Introduction to Lean Thinking

As described in Chapter 11 on process re-design, Womack, Jones and Roos first introduced the concept of Lean Manufacturing in 1990 by describing an approach to quality and operational management that had been adopted by the Japanese car industry, led primarily by Toyota. They were in fact describing an approach that, although inspired by Henry Ford’s production line at the River Rouge Model-T Ford assembly plant, had evolved continuously from the 1950s through into the 1980s, but which had been consolidated at Toyota into an organised “system”, the so-called Toyota Production System, or TPS. The pioneers that laid the foundations for this were Taiichi Ohno, who became an Executive Vice President in 1975, and his consultant and advisor Dr Shigeo Shingo. Whereas Ohno’s career remained with Toyota, Shingo went on to successfully introduce these concepts to many other industries, not only in Japan, but also in the US and in Europe.

The fact that other industries adopted the concept of “lean” early on in its development is important. Womack’s book was based on research that specifically focused on the automotive industry but the concepts and most of the tools used were not only transferred and adapted across other manufacturing industries as lean manufacturing (Womack and Jones 1994, 1996), but have also become established practices as part of the evolving nature of what has continued as Total Quality Management.

The evolving nature of the lean approach is an important issue as the practices usually needed tailoring to the specific context of the organisations adopting them. Over recent times many industries have discovered that the concepts and practices embodied in lean are indeed
transferable and adaptable, for example to the service environment. There has also developed much interest in the applicability of lean in the public sector, and a number of those organisations have already adopted lean initiatives with varying degrees of success.

With this background in mind, it is worthwhile considering a few “myths” about lean (table 15.1).
<table>
<thead>
<tr>
<th>Myth</th>
<th>Fact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lean is a manufacturing concept</td>
<td>Lean is a concept that applies to every organisational setting</td>
</tr>
<tr>
<td>Lean tools and techniques are not transferable and/or are not relevant to the public sector</td>
<td>Every organisation, whether in manufacturing, service or public sector has its own unique context and therefore some tools and techniques will not transfer well – however, had “lean” started in the public sector, the private sector would have found that not all the tools and techniques worked for them either. There has always been a need for sector and even organisation specific tools and techniques.</td>
</tr>
<tr>
<td>Lean is about cutting back on people resource</td>
<td>Lean is about eliminating non value-adding waste, not laying off employees</td>
</tr>
<tr>
<td>Lean is another management fad</td>
<td>The concepts and practices of lean have been in operation since (at least) the 1950s and are still with us</td>
</tr>
<tr>
<td>Lean is resource hungry to implement</td>
<td>Lean is most successful when the skills and knowledge required are embedded in the organisation</td>
</tr>
<tr>
<td>Lean is expensive to implement</td>
<td>Lean potentially saves far more than it costs to implement</td>
</tr>
</tbody>
</table>
There are four key issues that come out of this:

1. **Lean is transferable**

   The fundamental concept behind lean is that of stripping out non-value adding activity so that an organisation can truly focus on delivering what its customers actually want. In other words, it is not a good idea to expend our far from limitless resources on things that do not achieve what we are trying to deliver.

   This tenet holds true for the private sector because it aims to reduce operating costs but not at the expense of diminishing customer requirements or value. The overriding goal may be profit maximisation, but that is all about increasing the efficiency of how resources are utilised in order to provide something customers want, in order to provide future “business”. In the public sector, this relates to getting more for less. In other words, delivery capability increases whilst internal costs come down. Whichever the sector, effort should be focussed on delivering what is needed whilst reducing effort expended on what is not.

   Specific “lean” tools/practices that work in manufacturing may not work so well in other sectors but one would expect this. It is not the tools that are the issue as these can be adapted and/or developed to suit a specific organisational context – many already have. It is very easy to look at specific practices (often given as manufacturing examples) and dismiss them as “not appropriate” to another context. Even as service and public sector lean examples start to emerge, the response can still be the same – “yes, but I couldn’t do this – it wouldn’t work in my organisation”.

   The key lean principal is removing non-value adding activities so the challenge is about developing (or adapting) tools that will work, just as the pioneers of lean thinking did within their own context of the automotive industry.
2. **Lean does not necessarily mean losing people**

Language and words used in organisations are very powerful and therefore important. The simplest things that are taken for granted on a day to day basis within one context can become powerful symbols and cause divisions in ideology in others.

“Lean” can become a powerful word in a particular context and it may not necessarily communicate the intentions of the people who collectively developed the lean thinking. This was about freeing up resources to get on with the important things and delivering value add, rather than – say – reducing headcount. The pioneers of “lean” thinking were trying to reduce the time people spent on non-value adding activities so they could focus more on what would add value. It has become an empowering philosophy in many ‘lean organisations, including those hit with hard financial pressures, that they have built their capability by reducing waste.

