

Highways Agency Lean Maturity Assessment Toolkit

(HALMAT)



Version 2 (published 2012)

HALMAT The Highways Agency Lean Maturity Assessment Toolkit

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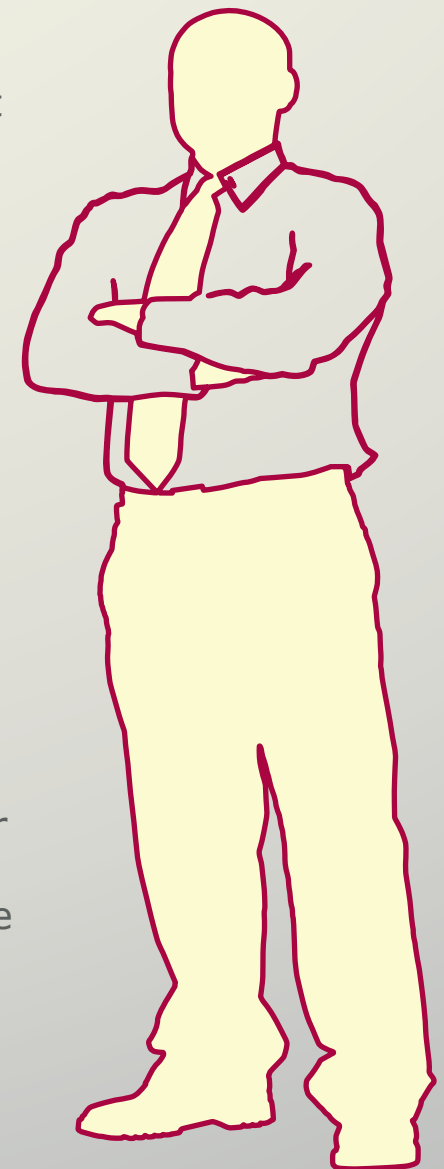
1. Background and procedure for completing a self assessment
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Version 2.0 Summary of changes from v1.0

General Changes between v1.0 and v2.0

The following general changes have been made between HALMAT v1.0 and v2.0:

1. The order of the sections has been changed to create better moderation flow and supply chain focus. Sections 1-4 now cover strategy, section 5 covers structure and behaviour, and sections 6-10 cover implementation.
2. Each section now has a series of bullet points to remind the user what the overall direction of the questions within is. This is meant to act as an aide memoire during the moderation process.
3. Each section now has a preamble which clarifies any potentially contentions and/or confusing points. This was deemed necessary due to the specifics of some accepted Lean language in contrast to the meaning of words in the construction industry generally.
4. Each HALMAT section is now subject to a 'weighting' on its score which will be advised by the Highways Agency Lean Division based upon the strategic direction of the Lean deployment required from the Highways Agency supply chain. These weightings will be used to calculate an overall weighted score for the organisation's Lean maturity which will be reported alongside the un-weighted score. The purpose of this change to increase the supply chain's focus on the strategic areas of Lean deployment.

