

# Becoming a Lean University: The Case of the University of St Andrews

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This article looks at how “lean” can be successfully introduced into a higher education setting by discussing what has become known as ‘The St Andrews Model’. The article demonstrates that “lean” can be adapted to suit the particular circumstances of an institution. Lean, underpinned by a manufacturing heritage, and the subject of a small but growing collection of academic and practitioner analysis, is readily transferrable to other sectors. This article will show that although the model draws on a common body of knowledge, there is not a one size fits all approach. The successful implementation of a lean programme is not an overnight activity; it is, rather, a journey where learning is done by doing.

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For your convenience, all articles have already been organised by chapter and subchapter online at [www.lg-handbook.info](http://www.lg-handbook.info). This article, C 5-5, has been assigned to:

Chapter            C: Change Processes: Vision – Decision – Action  
Subchapter       5: Implementing Change Strategies

## 1. The University of St Andrews

Through the case of the University of St Andrews (the University), this paper aims to introduce the application of “lean” in Higher Education (HE). After discussing the key elements of lean theory the article looks at how lean has been successfully implemented in HE through what has become known as ‘The St Andrews Model’.

The University, Scotland's first and the third oldest in the English speaking world, was formally constituted by the issue of a Papal Bull in 1413.

The University is now one of Europe's most research-intensive seats of learning - over a quarter of its budget comes from research grants and contracts. It is one of the top-rated universities in Europe for research, teaching quality and student satisfaction and is consistently ranked among the UK's top five in leading independent league tables. It was named Scottish University of the Year and was ranked 4<sup>th</sup> in the United Kingdom in The Sunday Times University Guide 2014 (The Sunday Times 2013). The University was placed 83rd in the QS World University Rankings 2013/2014 (QS 2013).

The University is located on the Fife coast some 50 miles northeast of Edinburgh. The University is a diverse and international community of over 9,000, comprising students and staff from over 100 countries. It has 7,500 students, 6,000 of them undergraduates, and employs approximately 2,460 staff, of which around 1,150 hold academic positions. While it may seem that the student to academic staff ratio is in itself not “lean”, generally speaking, the more academics that a university employs, the better the student experience and the more value they will get out of their degree. The student-staff ratio is one of the criteria on which the University is measured. It should be noted that the University has a proportionally large number of staff employed to service its significant buildings and residences, which are a result of the University's history and location.

## 2. What is lean?

Lean is an approach to process improvement in the workplace that began in manufacturing, and is now found throughout the service and public sectors, including Higher Education. Toyota is often cited as the birthplace of lean, as it was there that Japanese employee relationships were first married with western scientific management.

When people first encounter lean, they often think that all it involves is a series of one-off events designed to solve problems with processes (such events are often called ‘Rapid Improvement Events’ or

‘RIEs’). In fact, lean is about continuous improvements to work. Continuous improvement while it can include RIEs, means always looking for new ways of doing things to take account of changes in the internal and external environments in the context in which a Higher Education Institution (HEI) operates.

When successfully applied lean becomes part of an institution’s culture. Lean is therefore more properly regarded as an applied philosophy of work. The lean philosophy suggests that in order to make continuous improvements to work there must be a fundamental respect for people.

Despite the name, lean is not about decreasing resources involved in the delivery of process outcomes. It is about identifying the right amount of resources required to complete an activity in a way that meets customer needs. In working towards this aim it is typically found that processes are over-resourced.

There is a large body of work discussing lean for a range of industry, service and public sector applications. Publications concerning the application of lean in HE are less numerous. We therefore found ourselves having to adapt lean theory to make it fit HE.

We, over time, developed a definition of lean, that we believe works for the University and would work for other HEIs. Lean as we understand and apply it, is

#### **A definition of lean**

*“the right people continuously searching for the simplest and smoothest process in order to meet customer<sup>1</sup> needs perfectly”.*

### **3. Why lean?**

The idea of lean was brought to the University in 2006 following a senior staff member’s attendance at a conference presentation about lean. The then Finance Director agreed that a lean approach would suit the University’s ethos of focusing on people and the contribution they make to institutional success.

A three-year initiative was funded. Starting in mid- 2006, the University invested significantly in training and resourced a team of three staff. The team’s primary purpose was to lead lean change initiatives,

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<sup>1</sup> It should be noted that the term “customer” is used in this article as an inadequate term to represent all people or organisations that benefit from what a University does. It is not intended to trivialise the complexity of those relationships.

focusing on administrative functions. This early activity occurred before the global economic downturn and therefore there was no ‘sense of urgency’ that needed to be established to prompt the University into action (Kotter 1996). At the time, lean was seen as, and remains, a sensible philosophy in which to invest.

#### 4. Lean at the University

In the University lean is supported through a small team - the “Lean Team” (hereafter without quotes).

The Lean Team reports to the Chief Information Officer who in turn reports to the Chief Operating Officer. The Chief Operating Officer is a member of the Principal’s Office (the senior management team), and is responsible for providing strategic leadership in the overall development of the University’s non-academic services.

In practice, in order to embed the philosophy of lean the University has developed a devolved approach to decision-making; i.e. it supports staff to solve problems where the work is carried out. This means that in practice the Lean Team works to support staff of the University to improve their own work.

