see that, once they identified the waste bites. We emphasize that what they do, no matter what it is, is a process. Something out, something in — everything! That’s how we use value stream and flow. Another thing I particularly like to refer to during Rapid Improvement Events is the principle to seek for perfection. Because so often people think: “That’s okay. We’ve taken out a couple of wasteful steps. It looks better than before. We saved a bit of time.” And then I’m often using this big flip chart with the five principles and point to “pursuit perfection”. And people say: “We will never gonna achieve perfection.” And I say: “What when we at least try? Why don’t we try to be the best that we can?” That means also not worrying about what other people are doing. Not worrying about benchmarks. Let’s just be the best that we can be.

R: How about the principle of value? Do you use that a lot to focus people on customer needs?

I: That’s an interesting point because who are the customers of the university? You may think the students. But you can also go further and say it’s society as a whole. But seen pragmatically, if we’re working on a process that has students at the end of it, then we’re focusing on the students and we bring the students’ association in as often as we can. Often we’re looking at admin processes where the students are only peripheral, for example the electronic job tracking in Estates. Who is the customer in that process? Here we’re working with definitions of internal customers. In general we try to integrate the customer perspective by involving process stakeholders in the Lean process.

R: Looking more at the operational level: Which Lean tools and techniques do you use on a regular basis in your projects?

I: That depends on the project stage. The initial scoping stage would probably have a SIPOC diagram or Quad of Aims. During the event itself that’d be process mapping. We’ll quite often be waving the 5 principles around pointing to fundamentals there – flow, continuous improvement. Runners, repeaters and strangers is often used when people get hung up on the once in a lifetime event that you have to consider in the future state process mapping. It’s about getting people focus again on the process how it is in 80 or 90% of the cases. We also use a task matrix when there is uncertainty about who should be doing what. It has a list of tasks at one side and a list of roles at the other side. We often use the five whys – why are people doing things. Also we work with the eight wastes. We use something like the six thinking hats for people to generate ideas – nominal grouping techniques. All this is very much down to the earth. Usually we work a lot with sticky notes. When mapping processes or collecting ideas people just put down what they think and stick it up to the wall. Getting to the end of the process, we will probably generate an action list. Just an Excel spreadsheet. Who needs to do what by when? Who’s responsible for what? We also use Powerpoint when the project team member report back to their line managers and colleagues. So what they do at the end is tell a story of the journey during the week and how the new world is going to be. That’s really good for some people because they’ve never presented before. They might have worked for the university for 20 years without ever having spoken to a Vice-Principal. Now they are standing in front of them and are saying: “Well, that is what we’re gonna be doing. Isn’t that great?” So, it’s kind of giving people new experiences and skills as they
go through the week of the project.

R:  Now we approach the third section, which is about the application range of Lean in the university. Could you tell me how you select new projects and if you apply any selection criteria?

I:  When people approach us, my philosophy is to say: “Yes, come and talk.” For a couple of reasons: One is that I don’t like to say “no”, because we’re the change agents for the university. So at least meet and talk about the issue. Another reason why I prefer to say “yes” is that it might be somebody I’ve never met before and I want to establish the relationship. Even if I can’t to something for him now, we might do something together later on. That’s kind of a salesman approach. How do we determine whether or not we’re going to do something? That’s interesting. It depends on what the people want us to do. Some people only want a bit of facilitation. However, those small pieces of work often get bigger once you’ve started to look at the problem. Bigger projects will come in from different sources. With some of the admin areas we’ve been working with it’s a case of: “Sure, come in. We’ll need this amount of efficiency improvement. We’ll get the right people together. Let’s have a scoping meeting.” Sometimes we got to a scoping meeting and we’ve not gone any further because the people have decided that there wasn’t that big problem anymore once the have started to look at it in a more structured way. Anyway, once we got to a scoping meeting the decisions will be how long we’re gonna be taking, what are the deadlines, who’s gonna be sitting around the table. That might roll on to a planning session, where it’s more the operational level we’re dealing with. After the planning sessions we decide if the project should go proceed to the Rapid Improvement Event, where the actual change process starts. So it’s basically a couple of meetings where we assess if the project is feasible – that’s the only real selection criteria.

R:  How far are you actively acquiring new projects in terms that you approach units and say “we haven’t done any project with you so far, let’s do something”?

I:  Sure, we also do that. Just the other day we’ve sent out emails to three managers saying: “Hi, how about catching up? We’ll let you know what we are doing and see if there is any way that we can help you.” Two of them already came back and said: “Yeah, sure. Let’s meet up.” A lot of the unit managers were in constant contact with the Lean team anyway. Often on a personal level – we have a chat when we see them around town. That’s the advantage of working in a small town. So, we’re in constant contact with lots of them anyway. Those we’re not in contact with, it’s a case of giving them a ring. We’ve worked in every admin unit now and because of the work we have done we have really good relationships. People understand what we’re doing and so we’re not seen as a threat.

R:  Have you ever been sent in against the will of the responsible line manager, for example by the principal’s office?

I:  Yeah, we have. And that’s interesting because of one case in particular where the director of that unit played a very problematic role. We normally like to get the line managers of the involved units along to the start of a five days event. Where they say things like: “This is really important. You’ve got my full support. I’ll be there whenever you need me.” This particular person, the first thing he said was: “Lunacy- This whole thing is lunacy. I don’t understand why we’re doing it. We’ve been told to do it. We don’t want to do it.” A whole lot of words like that. But I mean we solved his problems. We found some funding. We found the resources to solve the key issue within this particular process. We then worked in another area in that person’s unit. Solved another problem. Spend some more money for him that didn’t come out of his budget. Worked in another. He’s now not working for the university and he’s saying fabulous things about Lean. That was brilliant. There’s another area where there was a lot of resistance. You’ll be chatting to this chap tomorrow. We couldn’t get in. But interestingly at a university function we both found the answer for working together in the bottom of a glass of beer. And we’ve done some excellent work with him and have now built a brilliant relationship with that particular unit.