3. **Lean is not just a fashionable idea that will go away eventually**

The concept of lean has been with us at least since the Japanese took on board these principals in manufacturing. Many years on we are still discussing it, so it is probably not a fad, although terms and emphases may come and go. What is certainly true is that these concepts, tools, techniques and philosophies have grown, adapted and evolved over time and have delivered sometimes quite breathtaking efficiency gains for those who have embraced them properly, even in the most unlikely environments.

If the aim is to adapt, or even transform the way we deliver products and services, including in the public sector, and to deliver more for less, whilst developing and maintaining our focus on the customer or citizen and meeting the goals and
objectives of other stakeholders, then “lean” thinking will help us by ensuring that we have the internal capability required.

4. Implementing lean is an investment

It is very rare to find examples where significant change has not had a concomitant cost and there are generally major resource issues when impacting any significant change. Lean is about reducing waste and cost – it is about doing more for less – so what really needs to be considered here is the fact that lean provides an opportunity to measure savings and actively demonstrate the savings made. Clearly, any cost of change can be set against the cost savings of the change.

It is worth noting however that in the manufacturing sector, the aim of introducing these techniques was to reduce cost whilst at the same time not losing value added to the customer. As these techniques are adapted to different situations, this aspect of delivering a quantifiable benefit to both customers and the organisation could potentially be lost. It is therefore critical that this aspect is not lost in any translation.

Lean and Six-Sigma

Six-Sigma was an improvement approach pioneered by Motorola and subsequently GE (see Chapter 14). It has its roots in the work of the early “TQM gurus” such as Deming, Shewhart and Ishikawa, who emphasised the need to understand and control variation in processes to improve the management of quality. Although six-sigma is geared more to reducing process variation, and as such has again been criticised for its manufacturing bias, it has nevertheless been found to be of enormous benefit in other sectors, especially where there are transactional processes. There has also been a lot of interest and indeed success in combining
the two approaches of Lean and Six-Sigma into “Lean Six-Sigma” or “Lean Sigma” programmes, where the lean element addresses waste and lead times and the six-sigma element addresses process variation (figure 15.1).

**Figure 15.1: Lean Six-Sigma**

This combined view produces a more holistic approach and provides a broader set of improvement tools and techniques. However, it has been argued that many service and public sector processes are not transactional in nature and attempts to reduce variation may actually be counterproductive, if not impossible to achieve. It therefore becomes easy for people to dismiss the approach as not being relevant to these sectors, whereas many of the elements contained within the overall approach are very relevant indeed. There is a need to understand how this thinking can be adapted and tailored to the specific context and needs of any specific organisation.

**Approaches to Lean Interventions**

As we have seen, Lean is not new and has been around as an improvement approach since Ohno and Shingo first introduced the concept in relation to the Toyota Production System. Many of these ideas have also been described in other documented approaches to
improvement, including TQM, and a number of authors and practitioners have started to distinguish between lean in manufacturing, in lean services and lean in public services, etc. In principle there are many similarities between these approaches.

Having described lean manufacturing in “The Machine that Changed the World” in 1990, Womack and Jones continued to develop their ideas and in their follow-up book “Lean Thinking”, published in 1996, they identified five key principles to guide an organisation’s implementation of lean:

1. Provide the Value actually desired by customers;
2. Identify the Value Stream for each product;
3. Line up the remaining steps in a Continuous Flow;
4. Let the customer Pull value from the firm;
5. Endlessly search for Perfection.

The emphasis placed on lean was that of understanding the “core value-adding processes” and the stripping out all non-value adding activity from these. To ensure that these then run smoothly, all supplying and support processes need to be designed and run to deliver as a continuous flow so that, as activity is pulled through the system by customer demand, things get done only when they are required to be done, so eliminating waste activity, unnecessary inventory and time delays.

If this was the basic concept of lean, a number of tools and techniques were developed in order to enable this including, for example, Just In Time supply (supplying only what is needed, when it is needed), Kanban systems (ensuring a constant supply of materials, but only as needed) and Poke-Yoke (mistake proofing). Although many of the tools in the “lean tool-kit” come from a manufacturing origin, the principles behind them are applicable to any delivery process, including in the services and public sectors.
The concept of the Value Stream is fundamental to lean. In many manufacturing industries, this can be seen as an internal core process of value-adding activity that ultimately delivers a value proposition (in the form of a product) to the customer. Customers very rarely get involved in the delivery of that product, be it a car or a computer (figure 15.2).

**Figure 15.2: Value Stream 1**

However, in services, as in many support processes in manufacturing, the customer does interact at various “touch-points” along the value delivery chain (figure 15.3).