#### Goals of lean at the University

The lean initiative, and therefore the Lean Team, has three main goals:

1. Culture Change – to create a drive and appetite for continuous improvement
2. Effectiveness – to ensure that all institutional processes meet existing and emerging needs
3. Efficiency – to maximise the use of all resources in the delivery of high quality services

Key aspects of the University’s approach to lean are:

- The Lean Team providing an objective service outside functional silos<sup>2</sup>

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<sup>2</sup> A term used within e.g. business process re-engineering (BPR) to denote areas within an organization where managers occupy a privileged position in terms of resources and influence, and where they use this for their own, self-interested, functionally-oriented motives rather than for the wider benefit of the business. BPR recommends the removal of a function-focused approach and its replacement with a process-focused approach, thereby destroying the functional silos and encouraging cross-functional integration. (Oxford Dictionary of Human Resource Management)

- The institution committing to a small team to actively lead change
- The approach being rolled out primarily using workshops to enable knowledge transfer
- Training in lean as part of an established programme for all staff
- The Lean Team actively pursuing opportunities
- The Lean Team supporting staff in ownership of their processes
- Staff across the institution improving processes from the bottom up
- The Lean Team working to the direction of the Principal’s Office

The Lean Team has, since its beginning, consisted of two to three staff appointed from non-academic areas of the University. The positions are now permanent and appointees to the Lean Team should meet the following criteria:

Attributes	Essential	Desirable
Education and Qualifications	Educated to degree level	
Experience and Knowledge	Good understanding of HE processes	Experience of implementing business change using Lean methodology
Competencies and Skills  Exp	Ability to communicate with staff at all levels and with students Ability to engage with and motivate people at all levels Ability to encourage others to develop creative approaches to problem solving Experience of motivating stakeholders to deliver against specific goals Ability to work as a team member and as a project team leader Ability to assess and organise resources and plan and progress project activities Ability to analyse business problems and engage in business development activities Good written and numeric skills. Computer literate. Confident with reporting and spreadsheet packages	Proven facilitation skills Experience of managing staff Experience of delivering presentations to internal and external audiences
Other Attributes/Abilities	Experience of project management approaches Experience of delivering training to staff	

**Table 1 Lean team member attributes**

Over time Lean Team members are expected to develop real strengths in the technical aspects of lean. They are also required to build and maintain excellent interpersonal relationships across the University and to do so with a high level of emotional intelligence. Confidence and resilience in the face of a sometimes unappreciative audience is something that comes with experience.

**Examples of outcomes of lean initiatives**

Early activity encountered a number of difficulties, and shortcomings, such as:

- Middle manager resistance to engaging with lean by e.g. not making themselves or their staff available
- Poor scoping of projects so that objectives were unachievable in the time set aside
- Failure to fully deliver project outcomes though inadequate project management particularly once the staff involved had returned to their daily work

The results achieved therefore have been hard won, and over time there have been some startlingly positive results. As noted in a report by Universities Scotland, the University has made some significant gains:

- On-line self-certification of student absence<sup>3</sup> is estimated to have saved over £130,000 each year for the past four years. The development of new software brought about consistency of process and saved large amounts of administrative staff time. The system also allows real-time monitoring of student absence data, helping, at an early stage, to identify students at risk of not completing their course.
- Improvements to the staff recruitment process including by advertising mainly on <http://www.jobs.ac.uk> have saved £150,000 each year for the past four years.<sup>4</sup>

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<sup>3</sup> Non-attendance at a class caused by e.g. illness

<sup>4</sup> Analysis of recruitment data identified that the vast majority of applicants invited for interview and subsequently appointed to positions at the University had applied online via <http://www.jobs.ac.uk>. Vacancy advertisements in specialist academic journals and print media, while not prevented, are now funded directly from professional unit and academic school budgets rather than from the HR budget.

- Improved student debt management and streamlining of the matriculation process has saved £100,000 each year for the past four years. Improvements have e.g. brought efficient accounting processes, easier payment for international students and improved access for students to their financial information, all helping to prevent problematic debts.
- A review of the casual staff payment process resulted in significantly less bureaucracy and has created efficiencies of £24,000 each year for the past four years (Universities Scotland 2013).

The Lean Team have for the past two years been engaged in delivering lean activity and training for other organisations, predominantly other UK HEIs. This is also indicative of the success of lean at the University.

## **5. Lean Theory**

The core theoretical elements of lean are the two Fundamentals, the five Principles, and the eight Wastes. What follows is largely as delivered at our lean training sessions.

### **5.1 Two Fundamentals**

Lean is a philosophy of work. It is an approach that has grown from the application of two key concepts: Continuous Improvement and Respect for People. These concepts, central to Toyota's philosophy, have been much studied, and in relation to HE, by the author Bob Emiliani.

**The two fundamentals of lean**

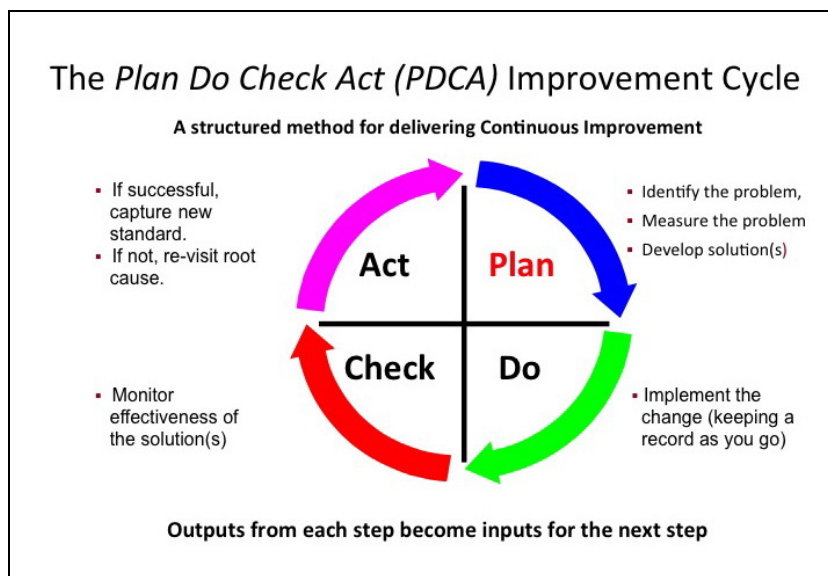
**Fundamental 1: Respect for People**

<p>What is it?</p>	<p>Defined by Toyota as comprising two elements:</p> <ul style="list-style-type: none"> <li>• Respect: "We respect each other, make every effort to understand each other, take responsibility and do our best to build mutual trust."</li> <li>• Teamwork: "We stimulate personal and professional growth, share the opportunities of development and maximize individual and team performance." (Toyota Motor Corporation 2012, p. 50)</li> </ul>
<p>Why do we do it?</p>	<p>Because:</p> <ul style="list-style-type: none"> <li>• People are our most powerful asset</li> <li>• Process is all about how people behave</li> <li>• Nothing works without people</li> <li>• We are all different</li> <li>• No one person knows everything</li> <li>• We cannot do everything ourselves</li> </ul>
<p>How do we do it?</p>	<p>By:</p> <ul style="list-style-type: none"> <li>• Involving all staff in decision making</li> <li>• Understanding that frontline staff know what works well and what needs improvement</li> <li>• Asking for and valuing the views of others</li> <li>• Creating an environment where values are more than words on e.g. a website</li> <li>• Remembering that respect for people does not necessarily mean agreement or compromise</li> </ul>