R:  How far can you build on informal pressure in terms of that the units that do not want to engage with you are singled out and considered as unprogressive within the university?
I: There may be a bit of that. But when you see people working out how long the current state of their process takes and they compare it to the future state they want to implement and you see the smile on their face and they think: “Wow, we can go from that to that!” That’s fabulous because you can see the lights come on, the pennies drop. I particularly remember one person working in recent project. The first day he was sitting there with his arms folded. And I said to him: “It’s really great to work with you for the next week.” And he said: “What?! I thought it’s only two days!” And then I met him a couple of weeks later and he was chatting to another guy who said to him: “You know what? Someone was telling me the other day that Lean was doing this and that.” And he answered: “It’s not Lean doing it to you. It’s you doing it to yourself.” So that person has completely switched around and has completely bought into it. That’s fabulous when you see those kinds of things happening. I’m not saying everyone turns out waving the banner. But for some people it does.

R: In total, how many bigger pieces of work – I’m talking about three- to five-days improvement events – have you carried out? And what are the most important areas you’ve worked with?

I: Just before you turned up I had a quick look and checked how many we had done. I think from memory we’ve done 29 five-days events since 2006 and about 15 four-days events and 15 three-day events. So all in all between 50 and 60 decent size pieces of work. The most important… That depends. If you ask for the areas of the university where we’ve looked at a critical mass of processes I would first name the library – we’ve done quite a lot of work there. We looked at the book buying, the book cataloguing, the shelving process. was also good. Because lots of people across the university think that is rubbish. And one thing that we love doing when we work with a group of people is when somebody’s saying is rubbish, we’re saying is not rubbish, we’ve done some brilliant work with them. Also Finance, we’ve done quite a lot of work with Finance. Also the sport centre and the Athletic Union that runs the sport centre. We changed a lot of things there. Other areas are notable because of the lack of willingness to fully engage with Lean. We may have done a lot of work with them but we don’t really think that that they’ve actually got it – and . There’s reasons for that.

R: If you think about areas the Lean initiative should look at in the future. What would that be? In particular: Have you ever thought about looking at the organisation of teaching and research?

I: Not often. We’ve looked at the examination paper sitting process. Very light touch there. We’ve looked at how the research funding is administered. But not directly in terms of the whole teaching and research process itself – more peripheral. We’ve looked at chemical hazard risk management system, which is relevant to teaching and research in chemistry, biology and physics. There, we’re obviously working with academics. What would be best for them? How can we lighten their administrative work? How can we make it so easy for them that they can fully focus on research and teaching? I kind of see in my mind that it’s easy to get the biggest bang for our buck and we’ve got the most control over access to people in the administrative units. So let’s get that sorted out first. And of course then you’ve got the little admin hubs in the schools – the school secretaries. We’re trying to engage the school secretaries in as much work as we can – where relevant.

R: What exactly are you doing with the schools or school secretaries?

I: Not so much recently. We’ve done quite a lot of work with them in the past. And we had a major success and freed up quite a lot of their time with the student self-certification of absence process that used to be manual and very time consuming. We just took a whole lot of admin work away from the registry and the schools.

R: Have you ever considered looking more at the overall student experience? I mean something like an analysis of the whole student life cycle?

I: What we’re doing next week is a meeting with the student sabbaticals – the president of
students’ association and his key officers. The outgoing group and the incoming group. We meet with them about every six months. What are your biggest issues? What are your biggest bugs? How can we help? Interestingly it started of being external processes – external to the students’ association. And then more recently they became internal processes. How can they run their elections process better? How can they form their students’ societies without so much hassle? Those sorts of things. It used to be: “These are the things that are bugging us about the university.” Now it is: “These are the things that are bugging us about ourselves.” We’ve only been working with them probably for the last two years really closely. Again it’s coming down to relationships. Listening to what they’ve got to say.

R: Well, let me ask a bit more specific. Again, have you ever though about looking at stuff like curriculum design, how programs are delivered, how the learning experience of a students is in terms of coordination of exam dates or stuff like that?

I: We’re aware of those issues. But we haven’t managed to get in.

R: Would you say you had a mandate for that? I know you don’t have a formal mandate but the informal understanding in the organisation about what the Lean team should do: Would that include looking at these core processes?

I: Oh yes, certainly. One of the people I’m going to email next week is the master – that’s the person all the heads of schools report to. To say: “Hi. How are things going? Let’s catch up for an hour.” So, tell him about what we’re doing and if there’s anything we can help with. Cause what we need is kind of a groundswell. By groundswell I mean it could only be one person that comes to us and says: “You know, I’ve got that problem. Can you help?” And we’d just sort of grow that into a major issue that needs to be resolved. For example, one of the people I emailed the other day and who’s due to get back to me – one of the IT help desk staff – said to me: “We’ve got a lot of paperwork here. I’m not sure if all that is necessary. What if you guys just come around and have a look at it?”

R: How much did you do with the [blank]?

I: Quite a lot of bits and pieces projects here and there. It’s interesting in the sense that the [blank] has a lot to do with students. But my view is that they were more process focused than student focused. They were more looking at internal process requirements rather than seeing a human being at the end of the process.

R: If you look at it more from a systems perspective: Have you ever considered to map the end-to-end student flow through the university system?

I: We’d love to do that. We’d love to map the student life cycle. Because to me that’s the core process for the university. Everything else is more or less peripheral. However, this is a huge analytical task and this processes crosses a lot of units in the organisation. You would need a lot more people to deliver something as big as that in a reasonable time frame. Cause we kind of like get things happening, we’d rather focus on projects where we can make a difference – deliver tangible results.

R: Okay, the next section is about implementation. Some of the questions are maybe a bit broad since we already covered a lot of details. Let’s maybe make it a bit more specific. Regarding the role of the Lean team: What do you do beyond your three- or five-days Rapid Improvement Events? For example in the area of trainings.