**Figure 15.3: Value Stream 2**

In “Lean Solutions”, Womack and Jones expanded their approach again to give a more thorough view of the customer, stressing the need to understand “consumption”, as in the customer’s demand requirements, and “provision”, in terms of the organisation’s capability to deliver these requirements.
They advocated the need for a 9-step approach (table 15.2).

**Table 15.2: Womack and Jones’ 9-Step Approach**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Learning to see <strong>Consumption</strong></td>
</tr>
<tr>
<td>2</td>
<td>Learning to see <strong>Provision</strong></td>
</tr>
<tr>
<td>3</td>
<td>Solve my Problem <strong>Completely</strong></td>
</tr>
<tr>
<td>4</td>
<td>Don't Waste my <strong>Time</strong></td>
</tr>
<tr>
<td>5</td>
<td>Get me Exactly <strong>What I Want</strong></td>
</tr>
<tr>
<td>6</td>
<td>Provide Value <strong>Where I Want</strong></td>
</tr>
<tr>
<td>7</td>
<td>Solve my Problem <strong>When I Want</strong></td>
</tr>
<tr>
<td>8</td>
<td>Get me the Solution I <strong>Really Want</strong></td>
</tr>
<tr>
<td>9</td>
<td>Solve my <strong>Complete</strong> Problem <strong>Permanently</strong></td>
</tr>
</tbody>
</table>

In terms of tools and techniques, the primary methodology presented was the Value-Stream Map, to identify materials and information flows and understand how and where value was created (and destroyed/wasted).

In this approach, lean is seen as a transformational with three critical success factors:

- Leadership;
- Process Understanding and Process Thinking;
- Understanding both Lean Consumption and Lean Provision.

Fundamental to the approach was the concept of providing what the customer **actually wants** through the application of a lean approach, i.e.:

- Identifying the value stream providing the value and removing all wasted steps;
- Putting the remaining steps into continuous flow;
- So the consumer can pull value from the system;
- While pursuing perfection.
Whereas six-sigma programmes have always been geared towards achieving significant cost savings by measuring their impact on the “bottom line,” lean has tended to focus more on the concepts of customer value and elimination of waste, rather than ROI. Bringing the two approaches together brings more of a focus on the need to prioritise projects for the impact they will have in terms of cost reduction.

The six-sigma methodology popularised by Motorolla (in manufacturing) and then GE Capital (in services) has become the standard for six-sigma improvement processes and many advocate using the same approach for lean six-sigma interventions. This five phase framework is known as DMAIC: Define Measure, Analyse, Improve, and Control.

Whereas Womack and Jones did not get into specific tools and techniques other than value-stream mapping, others have adopted more pragmatic approaches and suggested specific tools and techniques that are applicable in each of the five phases. The adapted the DMAIC framework to show the tools and techniques applicable to lean, as opposed to six-sigma, is shown in figure 15.4.

**Figure 15.4: DMAIC and the Lean Toolkit**

Although DMAIC has substantial acceptance as a six-sigma and lean six-sigma methodology, there are some who struggle with its use as a purely lean approach, especially in service and public sector environments, although there are similarities with the Deming Plan, Do, Check, Act (PDCA) cycle.
Value Stream Mapping

Value stream mapping (VSM) studies the set of specific actions required to bring a product family from raw material to finished goods as per customer demand, concentrating on information management and physical transformation tasks.

The outputs of a VSM based study are a current state map, future state map and implementation plan for getting from the current to the future state. Using VSM it should be possible to bring the lead time closer and closer to the actual value added processing time by attacking the identified bottlenecks and constraints. Bottlenecks addressed could include long setup times, unreliable equipment, unacceptable first pass yield, or high work or process inventories.

The VSM technique has been central to the approach advocated by Womack and Jones from their original work with Toyota, and is still the mainstay of lean interventions. The principle is to describe the current process, looking at both physical and materials flows and information flows, in a highly visual format and to apply measures to each process step to identify the time taken and the cost involved. By also identifying which activities add value and which do not, it is possible to analyse the process from a value creating perspective and determine the potential gains from eliminating non-value adding activity.

Whilst this fits well with the Define phase of DMAIC, Value Stream Mapping (VSM) is also used in the generation of a Target Operating Model (TOM), and should come after analysis and investigative work to identify what can be done to reduce non-value adding activities. Figure 15.5 shows a Value Stream Map from a manufacturing context where the original time taken has been identified and then altered to show what has been made possible by through understanding what can be changed.
In this example, the time taken for information to get from the customer to the manufacturer prior to the start of manufacture was 66 days and amounted to 1360 minutes of actual process time. Manufacturing time took 21 days (1075 minutes actual process time).

