Implementing Lean in Health Care: Making the link between the approach, readiness and sustainability

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Abstract

This paper draws on the findings of three evaluations, two Hospitals and a Mental Health Trust in England, on the implementation of Lean within Health Care. The paper analyses the case studies not only to assess if the approach taken was process or continuous improvement but also to evaluate the degree to which conditions of readiness related to Lean were present. Organisational readiness factors include understanding of the process/system view, customer view, data and engaging the staff to ensure that Lean is not just about making poor processes more efficient by focusing on the tools. The paper introduces a typology of Lean implementation which could be used to situate organisations to understand their relationship between the approach taken and, the state of the conditions of readiness thus the level of sustainability which could be achieved.

Key words: *Lean, Health Care, Organisational Readiness, Sustainability*

1. INTRODUCTION

Public Sector organisations over the past few years have experienced a rise in focus of the use of business process improvement methodologies particularly Lean and Six Sigma (Radnor and Boaden, [1] 2008). The evidence of their implementation includes Health, (Guthrie, [2] 2006; Fillingham, [3] 2007), Central Government (Radnor and Bucci, [4] 2007) and, Local Government, (ODPM, [5] 2005; Seddon, [6] 2004) organisations within the UK (Lodge and Bamford, [7] 2008) and the US (Krings et al, [8] 2006). The drivers for introducing business process improvement methodologies within public services include the demand for increased efficiency and the need for service expansion with limited resources (Radnor and Walley, [9] 2008).

In a recent literature review focusing on the use of Business process improvement methodologies in the Public Sector (Radnor, [10] 2010) 51% of publications sourced focused on Lean and 35% Health Services. It could be argued that methodologically, the majority of studies about Lean thinking in the public sector to date are not comparative or rigorous in common with other research on management interventions (Lilford et al, [11] 2003). Carefully selected case studies have been used to promote benefits in public services without a balanced view of the negative aspects or consideration of the influence of other factors. Many of the case studies have only considered Lean as a set of tools and techniques rather than a fundamental shift in culture and approach based on the Lean Principles (Radnor et al, [12] 2011). This paper will consider the Lean implementation by three healthcare organisations in

one region to consider their approach not only in terms of the approach taken, the tools used but also the degree to which they have engaged in organisational readiness.

Lean has its roots in Manufacturing, in particular the car industry, having been developed from the Toyota Production System (Ohno, [13] 1998). Over the years it has been adopted by many private manufacturing and service organisations. It could be argued that in these organisations in order to delivery products, services and, 'value' through a focus on profit there is a clear understanding of organisational processes, customer requirements, demand and variation and, strategy. Thus, may be when introducing management practices such as Lean, which has a focus on value, process and flow, the conditions of readiness already exist so there is a good 'fit' (Slack and Lewis, [14] 2007) which may allow a greater possibility of sustainability. However, within research work carried out in public services it has become apparent that these underlying conditions of readiness are not always understood or present (Radnor et al, [15] 2006, Radnor and Bucci, [4] 2007). So, how important are these conditions of readiness in Health Care and, what relationship do they have to sustainability?

2. DEFINING AND FRAMING LEAN IN HEALTHCARE

2.1 Defining Lean

Originating from the Toyota Motor Corporation, Lean is considered to be a radical alternative to the traditional method of mass production and batching principles for

optimal efficiency, quality, speed and cost (Holweg [16] 2007). The history of Lean Production has been widely discussed, and shall not be recounted here (instead refer to (Ohno [13] 1988; Womack et al. [17] 1990; Womack and Jones [18] 1996; Fujimoto [19] 1999; Hines et al. [20] 2004; Holweg [16] 2007; Spear and Bowen [39] 1999).

Although conceptually simple, it is not easy to define 'Lean': the core to the Lean philosophy is to continually improve a process by removing non-value added steps, or 'waste' (Japanese: muda). The initial wastes were defined by Taiichi Ohno for a manufacturing environment. It was hard to transfer these across from high-volume repetitive manufacturing, into low-volume or even service environments. This led to the development of the 'service wastes' that, are related to the original ones. NHS Institute for Improvement and Innovation (NHSI) [21] (2007) adapted these further and gave examples of Healthcare wastes (See table 1).