I: We do less training for staff than we used to because lot of the staff has been involved in Lean projects before. In the early days we would run a separate training sessions, three or so hours. We would introduce people to the history of Lean – Lean tools. And then the emphasis in that changed because of what happened during the Lean events. People started to understand what Lean was really all about by practicing it and we thought that this is actually the best approach.

R: Okay, but do you still run stand-alone training sessions? And if so: How sustainable is
"that? I mean, what’s the impact?"

I: What people take away from it is that... All people that show up to those sessions have never engaged with Lean before. So instantly we know ten or a dozen people we’ve never met before. So it’s back to those personal relationships. People you can call on and ring them up: “How are things going? Is there anything in your area?” Because those sessions are so much fun, because we’ve got them with the Lego game, we’ve instantly have eight or ten more allies around the university who can understand the whole point of Lean. And interestingly when we put all this information up on our website, we had contacts from some couple of places – one of them was in Norway who wanted to use our game in their own training. So it’s raising our profile as well.

R: The next questions are concerned with the project you facilitated and I will look at more closely over the next two days – the process. In particular, if you look at this project: What was your role as representative of the Lean team? Which problems did you face and how did you tackle them?

I: To start with, a massive amount of resistance. They didn’t want to engage with Lean. This had a good reason: and . when they were approached by the university to tender for training the Lean team, they each ended up with a project to illustrate their Lean approach. Group at this time worked with . My understanding of the story is that Group thought that they were feeding back the findings of their work to a small group of key staff. Their task was to figure out what was doing and how they could improve. As it turned out there was kind of a university-wide invitation to come along and hear this presentation. So the message that got was that there’s so much low hanging fruits, so much easy wins: “You’re stupid to not have done it.” So it was like a public execution. And they really started to hate it. So there was a lot of mistrust and it took us a long time to turn this around again.

R: So does that mean that the whole scoping phase of the project took much longer as you had to rebuild this personal relationship?

I: It was not the normal type of scoping that we would do. You compromise when you wanna work in an area. So these guys had something right in front of them. I made the point when we were sitting at the start of the session with the people from the operational level: “Are you happy with this? This is what your managers want.” So giving them some sort of power. Of course, they agreed that is was okay. Also there was a lot of mistrust between the involved people. The office not trusting the tradesmen. The tradesmen not trusting the office. All that sort of issues. But in terms of the actual redesign the project was absolutely fantastic. Once people got over these sorts of uncertainty what was going on and you’ve built a relationship, it was fine. People start asking themselves during the current state mapping session: “Why are we doing that?” And then they’re sort of thinking: “Okay there’s 54 steps in that process. Why are 23 of them somebody checking? What if we do it right the first time?” So they were coming to that kind of conclusions. They were getting it.

R: How does it make a difference that many participants for the first time have the full process in front of them?

I: Yeah. It makes a big difference. And also: “What I thought was the big issue was really minor. Because look at what happens down there.” Or conclusions such as: “The way we are doing things is causing big issues down the line. I can now understand why they were having those troubles.” It’s peeling that onion back so that people can understand what’s going on.

R: The next question is about critical success factors. If you had to compile a list of the five most important critical success factors in your projects so far, what would that include?

I: It depends. If we look at people who aren’t really happy to sit in the room and at the end of the project we may not have achieved much but we’ve got a really good working relationship with them. They understand what Lean is all about. Then that would be a
critical success factor for that group. But generally the sort of things I’m looking for are a dramatic improvement in processing time. Not spending any money on buying anything. No IT development. Just a completely new way of working. Just ripping off the old process and come with a new idea. Melding a team of people is another really important thing, particularly in these cross-functional projects where people ordinarily don’t get on. We’ve worked with a group of people, it was the [X] team, and we always have a bit of a wrap up chat at the end: “What went well? What didn’t go so well?” And some said: “We were called a team. But I don’t think we were a team until we spend five days together in a rooms and understood each others concerns, strengths and weaknesses.” So in that case we built a team. I thought that is absolutely fantastic feedback because most of the people on that so-called team had been on it for ten years or so but never felt that they were a team. Never had a common goal.

R: So you would say one important success factor is that you deliver tangible results without big investments in IT etc.? Just a simple solution for the underlying problem.

I: Yes. The key is to do it today or tomorrow and not spend too much money or time on it. Just come up with stuff you can do then and there.

R: How important is management support and leadership commitment for your projects? And at which stages of the project process would you bring it in?

I: Let’s discuss that based on the [X] process project. That scoping meeting was a lot of very senior management sitting around the table. Because this project had to cope with people blaming each other, not trusting each other. And the only way to get it going was to get [X] in there and the people reporting to him. And this is a project that was first mooted 18 months, two years ago but the time was never right. So the first step was getting top management agreement on the project scope and then we took it to the group of people actually working with the process and asked them: “Hold on. Do you actually understand this?” And they came out with their own Quad of Aims. And then there was this big event – [X] and [X] turned up at the university. That was the day we had that project scheduled so we had to abandon the project, reschedule it. And I thought: “That’s a fairly complicated Quad of Aims. Let’s meet again.” So we met again. And I said to them: “I don’t understand this. Do you understand it?” And they said: “No, we don’t understand it. Let’s write another one. Let’s make one we can all understand.” And so we created a new Quad of Aims. And that made the project flow so much easier. Because it was kind of a difficult concept and so we tried to split it up into two projects. One for the [X] and another one for the [X] as both were fairly different processes.

R: Okay, and then you’re sitting in those workshops and people come up with ideas how to improve the process. How do you make sure that their line managers support their recommendations?

I: Normally, we got broad agreement before the project starts. Because if we knew the outcome, we wouldn’t need the people around the table. So we got broad agreement that this is probably the sort of ideas that might come out of this project. But beyond that management usually accepts that the details are worked out by the project team. Also everybody knows that we have a direct line to [X]. And [X] is the money man, he’s the power in the university in terms of all that admin stuff. So people know we can go to him and they know that we will tell what we think the situation is so they’re conscious that there is that link. They may not appreciate it but they have to accept it.