**Figure 15.5: Value Stream Map (example 1)**

By identifying these timings and then challenging how much of that time was actually spent adding value and what was not, it was possible to reduce the total lead time from 87 (66 + 21) days to 20 (15 +5) – a saving of 67 days throughput time. Although this is from a manufacturing environment, the overall process (in terms of process steps and flow) is very similar to many service processes in that much of the non-value added time is spent “in transit” waiting for things to be done – often on administrative tasks.

VSM has been used successfully in the health sector in reducing patient wait times, where process delays are often due to a non-alignment of the process steps – in the language of the
Womack and Jones’ model they are not arranged in “continuous flow” and therefore are not adding value and in fact are increasing waste and cost.

Although there are some standardised approaches to VSM, there are also different approaches in operation. Figure 15.6 shows a Value Stream Map for Out-Patient Heart Failure Services at a hospital. The map takes the form of a horizontal timeline showing the sequential process steps, but also plotted on a vertical axis showing the cost of value-adding activity (above the timeline) and the cost of non-value-adding activity (below the timeline). The addition of staff costs provides a powerful diagnostic tool by which to address how non-value adding activities might be eliminated.
Although VSM would appear to be a simplistic tool/technique, it is important that how the various activities make up the process is understood. In complex service environments there may be some apparent non-value adding steps that are essential to another process that are in some way linked to the process being investigated. It is important that these dependencies are understood and it is therefore essential that Value Stream Maps are not created by individuals but by teams of people working in the process who know what is going on and can challenge each others’ perspectives. Lean should be a cross-functional, team-based approach. A development of VSM by the author and his colleagues is ‘Carbon Stream Mapping’ (CSM) in which processes are studied to identify carbon emission at various stages; Figure 15.7 is an example of a CSM.

Figure 15.7: Carbon Stream Mapping (CSM) example (NEW – see also ppt file)
Process Families

The manufacturing based example in Figure 15.5 may share similarities with some service processes, at least in part. In all organisations there are processes that, whilst at first sight may seem to have nothing in common, when they are broken down into their component steps they actually pass through the same stages, often worked on by the same departments and/or people. When different processes share the same process structure, they can be described as being in the same ‘process family.’

This is important from a VSM perspective, because working on a process family rather than a single process often yields far more information about the value adding and non-value adding steps across the family of processes. As long as the needs of each individual process are taken into account, and one process does not suffer as a result of changes to the “family,” it is possible to leverage the gains by applying them to a broader set of activities.

Figure 15.7: Carbon Stream Mapping (CSM) example
Value Stream Scopes (end-to-end processes - field to fork)

When Hammer and Champy brought Business Process Reengineering to the world’s attention in 1993, they highlighted the fact that major gains can be made in process improvement by looking at processes from an “end-to-end” perspective. This principle applies equally to VSM and lean. Value streams build up in the connection of the different activities that stem from initial “provision” to final “consumption” (using the language of Womack and Jones).

If we think of the food that we eat, this is the end result of a value stream that ultimately begins with animals and/or plants in a field (figure 15.8). The series of sequential steps that lead ultimately to that birthday cake or Chicken Tikka Massalla comprise an end-to-end value chain. Of course we could take it further still, but the bigger the scope of the Value Stream, the greater the potential for real gains.

Figure 15.8: Field to Fork

Scoping the value stream is a key decision in VSM as it will directly dictate the levels of improvement that are possible.
An insurance company was trying to take time out of its new business process in order to compete with internet-based competitors, as they could not turn around insurance proposals as quickly. Their information systems started tracking times on receipt of the proposals and finished when the documentation was sent to print. They scoped the intervention around their information systems, as anything outside was in theory not measurable. Whilst trying to save minutes on internal processes, nobody was looking at the days lost in the print room, in transit, proposals sat on the desks of brokers, etc (figure 15.9).

**Figure 15.9: Scoping the Value Stream**

**Four Steps for VSM**

Value Stream Mapping is a powerful technique that is at the heart of a lean approach. As a visual imaging tool, it allows the visualisation of other concepts, such as understanding what the customer sees as value and how that value is created by the internal processes of provision. It allows a quantification of that value in terms of time and cost and allows an understanding of the concept of continuous flow as compared to bottlenecks and constraints that add to time and cost and destroy or lessen customer value. If we add to this the concept of customer touch-points – identifying where the customer interacts with the elements within the value stream, which is so important in the service context – we can more clearly understand the concepts of customer value.

By looking at current methodologies of VSM it possible to discern a four step process (figure 15.10):
The Building Blocks of Lean

It is beyond the scope of this chapter to describe all the individual tools and techniques that comprise lean. VSM is undoubtedly central to a lean approach in that it is the primary visualisation technique for understanding how value is created (or destroyed) on the “provision” side of the value stream.