**Fundamental 2: Continuous Improvement**

<p>What is it?</p>	<p>It is:</p> <ul style="list-style-type: none"> <li>• Always looking for new ways to do things</li> <li>• Daring to be different</li> <li>• Never ending</li> <li>• Challenging</li> <li>• Developing a learning organisation that is capable of adjusting to changes in the context that it operates</li> </ul>
<p>Why do we do it?</p>	<p>Because:</p> <ul style="list-style-type: none"> <li>• The internal and external environments are always changing</li> <li>• Customer needs are always changing</li> <li>• Standing still means going backwards</li> <li>• Everything can and must get better</li> </ul>
<p>How do we do it?</p>	<p>By:</p> <ul style="list-style-type: none"> <li>• Implementing the Plan Do Check Act (PDCA) Improvement Cycle (see diagram below)</li> </ul>



**The Plan Do Check Act Cycle**

## 5.2 Five Principles

In their seminal book, “The Machine that Changed the World”, Womack, Jones and Roos identified five principles in the way that Toyota made vehicles that were to become definitions for what it means to be lean. (Womack, Jones and Roos 1990)

### The five principles of lean

These five principles, as interpreted by the University, are:

1. Maximise **VALUE**
2. Understand work as a **PROCESS**
3. Create smooth **FLOW**
4. Respond to **PULL**
5. Aim for **PERFECTION**

### Principle 1 – Maximise VALUE

In lean, all processes consist of three components:

- Non-value adding activity
- Value adding activity
- Waste

Non-value adding (NVA) activity consists of compulsory steps in a process that neither add value nor are they strictly waste. NVA activity can be created by e.g. the physical layout of a HEI, or in complying with legislation that does not directly add value to the purpose of a HEI i.e. teaching and research. At most, all that a HEI can do is try to limit the effects of NVA activity.

### Do only value adding work

Value adding work, the work that a HEI needs to focus on, is work that:

- Fulfils institutional objectives and meets customer needs
- Transforms a product or service
- Is done correctly the first time

This definition, where it focuses on ‘customer’ does not pose any difficulties for the HE sector despite there not being one simple identifiable customer. Our response to this has been to adopt a practical approach; defining ‘customer’ as ranging from the next person in the process chain through to the student and ultimately, society. The next

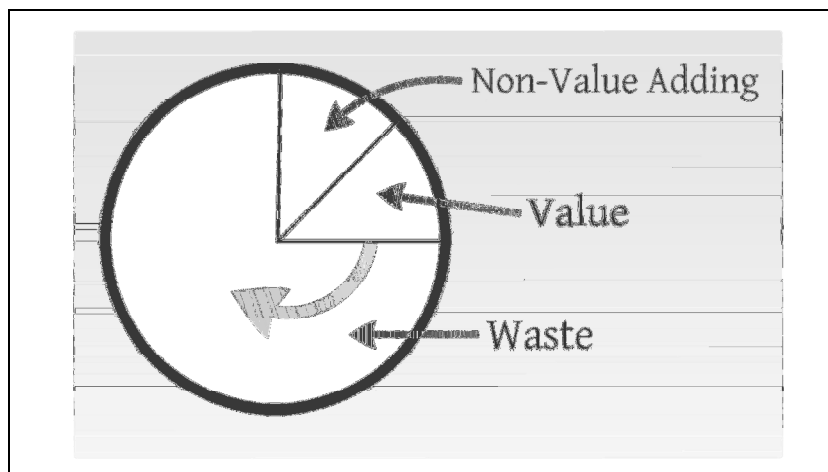
person in the process chain receives work that meets their requirements exactly, the student receives an education and qualifications that benefit them, and society receives the benefits of the teaching and research carried out at a HEI.

It can be seen then that unlike a private sector organisation, ‘value’ in the HE sector, or at least at the University, is not expressed in monetary terms. Any savings generated by them e.g. financial or time, are however welcomed and will ultimately feed into improving the University as a whole.

Value adding activity can be explained most simply as a combination of mitigation of the effects of NVA activity and the removal of waste from a process.

Waste is typically a significant portion of any process as evidenced by the level of improvement in the three exemplary fields mentioned above in the section entitled ‘Lean at the University’. The diagram below is representative of the typical make up of processes we have worked on.

There is almost always a part of each process that is NVA (non-value adding) and which may be very difficult to reduce. Our aim is to significantly expand that part of the pie that adds value to a process, and this can most often easily be done by simultaneously reducing that part of the pie labelled as ‘Waste’. The ultimate goal is to eliminate all waste from a process.



**Figure 1** Representative values of Non-Value adding, Value and Waste in a process

It is now appropriate to look at Wastes before moving on to Principle 2.

### Eight Wastes

Waste is any step or activity in a process that is not required to complete that process successfully. Waste in lean can be broken down into eight categories, and these are often represented by the acronym TIM WOODS. One outcome of lean activity is the elimination of as many of the eight wastes as possible. Ideally the only steps that will remain in a process will be those required to deliver the right product or level of service to the customer.