R: Okay, finally we approach the last section of the interview, which is about the impact of your Lean initiative. I understood that you try to quantify the impact of your projects in terms of time savings. How exactly are you doing that?

I: We’ll do that during the projects. Take again the [X] process: We map out the current state. And then we asked the guys around the table: “How long does that ordinarily take? One minute, two minutes, five minutes? Okay, it takes two minutes.” That sort of things. We don’t time people. We don’t want them to feel observed. We want them
to be completely relaxed. We use their expertise to come up with appropriate estimates. That’s all we need. And if you work with guys who have been on the team for 25 years you can expect that they should have an idea how long things take. And then when we get to the new world that we want, we just know that we have cut out an incredible number of steps. So we just estimate the amount of time that goes with them and that’s our savings. So it’s the project teams that are doing the estimates – not us. And that’s part of the learning curve.

R: Let’s also talk about the external function of performance data. How important is it to have a bottom line figure for the time savings to justify your work as Lean team?

I: No, that’s not really important. We provide regular reports but that’s not crucial. Our existence as a team is not really challenged. The university doesn’t do that. The university is softer. It’s clear that our focus is on long-term cultural change and that cannot always be measured in figures even though we track our more quantitative impacts such as efficiency improvements.

R: How far do the time savings you achieve in your projects translate into head count reductions?

I: Well, let’s take the example of the process that we redesigned. They had around two years worth of jobs to be done. A huge backlog. So the new process freed up around six FTEs. So they instantly got six more staff to reduce their backlog. What they also wanted to do was to move from reactive maintenance to proactive maintenance. So that we enable them to do. It’s less about cutting jobs. It’s more about increasing capacity. Doing more with the same amount of resources. More time to do the important stuff.

R: So that means you were never really required to deliver job cuts?

I: No. If there was, I’ve certainly never heard it. It would be difficult to work with some areas if people thought we’re coming along with a knife to start chopping staff. And the university is a nice place that doesn’t do things that way. At the moment at least.

R: Looking at the qualitative outcomes of your projects: How much would you say your projects facilitated sustainable cultural change throughout the university?

I: Bring people up and say: “Hi. Can we borrow you for an hour this afternoon? We’ve got a bunch of people who wanna know about X, Y, Z.” And they say: “Sure!” That’ll be the case of people from. Or they say: “Hmm. I don’t know I have to check my agenda. Wait. Sorry. No, I don’t have time.” That’ll be the case of people from. So it’s how people respond to you. That’s one clear indicator that there’s a shift in mindset. When you hear first hand or second hand that people that you’ve worked with defending the job that you do and explain it to other people in the university who might be more hesitant about working with Lean. That’s really good. We’ve heard that more often.

R: Looking at the areas where you feel your work had a significant impact: Do you think that they’re doing improvement activities on their own now? How far did they really get the idea of continuous improvement?

I: Some people do. And it kinds of hurts really because we’re the Lean people. They should involve us [laughing]. No, that they do it themselves is absolutely fabulous. Cause that’s what we say in our presentations. The whole idea is to work us out of a job. Everybody does Lean – change the attitudes, change the mindsets.

R: How would assess the acknowledgement of your work throughout the organisation? How visible are you in the organisations? If I met other staff from admin units or the schools, would they know that there is a University Lean team?

I: It depends on where you go. Most staff in the admin units would know about us, would have had something to do with us. The senior admin staff in the schools would have had something to do with us. The heads of schools – they change on a five-yearly basis so a
fair chunk of them would have heard about us – may even know us by sight. Of the academic staff probably only a quite low percentage would know the Lean team.

**R:** Which role does your website play for your internal and external visibility?

**I:** More external than internal, I’d say. We’ve got a list of current projects online that you can only access as a member of the university. Sometimes we refer people to that. But whether people go there proactively to see what we do, I don’t know.

**R:** Well, the last question is a very open question: How would you assess the future of Lean within your organisation? Is it rather a fashion with a limited shelf life or does it have the potential to become an eternal topic?

**I:** Difficult to say. I wonder myself from time to time: Are we doing enough? Should we be doing other things? We’re kind of [insert name]’s baby. If he goes, what’s gonna happen to Lean? So we’re kind of a one-man band in terms of support from the principal’s office. Have we built up enough opposition out there so that if [insert name] wasn’t here that they would kind of rise up and get rid of us? Cause I was only partly joking when I said that part of the reason that you’re here is because I know some people that’ll be uncomfortable with it because of the whole visibility of what we do. We’re here in a university. We’re here to teach. We’re here to challenge. But especially some people in the admin units just like to keep things kind of closed. For example, one group got so excited about the outcome of their project that they wanted to write an article. But we think the reason was because if you gonna tell people how fabulous you are now, you have also to tell them how fabulous you were not in the past. And they didn’t want that disclosed. You know, on a personal level I think Lean is absolutely fabulous. Will Lean in some form continue? I’m not entirely sure. There needs to be a champion at the principal’s office level. Otherwise it’s just not going to continue because if we hadn’t [insert name] championing Lean it would be an awfully hard slog because there wouldn’t be the pressure to buy in to engage with us.

**R:** So you say leadership support is crucial for the future of Lean in your organisation?

**I:** Yeah. And Lean, I’m sure, will evolve. Otherwise it’s not living through to itself when there wasn’t any continuous improvement. So it may end up with a different name. The university may bring something else in that’ll take elements of Lean from it.

**R:** Okay. Let’s just assume for a moment that the university keeps Lean. How would the role of Lean and the Lean team have to evolve as the initiative becomes more mature? What would be the logical next step?