Although the literature, and indeed practice, includes tools and techniques such as Just in Time, Kanban, Total Productive Maintenance (TPM), Cellular Production and Flow, etc (figure 15.11), many of these tools are specific to the workplace and some, for example TPM, may be less immediately applicable to the public sector. However these tools are designed to implement the required changes and whereas some are undoubtedly adaptable to service setting, new tools, more specific to a service environment will emerge as lean becomes more widespread in this environment.
Two other tools/techniques worth noting at this stage, however, are 5S and Kaizen.

**5S**

5S has been described as a system that creates a disciplined, clean and well-ordered work environment. Its original role in the manufacturing context was that of ensuring that work areas were free from clutter, clean and laid out in such a way that tools weren’t lost and time was not wasted on non-value adding activities to do with general house-keeping. The secret to this was contained in five simple steps:

1. **Sort**
   - The first step is to free up the workplace by getting rid of everything that is not required for the work – this reduces problems and decreases lead times.

2. **Set in Order**
   - What is left is then organised so that it is easily accessible and time is not lost looking for things that are misplaced.

3. **Shine**
   - This step relates to cleanliness and keeping things in good working order. Although this is easy to visualise in a shop floor manufacturing environment, the basic concepts can still apply in services.
4. **Standardise**

- In this step, the above three steps are standardised so that they become a routine part of day to day work. Management should create the time for allow resources for people to perform the first three steps.

5. **Sustain**

- The fifth and last step is about embedding the practice in business as usual by involving people at all levels, through peer and leadership behaviours, 5S audits, 5S goals and providing feedback on performance.

In the health sector in the UK, 5S has been successfully adapted to a “CANDO” approach:

- **C** = **Clean up** – sorting out necessary from unnecessary items for that area that are required to support flow of the service or product.

- **A** = **Arranging** – the ergonomics of the work area are looked at and the handling of tools or supplies to assess how they should be most effectively arranged and stored for ease of work and safe working practices.

- **N** = **Neatness** – this initially involves a large scale clean up and the establishment of standard practices for the organisation of items in the area, followed by a regular maintenance clean taking 5 – 10 minutes per shift.

- **D** = **Discipline** – the maintenance of the C, A, N stages and requires the team in that area to maintain compliance to the set agreed standards for the workplace. This discipline is supported by an auditing process to sustain and improve workplace organisation performance.

- **O** = **Ongoing improvement** – once CANDO has initially been carried out the team are then encouraged to continue to make improvements that will assist them in operating in the most efficient manner with high levels of safety.

5S is a way of engaging everyone in the organisation in lean activities and does present an opportunity for tying into a cultural approach in which individuals take personal responsibility for their own workplace and their attitudes to how they work.

Some authors have noted that in the final step of this approach, sustain (or ongoing improvement) another approach is often useful – **Kaizen**.
The Role of Kaizen

The word Kaizen comes from the Japanese: Kai (meaning change or action toward) and Zen (the good or better) – see also chapter 17. It is heavily associated with the Toyota Production System (TPS) and is therefore inevitably associated with the lean approach. Although the word has generally become associated with a philosophy of continuous improvement, it is also associated with concept of rapid, short term improvement activity – the Kaizen “Blitz”.

In a Kaizen blitz, typically a cross-functional, multi-level team of 6 to 12 members is brought together to focus on solving a specific work problem (i.e. not a factory or organisation wide process), and is characterised by a typical 3-5 day time period. The aim is to focus on achieving a rapid, breakthrough result by rapidly developing, testing and refining solutions to leave a new process in place. It is not about planning, but about doing, and keeping things simple. Although the team needs to be trained in Kaizen before the project, tools are kept very simple and few in number. Budgets are typically low but savings can be substantial and achieved very quickly. If a process owner exists, he or she usually takes responsibility and provides leadership, but the core team members are from the area being tackled – the actual people who do the real work.

The Key Principles of Kaizen Blitz are:

- Being open minded;
- Maintaining a positive attitude;
- Rejecting excuses and seeking solutions;
- Taking action – not seeking perfection, but implementing now with the resources at hand;
- Using all the team’s knowledge;
- Disregarding rank – everyone is equal.
It is interesting to note that VSM is typically a three day activity and it is not surprising that the two elements are often seen as being complementary parts of a lean intervention.

The Kaizen method has been successfully implemented in many service environments and there are many case studies documented. In general, however, it is possible to identify a generalised 10 step approach (table 15.3).