Table 1. The original seven wastes, service wastes, and healthcare wastes

Original Wastes	Service Wastes	Healthcare Wastes (NHSI, 2007)
1. Transportation	*Delay* on the part of customers waiting for service, for delivery, in queues, for response, not arriving as promised.	*Transportation:* • staff walking to the other end of a ward to pick up notes • central equipment stores for commonly used items instead • of items located where they are used
2. Inventory	*Duplication*: Having to re-enter data, repeat details on forms, copy information across, answer queries from several sources within the same organisation.	*Inventory:* • excess stock in storerooms that is not being used patients waiting to be discharged • waiting lists
3. Motion	*Unnecessary Movement*: Queuing several times, lack of one-stop, poor ergonomics in the service encounter.	*Motion:* • unnecessary staff movement looking for paperwork, • e.g. drug sheets not put back in the correct place storing syringes and needles at opposite ends of the room • not having basic equipment in every examination room
4. Waiting (Delay)	*Unclear Communication* and the wastes of seeking clarification, confusion over product or service use, wasting time finding a location that may result in misuse or duplication.	*Waiting for:* • Patients theatre staff results, prescriptions and medicines • doctors to discharge patients
5. Overproduction	*Incorrect Inventory*: Out-of-stock, unable to get exactly what was required, substitute products or services.	*Overproduction:* • requesting unnecessary tests from pathology • keeping investigation slots 'just in case'
6. Over- or inappropriate Processing	*Opportunity Lost* to retain or win customers, failure to establish rapport, ignoring customers, unfriendliness, and rudeness.	*Over processing:* • duplication of information asking for patients' details several times • repeated clerking of patients
7. Defects	*Errors* in the service transaction, product defects in the productservice bundle, lost or damaged goods.	*Correction:* • readmission because of failed discharge adverse drug reactions • repeating tests because correct information was not provided

Another way of defining Lean, and linking it to its actual implementation process is through the 5 Lean principles (Womack and Jones [22] 1996). The five core principles of Lean, based on an underlying assumption that organisations are made up of processes, are outlined in table 2 and link to the concept of value, waste reduction and continuous improvement (kaizen) into an ever-repeating process.

It should be mentioned that the focus on waste alone is rather restricting the scope of Lean: originally, 'muda' was one of three concepts: Muda, Muri and Mura. Mura relates to 'unevenness', and argues for stable demand that enable smooth process flows. The more uneven demand, the more variation in the process, and the less efficient the process will be. 'Muri' is the term for 'excessive strain', which argues for good working conditions that prevent injuries and strain on the worker which is a clear factor in reducing absenteeism.

Last but not least, it needs to be mentioned that a general perception of Lean is that it is only concerned

with waste reduction and subsequent cost reduction. This is not true, and in fact marks a severe limitation of the common understanding of Lean, as Hines et al [20] (2004) note there are in fact two ways in which to increase customer value: one, by reducing waste and thus the cost of a product or service, or two, by increasing the value-adding activities without increasing the cost of the service or product.

Thus, putting the elements together, Lean can be defined as:

'……a management practice based on the philosophy of continuously improving processes by either increasing customer value or reducing non-value adding activities (Muda), process variation (Mura), and poor work conditions (Muri).' (Radnor et al, [10] 2011)

Table 2. The five Lean principles (Womack and Jones, 1996)

1	Specify the value desired by the customer.
2	Identify the value stream for each product/ service providing that value and, challenge all of the wasted steps.
3	Make the product flow continuously. Standardise processes around best practice allowing them to run more smoothly, freeing up time for creativity and innovation.
4	Introduce 'pull' between all steps where continuous flow is impossible. Focus upon the demand from the customer and trigger events backwards through the value chain.
5	Manage towards perfection so that non-value adding activity will be removed from the value chain so that the number of steps, amount of time and information needed to serve the customer continually falls.

2.2 **Lean in Healthcare**

Evidence presented through the literature indicates that Lean has been embraced across public services especially since 2005, with Healthcare, Central Government and Local Government organisations embracing and implementing 'Lean' (Radnor [23] 2010). An approach to Lean based on the five lean principles in a healthcare setting, particularly a hospital, should remove duplicate processes and unnecessary procedures such as: recording patient details in multiple places, patients being moved towards before beds are available, patients being moved from one ward to another; excessive waiting for doctors and consultants and uncoordinated, variable discharge processes resulting in a longer length of stay than necessary (NHSI, [21] 2007).

Brandao de Souza [24] (2009) gives a historical perspective on the implementation of Lean into healthcare suggesting that the use of Lean in the UK first appeared in 2001 and, in the USA in 2002. Since then the number of academic articles has risen with 'over 90 publications found in ten countries from 2002 onwards referring to the use of Lean in healthcare' (Brandao de Souza, [24] 2009:122).

Although Lean is increasingly prevalent the literature suggests that healthcare organisations are implementing Lean through using simple tools and techniques through small enclosed projects which are creating 'pockets of best practice', (Brandao de Souza [24] 2009; Radnor [23] 2010). Royal Bolton NHS Foundation Trust is cited as the closest to a complete application of Lean in the UK (Radnor [23] 2010). Although Spear [25] (2005) asserts that 'in healthcare, no organization has fully institutionalized to Toyota's level the ability to design work as experiments, improve work through experiments, share the resulting knowledge through collaborative experimentation and develop people as experimentalists' (pg 91).

Table 3 illustrates some examples of the implementation of Lean in Health indicating various approaches and tools that have been used, including Lean production, flow, RIEs, and process mapping (Silvester et al., [26] 2004). It also illustrates some typical tangible and intangible benefits of the Lean implementation.

2.3 **Lean Approaches and Tools**

Regarding the approach of what is actually being implemented under the 'banner' of Lean within public services including healthcare it appears there are two approaches – discrete workshops and events taking place over a concentrated set of time often known as Rapid Improvement Events (RIEs) (e.g. within Healthcare, Radnor et al, [27] 2009) or a full implementation or programme approach (e.g. HMRC, Radnor and Bucci, [4] 2007).