#### Categories of waste in any process or activity

Waste	Description
Transportation	Unnecessary movement of materials, people, information, equipment or paper.
Inventory	Excess stock, unnecessary files and copies, and extra supplies.
Motion	Unnecessary movement by people e.g. walking and searching, things not within reach or easy access.
Waiting	Undue delay in fulfilment of a request or in a process step e.g. idle time that causes the workflow to stop, such as waiting for signatures, machines, phone calls and people to return.
Over-processing	Undue complexity in the manner of the creation of items or fulfilment of requests e.g. asking for student details multiple times, excessive checking or duplication, process more complex than necessary.
Over-production	Producing more than is required e.g. too much paperwork or information, too many copies, or producing ahead of need.
Defects	Work that needs to be redone due to errors (whether human or technical).
Skills	Not using the full potential of staff, wasting the available knowledge, skills and experience.

Please note that the eight wastes may overlap, e.g. over-production can lead to inventory and transportation and motion can occur at the same time.

### Principle 2 – Understand work as a PROCESS

#### All work in a HEI is interconnected

No work carried out in any organisation can take place in isolation. There must always be activity that takes place beforehand and in many cases after activity.

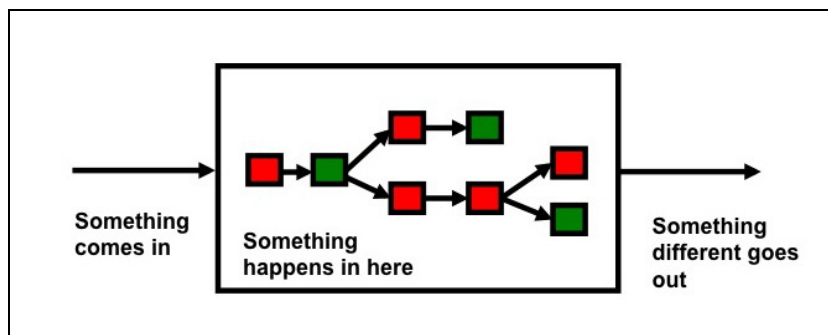
Any task can be thought of as a series of linked steps, i.e. a process. For example, during its lifecycle a book held in the University Library travels through a number of processes: request, acquisition, catalogu-

ing, book processing, shelving, use, collection management and potentially repair, long term storage, or disposal. Linking together steps as a process can reveal opportunities to make improvements.

Most processes evolve over time in response to any number of events, and this evolution, ad hoc by its nature, often increases the number of steps in a process and hence process complexity. In turn, process complexity provides increased opportunities for error. In many cases the reason for the development of the evolved step in the first place, the root cause, now no longer exists.

A good process is one that

- Leads to the result needed and expected, e.g. by the ‘customer’, i.e. is Effective
- Does things right as regards, e.g., cost, quality, time, i.e. is Efficient
- Does it the same way every time (minimal variation), i.e. is Repeatable
- Has reliable outcomes, i.e. is Predictable



**Figure 2** Representative Process Map

**Principle 3 – Create smooth FLOW**

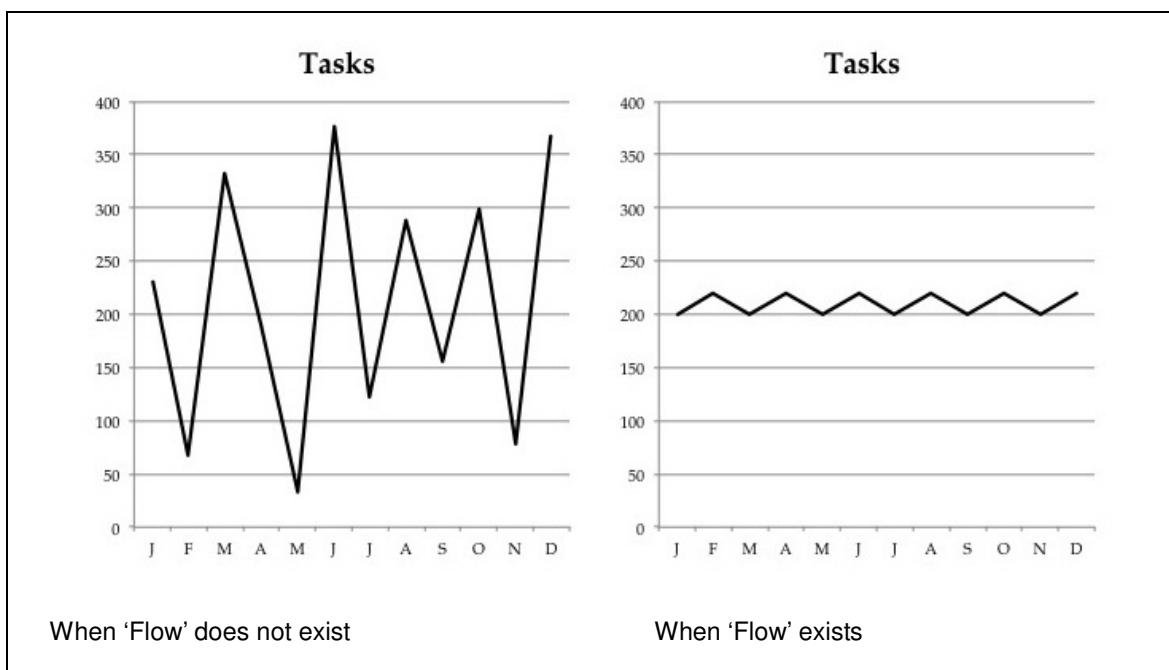
Flow is the waste of un-evenness. When a process flows, work happens steadily and resources meet demand. When a process does not flow, work builds up, creating peaks and troughs of activity and resources do not meet demand. Peaks and troughs can lead to delays for the customer and pressure points for staff. Levelling out peaks and troughs gives customers what they need more quickly, while making better use of resources such as staff time.