Table 15.3: A 10 Step Service Kaizen Methodology

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Define the Problem</td>
</tr>
<tr>
<td>2</td>
<td>Define the Goal</td>
</tr>
<tr>
<td>3</td>
<td>Define the Baseline</td>
</tr>
<tr>
<td>4</td>
<td>Define the Process</td>
</tr>
<tr>
<td>5</td>
<td>Explore Possible Sources of Variation</td>
</tr>
<tr>
<td>6</td>
<td>Identify Corrective Actions to Eliminate Waste</td>
</tr>
<tr>
<td>7</td>
<td>Develop an Action Plan to Take Action</td>
</tr>
<tr>
<td>8</td>
<td>Review Results</td>
</tr>
<tr>
<td>9</td>
<td>Replicate and Make Additional Improvements</td>
</tr>
<tr>
<td>10</td>
<td>Celebrate</td>
</tr>
</tbody>
</table>

**DRIVER: a Context-Dependant Process View of Lean (see also chapter 13)**

Many organisations make mistakes in implementing lean because they focus on specific tools and techniques that are not well adapted to their organisational setting. When this happens, not only does the lean initiative fail to deliver what was expected, but this becomes another example of “how lean does not work in our environment”. However, those organisations that have succeeded in implementing lean approaches have done so by adapting or developing approaches based on the underlying principles of lean, i.e. by focusing on what the customer sees as being of value, and then identifying activities that do not add value and taking steps to eliminate them.
Organisations that have repeatedly delivered major sustainable benefits from lean implementations have tended to follow a structured approach to improvement that has focused on what will work for them in their context, rather than trying to follow a set “recipe book” based on specific tools and techniques. By adopting a pragmatic approach it becomes possible to tailor specific tools and interventions from the vast armory that is available to deliver what is required within that specific organisational setting.

The importance of a pragmatic approach (rather than slavishly following a theoretical model) needs to be emphasised, and it is possible to discern from the evidence available a pattern in terms of what approach an organisation could follow to ensure that they consider the main concepts underpinning lean without being tied to specific tools and techniques that will not work well in their context.

Organisations that take this path to lean implementation tend to focus on six key phases (table 15.5) – see also chapter 13.

**Table 15.4: Driver - a Six Phase Approach to Lean**

<table>
<thead>
<tr>
<th></th>
<th>Define</th>
<th>Define the scope of the improvement project in terms of citizen, government and organisational goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Review</td>
<td>Map the current process and measure its performance to understand how it adds value and when it doesn’t</td>
</tr>
<tr>
<td>3</td>
<td>Investigate</td>
<td>Analyse the gap between current and desired performance identifying problems and prioritising opportunities</td>
</tr>
<tr>
<td>4</td>
<td>Verify</td>
<td>Generate and validate improvement solutions to realise the opportunities</td>
</tr>
<tr>
<td>5</td>
<td>Execute</td>
<td>Implement the improved process to sustain performance improvement</td>
</tr>
<tr>
<td>6</td>
<td>Reinforce</td>
<td>Learn the lessons and continuously improve</td>
</tr>
</tbody>
</table>

**DRIVER** (figure 15.12) has been successfully used in many private and public sector organisations as an improvement methodology and is tried and tested. It is clear that this approach embraces the concepts of lean whilst allowing sufficient flexibility for the detailed
tools and techniques that could and should be used. It is therefore presented as a pragmatic improvement approach for lean interventions.

**Figure 15.12: DRIVER: a Pragmatic Improvement Approach**
Define

At the start of any lean intervention, it is important to go through a number of key steps. The goals of the project should be articulated in terms of desired outcomes, and these should ideally be expressed in terms of the requirements of relevant stakeholders. For any one project the individual stakeholders may vary. For public sector organisations, for example, one would expect them to include at the least citizen, government and organisational stakeholders.

Stakeholder requirements also include two specific inputs to the lean intervention:

- The voice of the customer, in terms of what value means to the customer;
- The voice of the business, in terms of driving out non-value adding activities from the value stream so as to reduce time and waste and thereby cost.

The complex multiple-stakeholder perspective in many organisations means that gaining a clear understanding of the value proposition for all stakeholders will be challenging but requirements tend to be easier to articulate when expressed in terms of value.

Other approaches have highlighted the need to identify first the process that the lean intervention will be conducted on and then to understand the process family within which it sits – in other words, what other processes exist within the organisation that have the same underlying series of steps and activities. The process family perspective allows multiple gains to be made by leveraging the benefits of any solution across a number of different processes.

The scope of the process is critical to the outcomes and it must be very clear from the outset what is in scope and what is out of scope. As a general guideline one should always scope
the process at its largest and then work down to what is feasible and achievable. It is important to look at end-to-end processes (field to fork) if possible to avoid the dangers of scoping at a too low a level and thereby missing the most critical areas for removal of non-value adding activity.