**I:** You could try to systematize it. To follow something through like the students life cycle. So that we continue doing the bits and pieces, keep people engaged, but get some structure going. So that you’re following a big process through. That might be a degree of disruption here but you could at least try and do something. Or if you could compartmentalize it sufficiently by doing some kind of high-level mapping and figure out what you need to do and maybe increase your resources, you could increase the impact. Another way would be to keep the Lean team the size that it is but bring people on a more regular basis to work as secondments. And then send them back out so that you end up with a number of little hubs all over the university. We could also formalize the training and give people some kind or green belt in Lean or other certification. So that people have something concrete for their CV. Incentivize it.

**R:** Okay. That would have been my questions. Thank you very much. The last point is: Do you feel the university has an important aspect that we haven’t covered yet?

**I:** No, not really. The only thing that I’m thinking about all the time is: Why didn’t I know about Lean when I was working in my old job? [Laughing]
## Appendix 7: Overview of analysed documents

<table>
<thead>
<tr>
<th>No.</th>
<th>Case</th>
<th>Document code</th>
<th>Level of analysis</th>
<th>Project (only for micro level)</th>
<th>Document title/ description</th>
<th>Availability</th>
<th>No. of pages/slides</th>
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Appendix 8: Signed ethical approval form

Please note: This section contains a photocopy of the original document that was submitted to the Queen’s University Management School’s Postgraduate Office at 28/06/2011.
Queen’s University Management School

Student Ethical Approval Form

Name of student: Tobias Langer, Student No. 19056793

Student e-mail (for notification of result): t.langer@b.qub.ac.uk

Type of research Project (please tick):

- Masters
  - MSc Dissertation [X]
  - MSc Course work
  - UG
  - UG Dissertation
  - UG Project
  - UG Coursework

Name of supervisor: Dr. Antony Potter

Dissertation title/ Course Work/ Module/ Title/ Topic: Lean University: The application of Lean Thinking for Improving Processes in Higher Education

Section One: Checklist of ethical issues, circle Yes or No as appropriate.

1. Does the study involve participants who are particularly vulnerable or unable to give informed consent? (E.g. children, people with learning disabilities, your own students, or staff/student records) Yes [ ]
2. Will the study require the co-operation of a gatekeeper for initial access to the groups or individuals to be recruited? (E.g. students at school, members of self-help group, residents of nursing home) Yes [ ]
3. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (E.g. covert observation of people in non-public places) Yes [ ]
4. Will the study involve discussion of sensitive topics (e.g. sexual activity, drug use)? Yes [X]
5. Could the study induce psychological stress or anxiety or cause harm or negative consequences beyond the risks encountered in normal life? Yes [ ]
6. Will financial inducements (other than reasonable expenses and compensation for time) be offered to participants? Yes [ ]

If you have answered yes to any of the previous questions, please explain the ethical issues identified and continue overleaf
Method: A description of the important elements of the methodology is required. It may include some or all of the following as appropriate:

- A description of how the research will be carried out
- A description of the procedures to be used (e.g. interviews, questionnaires, observation, experimentation)
- Where the research involves self-report or observation, provide appropriate details of instruments (e.g. questionnaires, interview schedule, observation checklist, experimental procedure)
- Where the research involves the collection of information (e.g. from documents, databases or the literature) include a description of the information sought and the resources to be used. Include the search strategy for a review
- Describe the training received by the individual who will be collecting the data (e.g. Interview Skills Training, courses in qualitative methods, training in statistical analysis etc)
- Describe the design of any interventions to be used and the measurable outcomes
- Methods of analysis. To include all relevant statistical procedures

Participants and Recruitment: The following information about participants should be included:

- A description of, and rationale for, the study population (inclusion, exclusion criteria)
- The process by which participants will be sampled (including access to the sample)
- Sample size estimation
- Any special ethical issues with the proposed sample (e.g. children, vulnerable adults, and people with special communication needs)
- A statement of the investigator relationship, if any, to the participants

Section Two: Management of routine ethical issues

Does the study require informed consent e.g. for interviewing/questionnaire/focus group/participant observation/further use of data (Yes/No)

Does the study require access to files and other secondary data (Yes/No)

Describe the ways in which the research design has addressed the ethical issues identified above (Refer to the use of information sheets, consent forms, handling of sensitive data/information, the use of techniques to assure confidentiality and anonymity where this is guaranteed e.g. use of pseudonyms in the write-up. Where secondary data will be accessed plagiarism issues should be addressed).

Interviews: all interviews will be recorded and transcribed and interviews will be given the opportunity to verify their transcripts. Transcripts will not be passed on except to the dissertation supervisor. Pseudonyms will be used in the write-up. All interviewees sign consent forms (triangulation)

Documents: content will be double checked against interviews

If none, provide a full explanation as to why you feel your project does not have ethical implications. Please read the University Code of Good Conduct at this stage.
How has your research design taken into account issues of risk (for example the possibility of being unable to gain access to documentation or personal safety issues in relation to conducting questionnaires)?

access risks: more organisations than required will be contacted - should not be a big issue since Higher Education is a research-friendly environment
Decision

☒ No need for formal ethical approval processes.

☐ Requires formal ethical approval process: Please complete GOV 1* Form (GOV 1 commences the formal ethics approval and all forms are available at: [http://www.qub.ac.uk/mgt/research/](http://www.qub.ac.uk/mgt/research/))

Section Four: Student declaration
I have read and agree to abide by the requirements of the following University documents (http://www.qub.ac.uk/rrs/webpages/research-governance.htm):
• Policy on the Ethical Approval of Research
• Code of Good Conduct in Research
• Regulations governing Investigations into Allegations of Research Misconduct

Student’s signature ........................................ Date 15/06/10

In my opinion as supervisor this project raises no significant ethical issues.

Supervisor’s signature ........................................ Date 15/6/11

Completed Form should be submitted to the School Research Office, 25 University Square
Appendix 9: Research project information sheet and consent form

Please note: To protect the identity of the interview participants, photocopies of the signed consent forms are only made available to the dissertation supervisor as they contain the interviewees’ full names. This section contains a blank copy.
Research Project Information Sheet

Name of Researcher: Tobias Langer

Title of Project: 'Lean University' – The Application of Lean Thinking for Improving Processes in Higher Education Institutions

What is the purpose of the study?
To develop a better understanding of how Lean can be applied in a university context.