Rapid Improvement Events (RIE's) or a Kaizen event is a workshop involving multiskilled and cross functional people getting together to make small and quick changes, in three phases, beginning with a preparation period, followed by a 5-day event to identify changes and a 3-4 week follow up period when changes are implemented. Within the Scottish Executive evaluation project five sites used RIEs focused on waste elimination and quality improvement tactically in problem areas (Radnor et al, [15] 2006). The approach was cited by staff as favourable as it provided a faster return for effort, was more visible, quickly demonstrated potential for which they had some input and, did not challenge existing management control styles (Radnor and Walley, [9] 2008). However, RIEs tend to be more focused on short-term outcomes than longer-term developmental issues (Radnor and Walley, [9] 2008). Although within Royal Bolton Hospital RIEs are being used for embedding Lean in the organization via a seven week disciplined rolling cycle of planning,

executing and following up change (Fillingham [3] 2007).

In HMRC the Lean implementation took an approach where "there was nowhere to hide" driving the changes and improvements from top down and bottom up over a long period (Radnor and Bucci, [4] 2007). Lean was being implemented through a 5 year plan in all HMRC Processing sites using a suite of tools supported by dedicated Lean project teams. There was a number of dedicated Local Lean Experts based in local offices and Central Lean Experts who rotated over three-month periods between sites supported by external consultants. All of which was supported by a centralised programme team with emphasis placed on senior managers to 'Lead Lean' (Radnor and Bucci, [4] 2007). Lean was being seen as a journey even though some the challenges in the public service context including the potential changing political landscape and associated policies could be a distraction from wider process improvement implementation.

Table 3. Examples of Lean Implementations in Healthcare, (Wysocki [28] 2004; Guthrie [2] 2006; Radnor et al. [15] 2006, Gubb and Bevan [29] (2009).

Organisation	Methodology	Impact
Scotland Cancer Treatment	Lean	Customer waiting times for first appointment from an average 23 to 12 days and improvement of customer flow time for patients of 48%
Royal Bolton Hospital	Bolton Improving Care Systems (Lean)	Direct savings of £3.1m Death rate for patients fell by a third. The time taken to process important categories of blood fell from 2 day to 2 hours. Average turnaround time in pathology from over 24 hours to 2-3 hours
Nebraska Medical Centre	Lean principles to redesign the work area in the sterile processing centre and in the clinical laboratories	Reduced staff walking by 167 miles a year. Reduce lab space by 825 sq ft and specimen processing turn around time by 20% Reduced manpower by 11 FTEs, who were redirected to other critical work. Average length of stay decreased from 6.29 days to 5.72 days
The Pittsburgh General Hospital	Lean techniques	Change to the procedure for intravenous line insertion giving a 90% drop in the number of infections after just 90 days. The new procedures saved almost $500,000 a year in intensive-care-unit costs.
Flinders Medical Centre	Lean Thinking	15-20%more work, fewer safety incidents, same budget, same infrastructure, staff, and technology.

In terms of the tools being used for Lean a number of articles (e.g. Proudlove et al, [30] 2008) highlight that applying the simple tools and techniques was probably enough for public services. Drawing from the literature typical tools and techniques associated with Lean include kaizen events, process mapping, '5S', value stream mapping[1] and, visual management (Radnor, [10] 2010a). Reflecting on the tools it could be argued that the tools within the methodologies are used for three purposes; for Assessment, Improvement and Monitoring (see table 4) (Radnor [10] 2010). This distinction is often not made in organisations and, if made clearer could give greater clarity to the relevance and appropriateness of the tool.

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[1] Value stream mapping is the identification of all the specific activities occurring along a value stream for a product or product family (or service).

2.4 Organisational Readiness

Organisational readiness or 'enablers' as some authors (e.g. Hines et al, [31] 2008) call them can be summarised as improvement focusing on an organisation's awareness or realisation of the need for improvement, planning the change and developing an organisational culture which understands the customer requirement, has an organisational processes view and use of data to drive improvement.

From previous research and writing of Lean organisational readiness was defined to be about having an improvement strategy, engagement of staff through appropriate training and development, having a process view, understanding customer requirements, strong committed leadership and, understanding demand, capacity and variation, (Radnor et al, [15] 2006; Radnor [23] 2010b). It has been argued that organisational readiness is important for effective and sustainable use of the tools. For example, without

understanding the customer values and needs it would not be possible to develop a value stream map. Without understanding variation the data used for the visual management charts would be meaningless and even demotivational (Radnor and Bucci, [4] 2007). Evidence from previous research including within a large government department indicated that within some public sector organisations and sites, the focus of Lean was more on the mechanics of the tools and techniques and less on the readiness which could lead to lack of sustainability in the longer term, (Radnor et al, [15] 2006; Radnor and Bucci, [4] 2007).