Other key considerations at this stage include project management, team membership, governance at the intervention level, establishing performance metrics related to stakeholder requirements, communications strategies, and a direct, visible and clearly articulated link between this lean intervention and the vision and values of the organisation.

**Review**

The Review phase sees a description and analysis of the current state (“as-is”). At this stage, it is appropriate to start to build the Value Stream Map, based on the team’s knowledge of the process. Clearly team involvement is crucial to get a realistic and meaningful view of “reality” and, as the view is built, it may need to be checked and refined. Measures need to collected and mapped onto the process steps to identify time and costs.

It is important that Voice of the Business and Voice of the Customer data continue to be developed during this phase and as the view is built up, as this will challenge the current state analysis. The author and his colleagues have found in service environments, where the customer has direct contact within the value stream, it is important to identify these customer “touch-points” and, likewise, understand the value propositions that exist at each touch-point. It is also highly likely that supporting processes will be identified as impacting on the value stream and these will need to be explored to provide the cause and effect analysis that will take place in the next phase.
Investigate

Once the current state picture has been built and metrics have been added to the Value Stream Map to provide a clear view of the time taken for each process step and the costs incurred to deliver both value adding and non-value adding activities, we move into the “Investigate” phase. The aim in this phase is to find ways by which we can reduce the time taken and reduce non-value adding costs whilst still delivering the value add to customers and even increasing it, if required. This phase requires an in-depth challenging of the status quo and any assumptions that might be present in order to generate possible solutions to eliminate non-value adding activity and “dead time” when nothing is actually being done.

If the customer interacts with the process, touch-points need to be explored in detail to understand what is adding value, what is not adding value and what is actually destroying value in the customer’s eyes.

Any other processes interacting with this process, such as supplying process, will also need to be investigated for impacts and mapped as appropriate. Similarly, any processes that the process under investigation impacts upon should also be identified, as any changes made could have effects elsewhere in the “system”.

This phase is really about understanding where and how changes might be made and what the effects of those changes will be. A range of possible solutions may be developed and all possibilities should be considered in order to generate potential “future states”.

Verify

The investigation comes to an end when all possibilities have been explored and further ideas are exhausted. We now need to decide on the solutions that will be implemented by verifying
the impacts of the various ideas and determining which are the most appropriate for the specific context we are in.

In multiple stakeholder environments, we need to be sure of the impact of any changes on different stakeholder groups and some of the ideas generated previously may need to be modified or even discarded if they present problems to key stakeholder groups. It is also important to ensure that the proposed solutions fit with the organisation’s strategy and values.

The aim of this phase is to generate the definitive “future state” map that will then be implemented, and in doing so, there may be substantial testing and retesting of assumptions. In some cases there may be a need for pilot studies to test the feasibility of some of the proposed changes. The proposed “future state” process design then should generate confidence it can be successfully implemented and will deliver the potential gains identified.

**Execute**

Once the new process has been determined the changes will need to be implemented, which requires a robust change management plan. Implementing new ways of working is always a challenge and there are a number of documented methodologies specifically relating to this – see Figure of 8 framework in chapter 9. Implementation needs to be tailored to the organisation’s culture and specific requirements and is usually best carried out as a “phased” approach.

Senior management commitment to the proposed changes is critical, as is a broader buy-in from key stakeholders. Staff affected by the changes also need to be on board with the proposed changes and, therefore, it is essential that confidence that the required results can and will be achieved by the changes is established at all levels and with all constituencies
involved. Clearly excellence two-way communications will be an essential component of the implementation.

The implementation will require appropriate documentation to be developed. Training requirements will need to be determined and appropriate interventions developed and delivered. These will undoubtedly include training staff in lean tools and techniques and, if consultants have been involved, a full skills transfer programme should be in place, including mentoring and coaching as appropriate. If a pilot has not been conducted in the Verify stage, it is advisable to establish a “safe test” facility before full roll out.

Some lean tools described originally by Ohno and now part of the lean “toolkit” also now play a key role. For example, mistake proofing systems can be built in and tools identified in the Investigate and Verify phases now need to be implemented along with the new process.

Reinforce

Having made changes that will create a better value proposition for both the organisation and its customers (and other stakeholders), it is important that the changes are held and that the process does not “slip back” to its previous state. It is here that the concepts of Kaizen as a continuous improvement philosophy come in. Techniques such as 5S can considerably impact the culture of the organisation, and people should be encouraged to “think lean” in their everyday operations.

Whereas initial capability should have been built in the Execute phase, there will be a need for ongoing capability development to ensure that knowledge is not lost. Many successful lean initiatives have included processes for communicating learning points and establishing communities of lean “champions” and/or “practitioners,” who are skilled and knowledgeable
in lean, and take a lead in continuing lean interventions. The development of ‘Lean Academies’ is also popular in some industries.