Why have I been chosen to take part?
Because of your involvement in the university's Lean project.

Do I have to give consent to take part?
Yes, we will sign an informed consent form.

Will my participation be kept confidential?
Yes. Transcripts or recordings will be neither published nor passed on except to my dissertation supervisor. Moreover, the interview transcript will only be cited anonymously to protect your identity (e.g. 'senior manager, University A').

What will happen to the results of the study?
The interview results will be used for my master's dissertation and potential future research.

Who has reviewed the study?
Research proposal and interview questions were reviewed by my dissertation supervisor.

What if there is a problem?
You can contact either me or my dissertation supervisor. Please find the contact details below.

Thank you for taking time to read this information leaflet.

Contact Details of Researcher:
Tobias Langer
mail@tobias-langer.org
+44 (0)7722 / 985 208

Contact Details of Supervisor:
Dr. Antony Potter, Queen’s University Management School
a.potter@qub.ac.uk
+44 (0)28 / 9097 3088
Consent for Participation in Interview Research

Name of Researcher: Tobias Langer

Title of Project: 'Lean University' – The Application of Lean Thinking for Improving Processes in Higher Education Institutions

I confirm that I have been given and have read and understood the information sheet (see back) for the above study and have asked and received answers to any questions raised. [ ]

I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason and without my rights being affected in any way. [ ]

I understand that the researchers will hold all information and data collected securely and in confidence and that all efforts will be made to ensure that I cannot be identified as a participant in the study (except as might be required by law) and I give permission for the researchers to hold relevant personal data. [ ]

I agree to take part in the above study. [ ]

______________________________
Date

______________________________
Signature of researcher

______________________________
My printed name

______________________________
My signature
Appendix 10: Anonymised interview summary report

Please note: This report provides a commented summary of the coded interview transcript. In order to protect the identity of the interviewee and his institutions certain parts of the report were blackened.

Interviewee: COO/ CFO, University C
Date of interview: 23/06/2010
Interview length: 50 min

1. Motives

1.1 Drivers
- Need for a more systematic improvement approach: Initial projects in the Finance department brought some successes but the conventional approach of small projects could not tackle the cross-functional complexity of most university processes
  - “The business improvement unit was helping me to fix these small incidences. But we weren't having the systematic impact to really sort out the very complex administration that you find in a university.”
  - “We needed to find a way of making things better. Not just in one department. We needed to go across the campus.”
- External inspiration: went to a conference and thought that Lean could be this approach
  - “And we looked at Lean and it just seemed to fit.”
- Match academic excellence with admin excellence: Feeling that there is room for improvement in the admin area as it has never been systematically analysed and optimised
  - “This institution wants to be excellent in everything it does. And I would like the joiner, the person who processes invoices and the woman at the student reception to be as excellent in their jobs as our professors in biology or ancient history.”

1.2 Objectives
- Continuous improvement: Make things better on the long-run as opposed to short-term job cuts
  - “We just wanted to make things better. I know that sounds very broad. But that was the goal. We didn’t want to cut jobs. We didn’t set targets like in the Inland Revenue where they started by saying they want to get rid of 15,000 people.”
  - “We didn’t say within the next two years we solve all the problems because we’re not.”
- Sustainably change the organisational culture: Devolve responsibility and ownership for quality and improvement
  - “We have to make people understand that it’s part of everybody’s job to make things better.”
- Strategic alignment of university administration: develop systems thinking
  - “It’s about trying to line up all of the support services to be pushing in the same direction. To be working well with each other.”

1.3 Link to strategy
- Lean is a strategy on its own: It is about long-term cultural change and not only a project with limited shelf life
1.4 Why Lean
- Lean fits best to the needs and objectives of the university
  1) Intuitive approach for rapid tangible improvement without external support
    - “Lean just seemed to fit. We didn’t spend a lot of time studying and analysing. Bringing in expensive consultants to work out grand plans. It just said: ‘Let’s pick some staff and make it better.’”
  2) Universally applicable to all areas
    - Lean facilitation works everywhere as it utilises the specific knowledge of the people involved in the processes
  3) Internal focus on improvements as opposed to external orientation on best practice
    - “We looked at things like benchmarking studies. You could spend huge amounts of time to be as average as everybody else. But we didn’t want to be average. We wanted to be as good as we could be.”

1.5 Inspirations
- Other public sector cases rather show how to not do it: Lean should be more than rigid standardisation and cost cutting
  - “Revenues and customs showed us the way not to do it. You don’t lead with cost cutting. You don’t lead with working people out of their jobs.”
- Also there are only few examples where Lean implementation went beyond the stage of planning
  - “A lot of people only talk about Lean. I didn’t want to be someone talking about it. I wanted to be someone who’s doing it.”

2. Methods and tools
2.1 Challenges Public Sector/ HE
- 1) Complexity of the system: almost all important processes are cross-functional and involve different stakeholders
  - “The best way I got describe administration in this place is a ball of steel wool. All scrambled up. And you would spend a huge amount of time straightening a process. And once you got that fixed you would see that you created carnage everywhere else. So the system was a far more complex beast.”
- 2) Academic freedom and autonomy applied to administrative processes: no standardisation between decentralised autonomous units/schools
  - People like to argue just for the sake of arguing – this culture rubs off from the academics to the admin staff
    - “Academic freedom is used as a knockout argument against any kind of being challenged on how you do things. But academic freedom does not say you can do whatever you like and whenever you like. This is a real problem.”
  - This leads to a high level of fragmentation and inconsistence
    - “Standardising the processes of schools which have all been allowed to evolve differently. And saying: ‘This isn’t acceptable.’ Because if there are different exam processes, it’s almost impossible to support that appropriately from the registry and there’s huge waste of resources.”
• 3) Bureaucracy: Too many rules and formal decision making bodies hinder decision making and strategic discussions
• 4) More complex target structures and less exposure to external pressures: there no unifying overall objective such as the need to make profit
  o This facilitates a more individualist culture: people pursue their own personal objectives – they decouple form environmental needs
  o This is an additional challenge for management: it must refocus people from time to time and communicate the strategic objectives of the organisation