Table 4. Use of the Tools within Business Process Improvement Methodologies

Assessment: To assess the processes at organisational level e.g. value stream mapping, process mapping.
Improvement: Tools implemented and used to support and improve processes e.g. RIEs, 5S, structured problem solving
Monitoring: To measure and monitor the impact of the processes and their improvement e.g. control charts, visual management, benchmarking, work place audits

Organisational readiness links to the principles of Lean in that it reminds managers in public services that Lean is not just about making poor processes more efficient by focusing on the tools but to do so there may be a need to ensure that there is an understanding of the process/system view, customer view, data engaging the staff to drive the change and Lean programme.

2.5 **Sustainability**

Factors reported in the literature relating to sustainability for Lean are similar to those presented under enablers and success factors e.g. relevant training of staff, management commitment and effective monitoring of outcomes and impact (e.g. Lucey et al [32] (2005); Manos [33] (2007); Proudlove et al [30] (2008)). Hines et al [31] (2008) and Bale and Reginer [34] (2007) amongst others suggest that what is important regarding sustainability is the realisation that the implementation of Lean is a long term programme and not a short term fix. For example, if we consider sustainability as the embedment of the practice or 'the way we do things round here' (Feldman and Pentland, [35] 2003) an issue that can be raised regarding sustainability related to Lean is the focus on Rapid Improvement Events (RIEs) (Radnor and Walley, [9] 2008). Although participants claim to enjoy the RIE they also often mention 'frustration' on not being able to implement the changes agreed due to lack of management support, lack of time, or lack of resource (Radnor and Boaden, [1] 2008) which can lead to people becoming disengaged with the practice (Bateman, [36] 2005). The lack of support, time and resources themselves may be due to the lack of organisational readiness making it difficult to support

and implement the conditions for Lean outside the RIE workshop environment.

Bateman [36] (2005) reports that sustainability is not a concept with only two states, sustaining and not sustaining, but it can have a number of states in between that impact upon the level of improvement sustained over a period of time. For example, undertaking an improvement workshop can have a quick impact and result in improvement in an activity by 50% in the short term but "this can reduce to zero if enthusiasm and momentum are not built upon" (Bateman, [36] 2005). She suggests that "with follow up actions and post follow up actions, this can increase to almost 90% improvement over the longer period" (Bateman, [36] 2005). In the same publication Bateman [36] (2005) distinguishes between Performance Improvement (PI) and Continuous Improvement (CI) saying that PI can occur over a few months acting as a foundation for continuous improvement. However, "management sometimes expect CI to evolve out of PI without setting up a process for CI to occur" (Bateman, [36] 2005). So, what was the approach to Lean implementation in the Healthcare case studies? Were they focusing on only the tools without recognition of readiness and, so does it reflect their level of sustainability?

3. METHODOLOGY

In order to understand the approach taken and the conditions of readiness the paper will draw on three evaluations which took place between August 2007 to July 2008 across two hospitals and a Mental Health Trust in one region in the UK. The evaluations involved data collection through a variety of methods, the analysis of this data and the production of an evaluation report, in order to assess service improvements activities (Table 5).

All interviews were transcribed and additional 'reflective notes' were developed during the case study. The transcribed interviews were rigorously coded and classified using the six step procedure (Radnor [37] 2002). Radnor's technique for analysing and interpreting data follows six key steps, (1) topic ordering, (2) constructing categories, (3) reading for content, (4) completing coded sheets, (5) generating coded transcripts, and (6) analysis to interpretation. Radnor's [37] (2002) data analysis approach is designed for the researcher to code whilst allowing the qualitative data to be linked, shaped and searched. Through using this method of analysis a level of sensitivity to detail and context can be enabled, as well as accurate access to information. This method of interpretation permits rigorous searching for patterns, building of theories or explanations and grounding them in data. Allowing the key themes from the research study to emerge from the data to build a coherent understanding of how Lean is being implemented in Healthcare.

The material was written up as an individual case study reports which were validated by each organisation. Interview schedules based around common thematic

guides were developed for 'level' of staff in the organisation, i.e. senior grades, middle management and front line staff. Normally interviews with senior and middle management occurred individually, whereas focus groups with the 'front line' staff could consist of up to eight members.

Lean implementations were evaluated using a framework comprising of four dimensions: (1) the definition of Lean, (2) the activities undertaken, (3) the organisational readiness, and (4), the sustainability of process improvements. The first investigated the definition of Lean used in the organisation in order to assess the level of understanding and approach to implementation. Secondly, we considered the activities undertaken in order to understand what had been done under the 'Lean banner'. Thirdly, the organisational readiness was assessed in order to see what had been done to facilitate the implementation of Lean, and change in general. And finally, the sustainability of Lean activities was assessed in terms of ongoing and future activities planned.