Ongoing communication of successes is a good way of ensuring that the initial momentum and key messages are not lost, as is building in an appropriate reward and recognition system to ensure that positive lean behaviours are encouraged.

Companies and organisations that succeeded in establishing an ongoing commitment to lean have embedded the thinking in the day to day culture and have ensured that there is a direct link between lean initiatives and the organisational strategy and performance measurement framework.

Figure 15.13 shows a summary of the DRIVER framework for lean.

**Figure 15.13: DRIVER: a Six Phase Approach to Lean**

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<th>Phase 2: Review</th>
<th>Phase 3: Investigate</th>
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<td>Challenge Status Quo</td>
<td>Assess Impact &amp; Implications of Potential Future States</td>
<td>Establish Senior Management &amp; Stakeholder Buy-in &amp; Commitment</td>
<td>Continuous Improvement Philosophy</td>
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<td>Strategic Alignment</td>
<td>Value Stream Mapping (Inc. measures)</td>
<td>Identify Non-Value Adding Activity</td>
<td>Identify Different Scenarios for Stakeholder Impacts</td>
<td>Develop &amp; Implement Implementation Plan</td>
<td>Develop &amp; Sustain ongoing Capability</td>
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<tr>
<td>Stakeholder Requirements</td>
<td>Customer Value Proposition</td>
<td>Identify Value-Destroying Activity at Customer Touch-points</td>
<td>Assess Alignment of Potential Future States with Strategy &amp; Values</td>
<td>Develop &amp; Implement Communications Plan</td>
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Chapter Highlights

Introduction to Lean Thinking

- Womack, Jones and Roos first introduced the concept of Lean Manufacturing by describing an approach that had been adopted by the Japanese car industry, led primarily by Toyota – the so-called Toyota Production System.
- The evolving nature of the lean approach means that the practices need tailoring to the specific context of the organisations adopting them; many industries and sectors have discovered that lean concepts and practices are transferable and adaptable, including to the public sector.
- There are certain myths and facts about lean which lead to four issues to consider: lean is transferable, lean does not necessarily mean loosing people, lean is not a fashionable idea that will go away eventually, and lean is an investment.

Lean and Six Sigma

- There has been a lot of interest and success in combining the two approaches of Lean and Six-Sigma into “Lean Six-Sigma” or “Lean Sigma” programmes, where the lean element addresses waste and lead times and the six-sigma element addresses process variation and quality; this combined view produces a holistic approach and provides a broad set of improvement tools and techniques.
Approaches to Lean Interventions

• Womack and Jones identified five key principles to guide an organisation’s implementation of lean: provide the Value actually desired by customers; identify the Value Stream for each product; line up the remaining steps in a Continuous Flow; let the customer Pull value from the firm; endlessly search for Perfection.

• The emphasis placed on lean is that of understanding the “core value-adding processes” and the stripping out all non-value adding activity; all supplying and support processes need to be designed and run to deliver as a continuous flow so that, as activity is pulled through the system by customer demand, things get done only when they are required to be done, so eliminating waste activity, unnecessary inventory and time delays.

Value Stream Mapping

• Value stream mapping (VSM) studies the set of specific actions required to bring a product family from raw material to finished goods, as per customer demand, concentrating on information management and physical transformation tasks.

• The outputs of a VSM based study are a current state map, future state map and implementation plan for getting from the current to the future state.

• A development of VSM by the author and his colleagues is ‘Carbon Stream Mapping’ (CSM) in which processes are studied to identify carbon emission at various stages.
In all organisations there are processes that, when broken down into the component steps, actually pass through the same stages, often worked on by the same departments and/or people; when different processes share the same process structure, they can be described as being in the same ‘process family.’

**The building blocks of Lean**

The building blocks of lean include tools and techniques such as Just in Time, Kanban, Total Productive Maintenance (TPM), Cellular Production and Flow, Poka-Yoke and 5S (CANDO in health sector); these are designed to implement the required change; no doubt new tools more specific to service environments will emerge as lean becomes more widespread in its application.

**DRIVER: a Context-Dependant Process View of Lean of Lean**

Organisations that have succeeded in implementing lean approaches have done so by adapting or developing approaches based on the underlying principles of lean, i.e. by focusing on what the customer sees as being of value, and then identifying activities that do not add value and taking steps to eliminate them.

The ‘DRIVER’ improvement methodology has been successfully tried and tested in many private and public sector organisations. It is clear that the DRIVER approach embraces the concepts of lean whilst allowing sufficient flexibility for the detailed tools and techniques that could and should be used; it is therefore presented as a pragmatic improvement approach for lean interventions.