**Eliminate peaks and troughs to maximise efficient use of resources**

Un-evenness can be caused by:

- Bottlenecks – process steps constraining throughput
- Poor sequence of process steps
- Backlogs – piles of unactioned work
- Batching – waiting for a set number of items before taking action
- Low first pass yield – high percentage of work sent back to a previous step in the process to be done correctly
- Capacity that does not allow for continuous flow

The diagram below depicts, on the left hand side, a workflow characterised by peaks and troughs, and on the right hand side, a workflow that is smooth, with minimal variation.



**Think about the process from the customer's perspective**

**Principle 4 – Respond to PULL**

The principle of Pull can be the hardest to understand in an HEI context where staff is used to providing a standard service to students. Pull is about responding to the request the customer makes of the service in the way the customer would need (accepting that the provider of the service may have a better understanding of customer needs than the individual customers themselves). Key to this is to:

- Think about the process from the customer's perspective by asking 'What does the customer need and when?'
- Do no more than meets customer need (anything more is 'waste' - see above)
- Deliver the right thing, of the right quantity and quality, at the right time, and in the right place.

### **Principle 5 – Aim for PERFECTION**

We can always do better. Aiming for perfection, while challenging, means continuously striving to improve a process so that a better service can be delivered to the customer. Each time an activity is undertaken it can be further refined. One way to do so is to continuously apply the Plan-Do-Check-Act improvement cycle above.

**Continuously improve to provide a better service**

Factors that do not lead to a better service but which on the contrary limit what can be achieved include:

- Artificial targets/Targets set without a full understanding of customer need e.g. all emails answered within 24 hours regardless of urgency/ importance to the customer.
- Benchmarking – No two HEIs are the same, therefore benchmarking will not compare like with like. Best practice while interesting, will not usually have encountered our specific ways of working, our particular combination of IT systems, or our customer demands.
- A 'that will do' approach – While perfection may never be attainable, it is worth striving for, otherwise our customers may go elsewhere. HE is a competitive market.

We have found it useful to remind staff of the University's Greek motto 'Aien Aristeuein', which can be translated as "ever to excel" or "ever to be the best".

## **6. The St Andrews Model**

The Model is based on the Lean Team:

- Having access to dedicated office space
- Acting autonomously

- Building strong working relationships
- Following its clearly defined 8 Step Project Process
- 5 day Rapid Improvement Events (RIEs)

In establishing the Lean Team, significant funding was made available for management consultancy for initial knowledge and skills transfer. Dedicated office space, consisting of a large room for RIEs and a back office, was also made available. This space became a core strength as the team was able to offer an exclusive physical location equipped with tables, whiteboards, screen and projector, computers, wall space and refreshments.

The role the Lean Team members adopted over time - active leadership rather than passive facilitation - has contributed to the success of lean at the University. Establishing an identity outside any individual department, in order to enable objective facilitation, is also a key strength.

The management of the Lean Team lies with a senior manager (the Chief Information Officer), and is largely 'hands off'. This type of management reinforces the team's autonomous approach and thus greatly assists the team when working with staff who may otherwise be less open to participating in lean work.

The active building of relationships across departments and schools was another key element. Developing a network of staff who understood lean principles and who were prepared to help out, often at short notice, meant that momentum could be maintained.

#### **Development of the St Andrews Model**

Over the first four years of operation we evolved an eight-step approach, and captured it, at least in part, in the booklet "Becoming Lean: Pocket Guide". (Colvin, Robinson, Yorkstone 2010). This short text was originally written for University staff as a guide of what to expect when working with the Lean Team. The model, set out in the diagram below, was based on eight broad stages we experienced and then identified during lean project work.