Table 5. Outline of Case Study organisations

Name / type of organisation	Type of organisation	Number of interviews / focus groups conducted	Research period
Pottery General Hospital NHS Trust	General hospital, two sites, employing 3000 people, serving over 300K people.	15 staff interviewed including three senior executives, five senior service managers and, seven senior clinical managers/ clinicians. 3 focus groups held with front line and clinical staff.	August - October 2007
Iron Hospital NHS Trust	General Hospital across 8 sites (99% across 2 hospitals), serving over half a million people, employing 5000 people (3800 FTE).	18 staff interviewed including senior managers, clinicians, nursing staff and support staff. 8 focus groups held with nursing staff and clinicians.	January – February 2008
Ring Mental Health Trust	Mental Health Trust across 140 sites from community based teams to wards and day centres, serving 1.2 million people, employing 4000 staff.	25 interviewed including three senior executives, nine service managers, seven clinical managers, three clinicians and three members of the unit that facilitated the improvement activities at the Trust. 2 focus groups held with nursing staff and team managers.	May – July 2008

For this paper the findings from the case studies will be evaluated to consider the following propositions:

P1: If the approach to Lean is process improvement and few conditions of readiness are present then it will difficult to support and sustain service improvement within the organisation.

P2: If the approach to Lean is continuous improvement and many of conditions of readiness are present or being developed then it is possible to support and sustain service improvement within the organisation.

P3: That there is not always a direct relationship between the approach taken, the conditions of readiness and the service improvement activity in the organisation.

4. FINDINGS

The findings from each case study will be presented considering the approach to Lean taken, the elements of organisational readiness and, sustainability. Table 6 summarises the findings.

4.1 **Approach to Lean**

Within one hospital trust 'Pottery' the Lean activity had consisted of four Rapid Improvement Events (RIEs) in the Short Stay Unit, EAU / A&E, Fracture Clinic and Theatres and, some service improvement activity in the Diagnostics area of the hospital. These activities were associated with the improvements looked at capacity within the Departments. The main improvements were concerned with the use of more administrative and clerical resources in order to free up practitioner time and deliver more efficient services to patients.

In the other hospital trust 'Iron' the Lean activity was taking place across a number of areas including theatres, outpatient discharge planning, medical job planning tool, pre-op assessment and, pathology through mixed approaches although overall within the Trust the overarching service improvement approach was defined to be Lean. In one area RIEs had taken place within Accident and Emergency and the Medical Assessment Unit. Within another area an approach had been developed which combined Theory of Constraints, Lean and European Foundation Quality Model (EFQM) to drive the activity and projects. Finally, a Productive Ward project was also being introduced.

In the Mental Heath Trust 'Ring' a number of projects had been focused on which were linked to service improvement and Lean activities which included; access to psychological therapy, reduction of time from referral to treatment in neuro-psychiatry, out of hours care looking at crisis resolution and home treatment, the merger of two pharmacy teams and focusing on patient transfer between teams within the substance misuse service (SMS).

Within Ring an internal team had been set up to support the Lean activity – Capability and Capacity Unit (CCU). The main task of CCU was to facilitate service and business improvement. It was described as the Trust's internal process consultancy. It was responsible for organisational training, mentoring and coaching and had run six Lean workshops during its period of operation, with approximately 20-25 staff attending each workshop. CCU had facilitated Rapid Improvement Events (RIEs) together with external organisations, and worked with directorates on process mapping exercises. Whilst CCU were involved in mapping out the process, in order to highlight waste in the system, "it was up to the individual directorates to adopt the new working methods".

Table 6. Summary of the Case Study Findings

	Pottery	**Iron**	**Ring**
Approach to Lean	RIEs (4)	RIEs, ToC, EFQM, Productive Ward Service Improvement Team	Number of projects Internal Team to support (CCU)
Understanding the Process	Process mapping from customer perspective No comments across departments	"*Process improvement is easier within departments than across departments. There is no formal process for improving processes between departments*"	Couple of examples of process mapping across a pathway
Understanding Customer requirements	Little understanding but commissioners then patients mentioned	Included patients, Primary Care Trusts, PCT, local and central political organisations and other departments in the Trust but still not fully defined.	In some improvement work service users, including patient representatives and commissioners were involved.
Use of Data	Demand and the relationship with capacity/ resources were understood for a particular purpose	"*Not really understand capacity and demand, so often demand outstrips capacity.*"	"*Still need to grasp issues around capacity for referral, especially from the clinicians.*"
Engagement of Staff	Mixed response – better within departments	"*Evolution not revolution approach*"	"*Some staff are behaving differently as a result of getting involved in this project.*"
Sustainability	More RIEs, across departments and organisations Need to develop skills to support activity including Leaders	"*Need to get Lean into front line so live it rather than use it.*" Develop strong Leadership and Head of Service Improvement	"*I think that if Lean is adopted and becomes an inherent part of this organisation, it will deliver a lot.*" "*There is a need for more internal champions in the directorates to take this forward. It should not be CCU's responsibility*"

4.2 **Organisational Readiness**

4.2.1 Understanding the Process

Regarding understanding the process within Pottery one of the most often cited comments from the RIEs was that staff undertook process mapping exercises of the patient journey. For many staff this was new and they had not thought about the specific process from the patient perspective. Therefore from this point of view, staff had developed a better understanding of process within their own departments. However, there were no comments made regarding the process across departments or within the hospital as a whole.