2.2 Understanding of Lean
• 1) Employee empowerment
  o Lean devolves the responsibility for continuous improvement to the people on the shop floor
    ▪ “There is a fundamental need to allow those who do the job to design their job within control parameters and with the full support of their management.”
    ▪ “It says to everybody on the ground: ‘You have responsibility. It’s your job to make things better.’”
  o This requires a major change in management style
    ▪ “One thing that Lean does is that it’s not top-down. There’s a change in management style that is required. And that’s where we’ve got resistance.”
• 2) Reduce waste/ focus on the important things
  o Especially, reduce excessive checking and authorisation, e.g. when paying invoices
    ▪ “So that people spend less time on re-work, error adjustments or checking other people’s work – they should just do their job.”
  o This requires people to do their work right the first time so that failure demand (rework) can be reduced
• 3) Systems thinking/ integrated process view
  o Develop a cross-functional perspective and overcome silos
    ▪ “Suddenly they started thinking about the process. Because everyone only thought about his or her bit, where the whole point of Lean is to say: ‘Let’s look at the whole process. Let’s ignore the silos.’”
• 4) Root cause analysis
  o Understand and tackle the complexity of an interdependent system
    ▪ “Lean is about understanding an area. Identify and understand the problems that this area creates for the system and who is impacted by those problems.”
• 5) Pragmatic immediate improvement
  o “It’s about getting you’re sleeves rolled up and starting to fix things.”

3. Spread/ application range

3.1 Project selection
• Gradual emergent groundswell approach: Build relationships, convince people, gradually spread application
  o “We were trying to achieve a managed evolution rather than a revolution. So we were trying to achieve change over time without breaking anything as we went. And this is a very gradual process. We didn’t force Lean in. It was about invitation. It was about identifying
problems and trying to fix them – a problem at a time. And then trying to spread good practice based on that.”

- While this approach gives preference to voluntary participation, it also includes soft pressure:
  - “We’ve allowed units to identify themselves. Where they haven’t identified themselves, we either had a quiet word: ‘You need to do something.’ Or if that didn’t work we said openly: ‘There is an issue, you need to work on it.’ So there are times where you just have to pick areas and tell people that they are not doing enough.”
- However, in retrospective there should have probably been more strategic direction:
  - “Looking back I think we should have been more prescriptive. Push Lean in more.”

### 3.2 Past focus

- So far Lean has focussed on the administrative support processes as this is perceived as the most problematic area
  - “There was the feeling in the organisation that our support processes were not as good as they could have been.”
  - “If you look at most academic output measures: We’re pretty good at research. We’re pretty good with teaching. We’re fairly popular. I don’t think I steam in there. Telling academics how they should do their business, which they are doing fairly well.”

### 3.3 Future focus

- However, only recently the scope was extended to the administrative aspects of academic processes
- For that it was important to fix the support processes first
  - “We’re crossing that line now. It was important for me to be seen to be tackling the purely admin side first. We are now starting to look at the academic administration of the institution.”
  - “It was important to put our own house in order first. We had to be self-critical – expose and fix things that weren’t working in the support processes. Only this allowed us to create an exposure to the academic administrative side of the business.”
- Next big thing: Chance to re-define the role of the school administrator
  - “By changing three or four of these administrator roles, we can have a huge impact on the way work is done. Especially we could start tackling all these duplications between schools and central administration – schools stop doing their own accounts, stop copying every invoice. All these things, which are just hugely wasteful.”

### 4. Implementation

#### 4.1 Role of Lean team/ initiative

- The team is an invaluable resource: “They are the main change agents I’ve got in that place.”
- The Lean team has an invaluable role that cannot be taken over by the units: It provides a fresh view/ external perspective on things
  - “It was never so effective if we didn’t involve the Lean team. Because if you didn’t have that external challenge, there’s always a risk that a common understanding takes over. You have blind spots and you don’t see the real improvement opportunities.”
4.2 Success factors

- 1) Change decision making processes first as a premise for devolving responsibility to staff
   - The root cause for many inefficiencies such as double checking and delays is bureaucratic decision making
   - Efficiency reviews: drastically reduce number of subcommittee; focus on strategic aspects; leave operational aspects to the staff
- 2) Right mix of top-down strategic commitment and bottom-up improvement work
   - Top-down: Clear and consistent signal that Lean implementation is taken serious and that it is a long-term approach; support for work of the improvement teams
   - Bottom-up: develop and implement specific improvements for admin processes – no interference of management in details
- 3) Line management support for Lean projects
   - “I think management is critical. Ideally you want managers prepared to focus on outputs and control parameters. Managers that give their staff discretion and freedom to change. You don’t want control freaks, egos or blockers.”
   - “Before you can change the process, you need to create a supportive management environment.”
- 4) Initial project phase is key: ensure support of all involved line managers

4.3 Barriers to change

- 1) Improvement is misunderstood as blame game
   - “Often if you say to a manager ‘you can make that better’, he’ll take that as criticism. So you need to persuade people saying identifying improvement opportunities does not mean criticising the past.”
   - “It’s important that you depersonalise things. Because if you personalise things you focus on the responsible person when you instead want to focus on the underlying problem.”
- 2) Bad and old-style management: cannot devolve responsibility and empower people
   - It needs a shift from the bureaucratic input-focused manager to the empowering output-focused manager
   - “So you’ve got a problem with dogmatic managers. And you’ve got a problem with big egos. And you’ve got a problem with control freaks. Those managers just don’t get the idea that in Lean management has to focus on empowering people, enable them to take ownership and responsibility. The whole point of having staff is that they know their job better than you do.”
- 3) Fear of job cuts might curb full engagement and cultural change
   - “We had resistance and there were fears that this is about cutting jobs.”