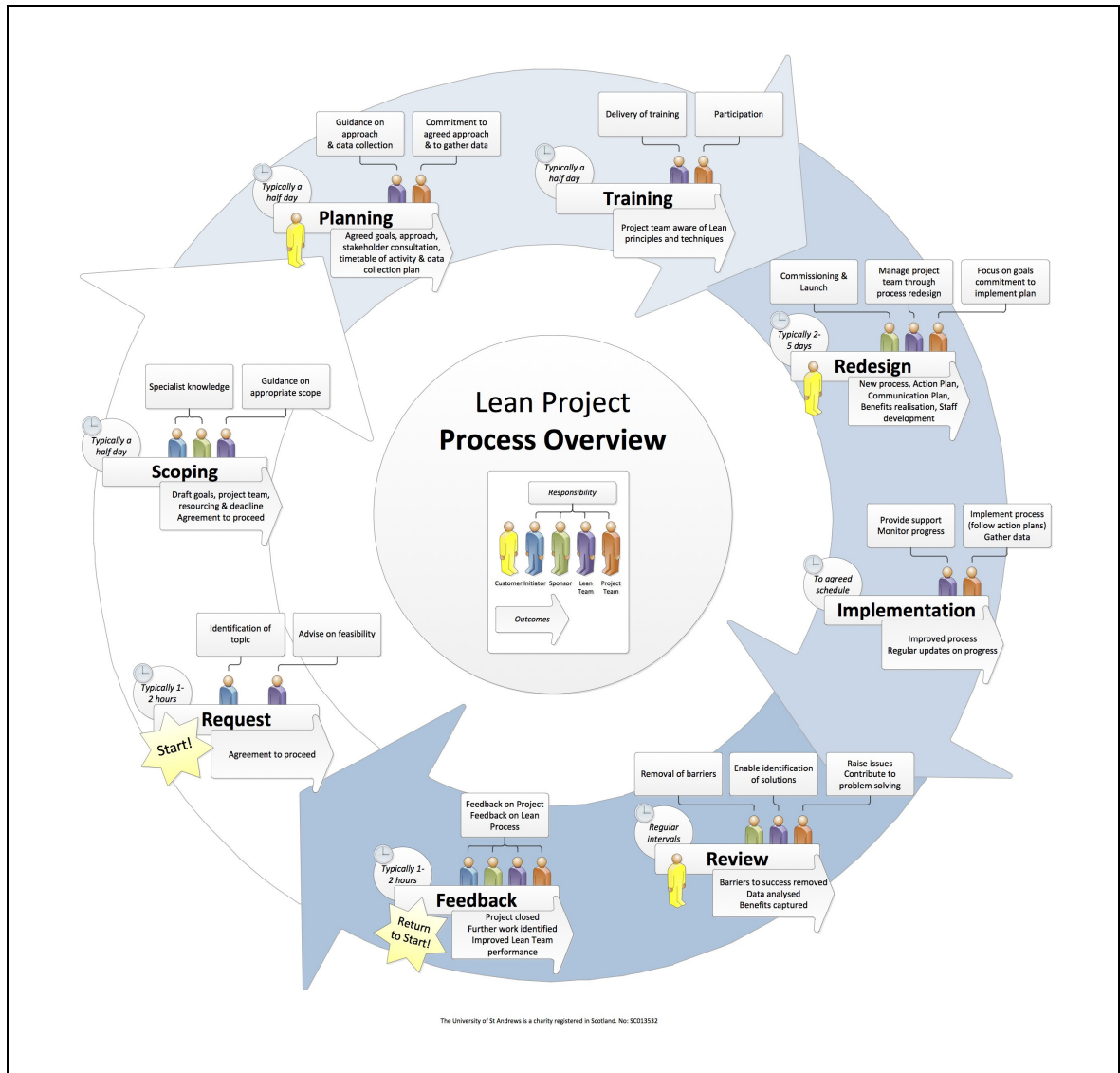


Figure 3 The St Andrews Model

This model is explained below.

The focal point of many lean projects is the RIE, the redesign stage in the eight-step process. The typical preparation time for an RIE can be three to six months, with full implementation taking significantly longer. In a five day RIE there is scope to undertake significant activity. Outputs of the event should be completed pieces of work to support implementation, or indeed be implementation. Key to these events is ambition for the achievement of real work.

**The main activity in a rapid improvement event**

The principle activity in an RIE is:

1. Establish the current position
2. Analyse this from a lean perspective (see the 5 Principles above)
3. Generate and analyse ideas for improvement
4. Run experiments (and/or conduct consultation) to test those ideas for improvement
5. Create a new process that includes these ideas

Working through these stages provides a clear structure to the RIE and supports the RIE team in their approach to the process to be improved.

In an RIE the project team (RIE Team) is removed from their workplace, typically for five days. Taking any significant amount of time out of the office is a challenge, especially when RIE staffing consists of between eight to 12 staff. However, feedback from staff involved indicates taking this time provides significant benefits. Working in a solid chunk of time mitigates the risk of loss of momentum between activities and typically enables a problem to be solved using less effort. That effort then becomes more visible and savings made by the changes can be realised much more quickly.

Projects of course can be undertaken in a series of smaller chunks of time, which makes it easier to fit work around existing commitments. However, momentum is lost between these small sessions, and we have found significant amounts of time have to be spent catching up.

We now look at the St Andrews Model in more detail.

**The Model in practise**

**Resource required during a lean project**

Running a lean project involves providing the right level of resources to ensure that the project is a success. A lean project will require a significant amount of staff time, particularly if a five-day RIE is held. For example, a project requiring eight staff over five days, and including staff time for the other stages of our eight-step process, will require an investment of about 60 working days. This figure excludes any time for pre-project work by the project team (e.g. data collection), the implementation stage (timings vary considerably across projects), and Lean Team staff time.

A suitable room will also be required - we have a dedicated lean room. You will also need e.g. stationery, refreshments, and access to relevant computer programmes. Implementing project outcomes may require additional resources, particularly financial investment if a new computer programme is required.

Without this right level of resources, it is unlikely that a new process that meets customer needs will be delivered, and, moreover, there will be no move towards developing a lean culture of continuous improvement and respect for people.

The assumption made in this section is that a request for improvement to a process leads to a five day RIE and all participants in the RIE are new to lean and the St Andrews model.

**How the model works in practise**

### **Step 1. Request**

#### **Purpose**

- Discuss whether or not an idea for improvement may lead to a lean project

#### **Timing**

- The meeting will usually last one to two hours

#### **Key Outcomes**

- Requestor identifies issues as they see them
- Requestor defines vision in a sentence, answering the question, 'If the process was to be perfect, what would it look like?'
- Requestor suggests potential deliverables
- Requestor made aware of eight-step process
- Scoping meeting arranged if project is to proceed

#### **Notes**

- A request for an RIE can be made by any member of staff, or student
- There is no guarantee that a request will result in an RIE; scoping will usually determine the outcome of a request

### **Step 2. Scoping**

#### **Purpose**

- Determine whether or not an idea for improvement will lead to a lean project

#### **Timing**

- A Scoping meeting will usually last from two to four hours

### **Key Outcomes**

- Issue defined and broad project aims identified via, as appropriate:
  - BOSCARD<sup>5</sup>
  - SIPOC<sup>6</sup>
  - Quad of Aims (QoA)<sup>7</sup>
- Scoping Team define their vision in a sentence, answering, ‘If the process was to be perfect, what would it look like?’
- Data requirements identified
- Draft deliverables prioritised
- RIE Team members identified (and then notified of next steps)
- ‘On-call’ staff (i.e. staff who are not central to the RIE but who may need to be called on should their expertise be required) identified and notified of next steps

### **Notes**

- Attendance is usually limited to two to four key senior staff involved in the process
- An inadequately scoped RIE will result in sub-optimal outcomes

### **Step 3. Planning**

#### **Purpose**

- To get buy-in from RIE Team members

#### **Timing**

- The meeting will usually last from two to four hours

#### **Key Outcomes**

- RIE Team members understand need for RIE
- Confirmation of dates, times and venue of RIE

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<sup>5</sup> BOSCARD stands for Background, Objectives, Scope, Constraints, Assumptions, Risks and Deliverables, and is a standard project commissioning document, and a way of giving structure to open discussions.

<sup>6</sup> SIPOC stands for Suppliers, Inputs, Process, Outputs and Customer, and is a standard lean/6 sigma analysis tool.