Also within Iron regarding the view of the patient journey as a process through the whole of the relevant hospital, there was a silo mentality at departmental level. Even in successful projects, it was highlighted that there was a disengagement of staff between

departments. There was the opinion that problems were departmental problems and not organisational problems. "*Process improvement is easier within departments than across departments. There is no formal process for improving processes between departments*"

Within Ring when asked about the process view two areas were able to provide an answer. These answers highlighted that only some areas had learnt specific aspects about having a process view. This highlighted to the Trust that there was a need to understand that the teams involved in process mapping should be more widespread and include more people.

One department within Ring highlighted that it had tried to use the tools learnt to look at other processes. It had undertook a process map across the patient pathway from the moment the referral letter arrived to the moment the patient was discharged. This was seen as improving the service. In another department the visual map of the pathway enabled staff to see where they were in the process.

4.2.2 Understanding Customer requirements

An important element of Lean is to improve service from the user or customer's perspective. Staff across the Trusts were asked about how the customer's requirements were considered during the Lean activity, to assess whether there had been a customer focus to the improvements that had taken place. The term "customer" often had to be clarified during the interviews with staff.

Within Pottery there was very little understanding of the patient requirements. It was acknowledged that patients and relatives had a voice and could provide feedback via workshops for example. However, it was also highlighted that having the right facilities would help with patient flow, thereby implying that this would meet their requirements. However this issue ignored whether gaining new facilities has been explicitly stated by patients.

In Iron there was a lot of discussion around the topic of customer requirements with a variety of answers. With regard to who the customer was, it was highlighted that customers included mainly patients, and Primary Care Trusts, practice based commissioners, local and central political organisations and other departments in the Trust. "*Commissioners are the customers who we meet with on regular basis. The patient is the consumer – who we meet through patient and public forum involvement which does help to understand their requirements.*"

In terms of understanding the requirements of the customers within Iron some points noted included; a need to seek patients view of patient experience and use patients to evaluate their experiences, commissioners often had difference requirements and these expectations could conflict with what the hospitals could and wanted to deliver, some departments highlighted that they had consultant internal customers about their processes, in order to inform their process mapping activities and, there was some uncertainty about the degree of customer focus at the RIE events

and the general belief was that the events were more for the staff than the patients. "*The general impression is that the customer requirement has not been fully defined. Therefore service improvements are being undertaken without actually knowing what the customer wants*"

Within Ring there was agreement that the Trust had respect for the customer and this respect was always at the forefront of services being offered. Additionally it was very positive to note that in some of the process mapping exercises, service users, including patient representatives and commissioners were involved. The need to engage customers in the service improvement was recognised.

However, within Ring there was some disagreement across the Trust regarding the view of the patient as the customer and whether the service improvement activities had actually impacted upon the patient/customer. Whereas all staff would agree that the Trust tried to improve services to users, there was a need to understand that this was not the same as the customer experience. "*Helping people get better is not the same as making people feel good during the process*".

4.2.3 Use of Data

Within Pottery the use of data was within the diagnostic improvement activity in order to reduce waiting times. Here the levels of demand and the relationship with capacity/ resources were understood for a particular purpose. Data particularly related to capacity and demand within the RIE activity was not recognised.

Within Iron there was some evidence that staff were starting to understand capacity and demand patterns and use this understanding in their day to day working. For example, in radiography staff had started to collect demand and activity in order to create a baseline and, in theatres they had adopted workforce planning on a four week cycle for theatre and surgeon utilisation.

However, some concerns were raised about the understanding of capacity and demand across Iron. It was often felt there was not enough capacity, but historical demand patterns or forecasts had not been collected. Some interviewees suggested that the Trust as a whole "*does not really understand capacity and demand, so often demand outstrips capacity. It is possible to predict winter bed pressures but - all trying to beat our own system.*" There was little demand data and even less capacity management. In one department there was an idea of what the demand patterns were and they had the data but it was not used as information for decision making.

The level of understanding regarding demand and capacity did vary across the Ring Trust. In one area, they had used a workforce planning tool that enabled it to identify that the number of referrals far exceeded capacity. However, "still need to grasp issues around capacity for referral, especially from the clinicians. This needs to be addressed because better capacity planning can protect staff from overwork and set expectations on our workload." In another area, it was highlighted that the service had created a very

predictable service which had reduced the variation which had enabled additional capacity to be released.

4.2.4 Engagement of Staff: Team working and structured problem solving

Within Pottery there was a mixed response to team working. There was better clarity of team working in some departments and better interdependence within some departments. However there is still some doubt about team working across departments. In some departments, it was stated that it was too early to tell whether the RIEs had had an impact on team working. However, there was an understanding amongst staff that teams need to develop further and that they need to work together more to bridge the gap between departments.

In terms of structured problem solving in Pottery it became clear that other than RIEs, staff had not been exposed to other problem solving techniques. There appeared to be no understanding of what other techniques could be employed.