5. Impacts

5.1 Measurement/ tracking

- Internal justification: Being able to demonstrate the benefits of Lean when needed
- “Qualitative stories” are most powerful
  - Have a good elevator story to catch peoples interest
  - Simple ideas that brought significant time savings and quality improvements
• But it’s also good to have quantitative information available
  o Justify the resources invested in the Lean team
  o Apply soft pressure on other units to pursue similar improvements
  o “The fact that that knowledge exists means it can be used. But we haven’t tended to lead on it. Haven’t tried to overemphasise it – for the HRMC reason. But from times to times it helps.”

5.2 Quantitative impacts
• Increased efficiency: staff time savings for better service
  o “Most of the savings we have achieved are in freeing up people’s time and making services to students and other staff better.”
• Improved quality/ reduce failure demand
  o “An invoice was taking 17 working days to get to Finance. Suppliers were phoning after 10 days. So actually we had a full person tied up chasing invoices. This person can now contribute to more valuable tasks.”
• But: Lean allows to achieve long-term headcount reductions
  o “In the areas where Lean was implemented, we reduced the headcount. Although it didn’t start like that. But the teams were getting more efficient and when people left we simply didn’t fill their positions.”

5.3 Qualitative impacts
• Sustainable cultural change: Empowered organisation, continuous improvement, process-based thinking
• This is more a long-term impact
  o “I think Lean works. And we’ve demonstrated that it works. But it doesn’t transform a place over night.”
• Also a lot of positive side-effects: motivation, team building, cross-functional communication and collaboration, HR development – better managers and staff
• However, varying degrees of change throughout the organisation
  o “I would say I have a couple of pockets of real excellence. I’ve got some larger pockets of acceptance and understanding. And we still have some laggards.”

5.4 Resources
• ----

6. Closing/ Future of Lean
• After being established, the role of the Lean team has to be broadened from pure facilitation to coaching and advisory
  o “They’re gonna have to take their accumulated knowledge and apply that very rapidly. Not as a facilitator – more an actual idea provider. Their judgement matters.”
• A lesson learned is that the people or leadership dimension has to be addressed more intensively: help them to develop a supportive attitude (“can do”), make them understand Lean
  o “I think if I had to do it again, I would combine Lean with a leadership program around change management and organisational development – facilitating good management behaviour, which is a premise to Lean implementation.”
## Appendix 11: Summary and comparison of literature review and case study findings

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Aspect</th>
<th>Manufacturing</th>
<th>For-profit-Services</th>
<th>Public services</th>
<th>Higher Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1) Motives</td>
<td>Drivers</td>
<td>Increase competitiveness (often sparked by critical incidence)</td>
<td></td>
<td>Budget cuts/ government programme</td>
<td>Highly case-specific, but lack of urgent environmental pressures</td>
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<tr>
<td></td>
<td>Objectives (dimensions)</td>
<td>Lead times, productivity, quality, inventory, cultural change</td>
<td>Lead times, productivity, perceived quality, cultural change</td>
<td>Lead times, productivity (w/o job cuts), perceived quality, cultural change</td>
<td>Largely qualitative “feel-good” objectives: improving services and cultural change</td>
</tr>
<tr>
<td></td>
<td>Lean justification</td>
<td>Best practice: well-proven approach</td>
<td>Rationale not fully understood</td>
<td></td>
<td>“Management fashion”: Lean as legitimate approach to drive &quot;systematic improvement&quot;</td>
</tr>
<tr>
<td>Q2) Methods</td>
<td>Principles and methods</td>
<td>Lean production: fully integrated toolbox for applying all Lean principles and methods</td>
<td>Largely limited to “value stream”, “flow” and “root cause analysis”</td>
<td></td>
<td>Like (public) services + strong emphasize on staff empowerment</td>
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<tr>
<td></td>
<td>Tools &amp; techniques</td>
<td>Similar to conventional process optimisation – largely limited to VSM and RIEs</td>
<td></td>
<td></td>
<td>Like (public) services + management training</td>
</tr>
<tr>
<td>Q3) Scope</td>
<td>Units/ areas</td>
<td>Production, R&amp;D, Sales</td>
<td>Service delivery system, support processes</td>
<td></td>
<td>Different bits and pieces of the university’s value stream</td>
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<tr>
<td></td>
<td>Implementation strategy</td>
<td>More holistic top-down approach</td>
<td>More emergent bottom-up approach</td>
<td></td>
<td></td>
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<tr>
<td>Q4) Imple-</td>
<td>Awareness</td>
<td>High, mainly due to exposure to markets (customers, finance, suppliers)</td>
<td>Lower, due to limited exposure to external pressures (tax funding, complex stakeholder relations)</td>
<td></td>
<td>Highly case-specific but lower than in private sector</td>
</tr>
<tr>
<td>mentation</td>
<td>Change capacity</td>
<td>High, mainly due to more personal management commitment</td>
<td>Lower</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Organisational culture</td>
<td>Supportive (market-driven)</td>
<td>Impeding (bureaucratic)</td>
<td>Impeding (bureaucratic + academic)</td>
<td></td>
</tr>
<tr>
<td>Q5) Impact</td>
<td>Quantitative</td>
<td>Revolutionary performance improvements</td>
<td></td>
<td>Significant impacts but less revolutionary + lack of systematic quantification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Qualitative</td>
<td>(Organisation-wide) cultural change towards continuous improvement</td>
<td>Islands of excellence with better process-view and customer-orientation</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Unintended</td>
<td>Increased cash flow due to inventory reduction</td>
<td>----</td>
<td>Negative effects on staff satisfaction (performance pressure)</td>
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</tr>
</tbody>
</table>

Source: compiled by the author