<sup>7</sup> A QoA is a simple statement of project goals and consists of four sections: Purpose (a high level explanation of the reason for the process), Stakeholders and Benefits (of the new process), Deliverables (desired outcomes of the new process), and Measurables (how the outcomes are to be measured).

- Draft QoA confirmed, after modification if necessary
- Prioritisation of draft deliverables confirmed, after modification if necessary
- Confirmation of data requirements
- Manager confirms availability for Introductory and Presentation stages of RIE, and of availability at other times during the RIE

#### **Notes**

- Attendance is essential for the Manager and all staff in the RIE Team, including those staff identified as ‘on-call’

#### **Step 4. Training**

##### **Purpose**

- Familiarisation with lean

##### **Timing**

- A training session will usually last from three to four hours

##### **Key Outcomes**

- Understanding of the basics of lean through:
  - Presentation
  - Question and answer session
  - Lean Game<sup>8</sup> e.g. Paper Plane, or Lean Lego simulation
- Understanding of what will happen during the RIE

#### **Notes**

- Training can also take place before Scoping or Planning
- Attendance is essential for the Manager and all staff in the RIE Team, including those staff identified as ‘on-call’

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<sup>8</sup> There are a number of lean simulation games available that typically include establishing steps in a process, and allowing teams to analyse and re-construct those processes to increase optimisation. A range of games are available at <http://www.leansimulations.org/p/huge-list-of-free-lean-games.html>

### **Step 5. Redesign**

#### **Purpose**

- Delivery of new process

#### **Timing**

- An RIE can last from one to (typically) five days

#### **Key Outcomes**

- Understanding of current process
- Generation and analysis of ideas for improvement
- Creation of new process
- Learning of lean tools and techniques
- Culture change

#### **Notes**

- Manager must demonstrate clear support for the RIE
- Lean Team facilitates, and leads where necessary
- The RIE is about making changes, not just planning to make changes

#### **Typical timetable of Activity during an RIE**

##### **Day 1**

- Manager enthusiastically commissions the RIE
- Restatement of goals and the RIE process
- Analysis of any data gathered
- Current State Mapping begins
  - Using pens, sticky notes and a roll of paper
  - The process to be mapped is the **process as it is now**. Not what it should be, not what the written procedure says it should be, or what someone thinks it is or should be
  - Focus on Runners, and if time, Repeaters, park Strangers<sup>9</sup>

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<sup>9</sup> 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.

**Typical timetable of activity during a five-day rapid improvement event**

- Ideas generated for possible changes in the process are to be written down for consideration later
- Add in timings for each step and intervals between them (based on data previously gathered, or, informed estimate)
- Collate timings to give totals for process time and elapsed time
- Identify which steps are Waste, and which type of Waste (TIM WOODS), by tagging the steps
- Take photos as a record, the process mapped is now out of date and will never run again

## Day 2

- Continuation of Current State Mapping
- Ideas generation and analysis
  - The aim is to get the RIE Team to throw the rulebook away and explore all possibilities for the new process – no idea is a bad idea!
  - Working alone, the RIE Team write down their ideas, one idea per sticky note
  - Using Nominal Grouping Technique<sup>10</sup>, the RIE Team then group their ideas on the wall, together with any written during the current state mapping stage, clustering ideas under headings relevant to them
  - The RIE Team then evaluate those ideas, firstly by discussing the negative aspects, and then the positive aspects
  - All the while the RIE Team is digesting information and evaluating possible future courses of action

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- **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.

<sup>10</sup> Nominal Grouping Technique allows for groups to generate a large number of ideas and reach a consensus about the main themes within those ideas.

### **Day 3**

- Continuation of ideas generation and analysis
- Future State Mapping
  - Referring to the ideas generated during the ideas generation and analysis stage, creation of an 'Ideal Future State', a state where there are no limits such as cost, time or software
  - When completed, record the map using mapping software such as Visio

### **Day 4**

- Future State Mapping
  - Creation of an 'Interim Future State', a state that is achievable given any constraints such as funding, software not being in place from the next working day, etc. This is the process that will run from the next working day
  - Add in timings for each step and intervals between them (based on data previously gathered or informed estimate)
  - Collate timings to arrive at totals for process time and elapsed time
  - The difference in timings between this map and the current state map will give an indication of time and cost saved
  - When completed, record the map using mapping software such as Visio

### **Day 5**

- Completion of Interim Future State Map
- Action Planning
  - Record all outstanding tasks and assign to an RIE Team member
  - Recorded on a spread sheet - headings of 'Action', 'Person Responsible', 'Deadline' and 'Comments'
  - Set date and time of first, and subsequent, Review Meetings
- Presentation Preparation and Delivery
  - Presentation to staff who were not part of the RIE Team covering what happened during the RIE and its outcomes
- Feedback
  - Gather feedback from the RIE Team about how the RIE ran



## **Step 6. Implementation**

### **Purpose**

- To put the new process into place

### **Timing**

- Begins as soon as possible, preferably before the RIE ends, and continues until all the tasks on the action list are completed

### **Key Outcomes**

- New process in place

### **Notes**

- The Lean Team goes to the work area on the first day (and subsequent days if necessary) and checks on progress

## **Step 7. Review**

### **Purpose**

- Maintain RIE momentum and staff motivation

### **Timing**

- Meetings held at 15, 30, 60, 90, etc. days as appropriate, until both the Lean Team and the Manager are satisfied and the project can end.
- Meetings last two to three hours

### **Key Outcomes**

- Action list tasks completed on time
- Progress in meeting deliverables is managed
- Barriers to progress identified and removed
- Unanticipated issues resolved immediately

### **Notes**

- The importance of follow up cannot be underestimated in ensuring the project deliverables are realised. Some benefits will only be fully realised following the end of the RIE
- Meetings are chaired by the Lean Team
- All RIE Team members attend each meeting

### **Step 8. Feedback**

#### **Purpose**

- To determine
  - The overall success of the RIE
  - How the eight-step process can be improved
  - Opportunities for further work in the area concerned

#### **Timing**

- Three to 12 months after last Review meeting.
- Meetings last from one to three hours

#### **Key Outcomes**

- Benefits recorded
- Development of the eight-step process
- Further work

As the above demonstrates, at a minimum level the outcomes from each RIE are a new detailed process, and an action plan for implementation. Ideally significant aspects of the new process are already in place by the end of the RIE.