In Iron there was a range of views regarding the solving of problems. It was felt that some staff were able to identify problems or were aware of the problems that existed, but were unable or were not supported in making changes. In these cases, it was felt that managerial staff were unwilling to delegate operational responsibility to make the relevant changes. A need was expressed to empower and educate all staff in allowing changes to occur. "*In general, problem solving is happening at different levels in different departments and is very much down to line managers. Some activities are working well such as the RIE and process mapping exercises.*"

In summary staff highlighted that they were doing some things differently as a result of the service improvement activities; directors felt they were no longer taking knee jerk reactions and were moving away from short to medium term planning to long term planning, the culture was moving from one of fire fighting and responding immediately to one of cause and effect with a focus on the patient and, staff were no longer just talking about service improvement they were actually doing it. Overall, many interviewees felt that the service improvement activity had been 'done with' not 'done to' them. This view was supported by the senior management, who mentioned that they had made an effort to take an "*evolution not revolution approach.*"

For Ring the majority of the staff did recognise that their behaviours had; one service manager highlighted that they were more able to challenge staff, staff had tried to take more responsibility for making changes and actively looked to try and change processes, time was taken to met with clinicians, nursing staff and operational staff to discuss service improvement and, several team managers in a focus group highlighted that had become motivated to make improvements in their own teams.

However, within Ring "*some staff are behaving differently as a result of getting involved in this project. There is talk about how things can be done differently and in terms of the day to day job there is talk about*

adding value but the whole language of Lean is not used by everybody".

4.3 **Sustainability**

One of the key aims of any improvement activity is to ensure that the changes that have been undertaken are sustained over the longer period and allow for continuous improvement. Staff were therefore asked to identify what was required in order to ensure that the improvements would be sustained over the longer period and what would be needed to allow sustainability.

For Pottery staff highlighted that they hoped that there would be a blurring of boundaries between the Trust and other related organisations including social services/community organisations, opportunity for further rapid improvements using a series of short sharp quick improvement events, that staff could develop more skills, more patient focus and give more opportunity to reflect.

In terms of improvement activities that were seen as being sustained it was hoped that the methodology of the RIEs would stick. Although, it was acknowledged that RIEs may not well be because they require a lot of follow up events to ensure that improvements are being undertaken. In order to facilitate the sustainability of the improvements, it was noted that; team leaders need to be developed so they see improvement as part of their role, communication of the changes via team briefs and newsletters needs to be better and, staff need time and training away from their department to develop team working skills, to motivate improvement in order to improve care and structural change.

For Iron it was highlighted by staff that in order to sustain improvements, there was a need to keep people in post and focused on the improvement, via appropriate communication channels, keep ideas and enthusiasm until the new way becomes the way of working. "*Need to get Lean into front line so live it rather than use it.*" This was supported by strong cohesive leadership by engaging both senior and middle managers, implementing project management supported by a Head of Service Improvement who ensured that change was undertaken for right reasons, measured, demonstrated and, celebrated where successful. "*To sustain there is the need for ownership and skills at the right level, support to make decisions, monitoring the implementation of change and seeing which ones actually work and make a difference and designating people to monitor the effectiveness of changes and implement.*"

Similar to Iron within Ring the majority of staff interviewed believed there was a future for Lean in the Trust and highlighted potential projects. "*I think that if Lean is adopted and becomes an inherent part of this organisation, it will deliver a lot to the stakeholders and service users. It will reduce waste and add value.*" The key elements mentioned to ensure continuing service improvement were; more clarity around staff accountability, visible leadership, better communication, internal facilitators or Lean champions and training. "*There is a need for more internal champions in the*

directorates to take this forward. It should not be CCU's responsibility…. they can facilitate change, but the day to day people need to drive this".

5. DISCUSSION AND CONCLUSION

The findings above reflect a mixed approach to Lean across the three Trusts. It could be argued that Pottery has focused more on process improvements across fewer areas or departments compared to the other two Trusts. However, although the activity across Iron and Ring was more apparent overall the findings indicate that the focus of Lean appears to be focused on Rapid Improvement Events (RIEs) and Projects which could lead to 'patchiness' of activity with a range of actions taking place within and between the divisions many which were not recognised outside individual departments. Although, in Iron and Ring there is at least recognition on the impact of this for the future development of Lean.

Considering the findings regarding conditions of readiness. Lean principles can relate to organisational readiness in terms of understanding both the external and internal customer (value and value stream), having a process view (flow), identification of capacity and demand (pull) and, linking to strategy and engagement of the staff (perusing perfection).

In Pottery customers were described as 'should be' patients but often identified as the commissioners with, as in the other case studies, little reference to the internal customer such as the surgeon, consultant or nurse. The process was seen as the department/ward process or a patient pathway. The levels of demand and the relationship with capacity/ resources were understood really only by diagnostics and, teamworking had improved through the RIEs within particular areas.

For Iron again customers often seen as the commissioners with the patient requirement not fully defined with a focus on 'how are we doing rather than how do we improve.' Again the process was mainly seen as the department/ward process not as end-to-end process. There was a recognition that it is important to understand demand and need to match with capacity but information was still needed to achieve this. Finally, there was a feeling that culture was moving from fire fighting to more cause and effect analysis, starting to move from financial focus to the patient.

Finally, for Ring it was felt that there was little change in the view of the patient as a customer. There was a better understanding of process where process mapping had been undertaken. As with Iron a recognition of the importance to understand demand and need to match with capacity and, examples of changes in behaviour e.g. more able to challenge staff, more openly discuss and carry out service improvement.