## **7. Lessons Learned**

Looking back on our experiences in applying lean at the University, there has been some rich learning that may reflect the experiences of colleagues elsewhere. That learning may also be of assistance to those contemplating introducing lean to their HEIs.

### **Points to consider when introducing lean to an HEI**

**Lean is more than RIEs** – The Lean Team’s aims are much more than improvement through a series of RIEs. Optimising improvement relies on each staff member constantly improving his or her work on a daily basis. This is not easy to achieve, but to support this; our approach was one of actively undertaking knowledge transfer through facilitated events. We ran lean training sessions integrated with management level and front line staff training programmes (focussing on lean leadership and tools and techniques respectively) but primarily sought to embed lean through active application to business process redesign. We simultaneously built a network of staff who were prepared to ‘give it a go’, and developed skills as appropriate through an action learning approach.

**Where to start** – Begin with a bite-sized piece of work that is well scoped and that will deliver a quick and significant win. We started with projects that were poorly scoped: they were far too big and the wins were very slow in coming and momentum was lost.

**Dedicated Lean Team** – Even in a university the size of St Andrews it was impossible for any of the team of three to retain responsibility for a function elsewhere in the University. We need to be available to staff and to move quickly, i.e. to be customer focussed.

**Knowledge transfer** – We have found that as well as the clear benefits the optimisation of process brings to the customer, the RIE Team members, particularly those who have been involved in more than one RIE, were often using the tools and techniques they were exposed to during the RIE in other work, and also developing better working relationships with colleagues. In this way RIEs leverage knowledge transfer of lean tools and techniques, and help to support the development of a positive organisational culture.

**Structure and support** – Knowledge transfer fits with the key principle that the Lean Team should not take ownership of any process but rather provide a structured approach and support to allow staff to improve their own areas. This is difficult, however, when there is no clear owner of the new process that emerges. Therefore to support staff the Lean Team often takes an informal management role to ensure RIE outcomes are delivered. This again relies on strong interpersonal skills for successful outcomes.

**Senior championship** – A critical factor in the inception and growth of lean at the University has been the championing of one senior manager. This may be less critical as the lean movement in HE at large grows in momentum.

**Management buy-in** – An action-orientated approach can be challenging to the culture of some parts of an organisation. Therefore in the lead up to an RIE it is critical to ensure that the leadership of the relevant areas have been able to scope the activity in a way they are comfortable with.

**Relationships** – In all our work, and in particular in facilitating an RIE, personal style and relationships is key. The ability of the Lean Team to build constructive interpersonal relationships has been consistently identified in RIE Team feedback as key in the most constructive activity undertaken.

**Developmental focus** – Where staff felt they were under-performing or otherwise lacking, or believed that others thought so, there existed a prejudice that we were offering a remedial service. We worked hard to ensure this perception did not grow, as we found such contexts made innovation difficult.

**Ownership** – We have found it vital to ensure that ownership of processes remains with the staff running those processes. The Lean Team cannot take on the role of University process owner. It is for the staff in the work area to take ownership of their process and apply the lean tools and techniques they were exposed to during the RIE in order that continuous improvement can take place. Instilling ownership can be a challenge since staff may be used to following their managers rather than they themselves taking charge.

**Non-blaming approach** – The importance of this cannot be emphasised strongly enough, as a prerequisite of allowing people the space to experiment in order to improve.

**Solution providing** – In leading improvement we often found ourselves observing the real difficulties front line staff have in moving towards improvement, and in using their knowledge of processes to develop workable solutions. In these situations there was an enormous emotional pull to provide a solution. We found that solution giving by us reduced the capacity of the involved staff members to develop. We observed that in the discovery of their own ideas individuals found the greatest learning, biggest rewards, and often most innovative solutions.

**Lean yourself** – The Model, in accord with lean thinking, is subject to continuous improvement. We have, for example, after acknowledging that implementation of an ideal future state may take some time, introduced an interim future state. Using this interim step allows the RIE Team to see improvements with a minimum of delay. Granted, it would be preferable to implement the ideal process as identified in each RIE immediately, but this is possible in very few instances. With an interim step, staff see work immediately improved and this helps in delivering the full solution in a shorter timeframe.

**Action** – ‘Doing something’ and providing an environment in which others can take action is vital in ensuring project deliverables can be met. Often we found staff were seemingly incapacitated by an inability to step outside of their comfort zones and to either ask for assistance or to challenge the status quo.

**Action learning** – Learning how to facilitate an RIE is not a classroom exercise. There is no substitute for learning on the job. Staff new to the Lean Team begin by observing experienced team members facilitate an RIE, and then over time, have increasing input until they themselves have reached the stage where they are in a position to teach.

**Perseverance** – lean takes time and not everyone, particularly those in middle management positions, can immediately see the benefits of respect for people and continuous improvement.

## 8. Conclusion

It is easy to understand the key elements of lean: it is much more difficult to lead a lean initiative in a higher education institution, and even more difficult to ensure your HEI lean initiative survives and prospers. If you have a simple process others can understand, and if you learn from your experiences and sincerely have a respect for people and a genuine enthusiasm for continuous improvement then your lean journey will be a happy one, if not always smooth.

Finally, we hope we have provided some structure and some advice that can practically assist you in your lean journey. We have found, over time, that by continuously improving our eight-step process it continues to work for the University. It may work for your institution, but, most importantly, please do not try to imitate the St Andrews Model without amending what has worked well for us to suit the context of your own, undoubtedly unique, organisation.

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