For sustainability there was hope across all the Trusts that Lean would be sustained along with recognition that some things needed to be done differently in order to support sustainability including greater engagement of the staff through more training, better communication as well as senior management and leadership commitment. A quote from Iron summarises many of views related to sustainability particularly for Iron and Ring "*What is needed is more significant delivery change and a step change in service improvement. This will be more sustained than one off minor department improvements e.g. tidying of areas, undertaking 5S events. There is a real concern that these departments will drift back to where they were before*"

Therefore, if we consider the propositions set out in the methodology the third one stated that there is not always a direct relationship between the approach taken, the conditions of readiness and the service improvement activity in the organisation. The findings from this research and analysis would suggest that this is not true. Within Pottery focused activity was taking place where although it was having some level of impact the understanding and development of the conditions of readiness were still low and a lot of activity would be needed to support future sustainability of Lean within the organisation.

Pottery also helps to support the first proposition in that if the approach to Lean is process improvement and few conditions of readiness are present then it will difficult to support and sustain service improvement within the organisation.

In terms of the second proposition which states if the approach to Lean is continuous improvement and many of conditions of readiness are present or being developed then it is possible to support and sustain service improvement within the organisation none of the organisations presented in this paper would support this. In Iron and Ring there was more recognition of the conditions of readiness although their importance and relationship with sustainability was still not fully understood. Although for Ring the improvement activity was still very project based focused on particular department and areas through an improvement team. Iron was probably closer to continuous than process improvement than the other two organisations in that Lean was being implemented more systematically in a number of areas driven by senior management.

The propositions refer back to the work of Bateman (2005) in that they differentiate between process and continuous improvement. In this paper the degree of the conditions of readiness has been considered highlighting that the lack of them impacting on the sustainability of Lean in public services. Table 7 attempt to situate the findings by presenting the relationship between the <u>approach</u> of the improvement activity to the <u>degree of understanding</u> of the conditions of readiness. The table draws on the ideas and concepts of McGill and Slocum (1993) who present a number of approaches to experience based around an evaluation of organisations philosophy, management practices, employees, customers and change – similar to those conditions presented in this paper as organisational readiness. In their paper they describe the characteristics of four types of organisations which they frame within learning organisations; knowing, understanding, thinking and learning (McGill and Slocum, [38] 1993). A paper by Westrum [39] (2004)

focused on Healthcare presents a typology of organisational cultures. In this paper Westrum [39] (2004) defines culture as an organisations pattern of response to problems and opportunities. He states a response on personal need is pathological, focus on departmental is bureaucratic and, focus on mission as generative (Westrum, [39] 2004). Table 6 combines the characteristics of the McGill and Slocum [38] (1993) with the typology of Westrum [39] (2004) using some of the same names.

Table 7. Typology of Lean Implementation

Continuous Improvement	**Proactive** Project based, organisation wide, addressing the problem areas, joined up programme	**Generative** Organisation wide, self sustaining, improvement viewed and promoted as the norm
Process Improvement	**Bureaucratic** Point Optimisation, department focused, implemented by the rules when told	**Understanding** Project Based, organisation wide, supporting organisation approach, but no joined up programme
	Little understanding of Conditions of Readiness	*Greater understanding of conditions of Readiness*

Relating table 7 to sustainability and the findings from this research it could be argued as organisations move from bureaucratic either through understanding or proactive to generative a more continuous, systematic approach to improvement is developed along with conditions of readiness so by supporting greater sustainability. In terms of the case study organisations for this paper referring to the summary of the cases in this discussion it could be argued that Pottery is 'Bureaucratic' as the focus is on isolated department improvements with little recognition of the conditions of readiness (customer, process view, capacity and demand and strategy and engagement) related to Lean. Ring is 'Understanding' as it supports a Lean organisation approach but the focus is on an improvement team (CCU) developing and implementing the approach through individual projects rather than the staff who are involved in the service delivery. Iron is also 'Understanding' as there are mixed approaches across the divisions but some recognition and development of the conditions of readiness to develop a wider understanding of Lean.

Through the presentation of rich data across 3 case studies this paper has explored findings in relation to a set of propositions leading to the development of a framework which aims to link the approach of Lean, the conditions of readiness and sustainability of Lean for health care. The typology within the framework indicates how an organisation can develop from a bureaucratic approach to Lean implementation to generative through either being proactive or creating a greater understanding. It could aid organisations in situating themselves on the Lean journey by not only considering the tools and approach they are using but also the degree to which the culture and behavioural aspects of the organisation are changing through the engagement in of the organisational readiness factors or practices.

Therefore, the framework could be used for other public services by managers and change agents implementing Lean. In terms of theory the framework and this paper attempts to start to draw together knowledge and frameworks from organisational design and theory and, change management to understand Lean Implementation in a context which it what not designed for. Previous research (Radnor et al, [12] 2011) has shown that, particularly in healthcare, Lean in context dependent – not in terms of manufacturing to service but private to public. In order to understand how Lean can be adapted it is important to consider not only the structural, mechanistic or tools of Lean but also the infrastructure, behavioural or cultural elements.

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