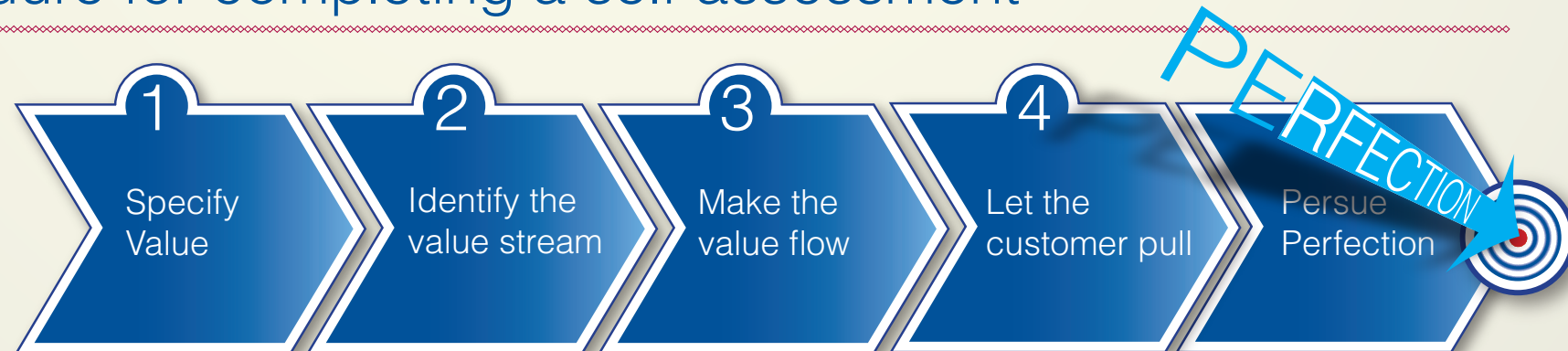


Specific Question Changes between v1.0 and v2.0

v2.0	v1.0	Question changes	Level changes	Reasons
1.1	1.1	No changes in emphasis, wording has been augmented	No changes in emphasis, wording has been augmented at all levels	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
1.2	1.3	Change in emphasis, wording has been augmented	Levels have been extensively re-written and augmented	Original Question overlapped with training questions and did not provide enough guidance as to how to achieve increased maturity
1.3	1.2	No changes in emphasis, wording has been augmented	No changes in emphasis, wording has been augmented at levels 2-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
2.1	10.1	Link to business performance has been made clearer	Link to business performance has been made clearer, wording has been augmented at levels 2-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
2.2	10.2	No change	Minor semantic and clarification changes	Clarity of question purpose
2.3	10.5	Supply chain now "correct size and demographic" rather than "small enough"	Minor semantic and clarification changes	Creates greater freedom to develop Lean supply chain relevant to organisational operation
3.1	2.1	No change	No changes in emphasis, wording has been augmented at levels 2-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
4.1	10.3	Clarification that the question is specifically about 'Lean skills'	No changes in emphasis, wording has been augmented at levels 2-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
4.2	10.4	No change	No changes in emphasis, wording has been augmented at levels 2-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
5.1	4.1	No change	No changes in emphasis, wording has been augmented at levels 3-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
5.2	4.2	The phrase 'risk taking' has been replaced with 'initiative taking' for innovation	No changes in emphasis, wording has been augmented at level 4	The word 'risk' has different connotations for different types of organisation and may have contractual meanin
6.1	8.1 and 8.2	The two HALMAT v1.0 questions have been merged	All levels for the two HALMAT v1.0 questions have been merged	Too great an amount of overlap between the meaning and evidence to warrant two separate questions
7.1	3.1	Link to business performance has been made clearer	Link to business performance has been made clearer, wording has been augmented at levels 1-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
8.1	6.1 and 6.2	The phrase "where appropriate" has been added; the two HALMAT v1.0 questions have been merged	All levels for the two HALMAT v1.0 questions have been merged	Too great an amount of overlap between the meaning and evidence to warrant two separate questions
9.1	5.1, 5.2 and 5.3	The three HALMAT v1.0 questions have been merged	All levels for the three HALMAT v1.0 questions have been merged	Too great an amount of overlap between the meaning and evidence to warrant three separate questions
10.1	7.1	No change	No changes in emphasis, wording has been augmented at levels 2-4	Augmentation to provide increased guidance to the supply chain as to what is required to enhance Lean adoption and benefits
10.2	7.2	No change	Minor semantic changes	N/A
10.3	7.3	The phrase "considered in initial design" has been added	Minor semantic changes	Makes it clear that mistake proofing must be considered back at the service/product design stage
10.4	9.1 and 9.2	The two HALMAT v1.0 questions have been merged. Wording has been changes to "equipment you rely upon"	All levels for the two HALMAT v1.0 questions have been merged. Reference to planned maintenance and data capture in levels 1 and 2 have been swapped	Too great an amount of overlap between the meaning and evidence to warrant two separate questions. Question now does not allow the "don't own equipment" argument. The level 1/2 swap is in response to supplier comments that planned maintenance is more common than data driven maintenance

1.0 Background and procedure for completing a self assessment

The aim of the toolkit is to help organisations in the Highways Agency's supply chain to determine the extent to which they have transformed themselves to adopt Lean principles in line with the Agency.



These instructions contain

1. A brief guide to Lean for those organisations not familiar with the term.
2. A glossary of terms used in discussing Lean
3. A procedure for completing the assessment form.

What is Lean?

Lean is a word used in an attempt to characterise the approach to manufacturing developed by the Toyota Motor Company in the 1950's, to enable the company to compete with the Western automotive industry with far fewer resources. At its heart it is a method of producing what a customer or client wants when he or she wants it with a minimum of waste and to a high level of quality. It was first applied to the automotive manufacturing environment but due to its success its principles are now being applied in many fields from construction

to health care. It is not a strategy but a powerful tool to help a company improve its performance. A great advantage of the Lean approach is that, with a little help, people at all levels can contribute and find ways to work smarter rather than harder.

The principles of Lean and the series of steps for their application are summarised below.

- 1. Value.** This element can only be specified by the customer or client
- 2. The value stream.** The core actions required to produce a product or project or service.
- 3. Flow.** The method of aligning the process in order to facilitate the critical path.
- 4. Pull.** Customer or clients should be able to pull the product or project or service on an as needed basis
- 5. Perfection.** Develop and amend the process continuously in pursuit of perfection.

"Lean Thinking" Womack and Jones"

The focus of these principles is on analysing processes in terms of customer or client value and eliminating waste. This is done by mapping processes and analysing them rigorously to determine what is value adding and what is not on the basis that value is defined as something a supplier considers a customer or client, internal or external, is prepared to pay for. The rest is waste and processes are redesigned to try and eliminate this. In practice the analysis of processes normally show three categories "Added Value", "Non Added Value but Essential" and "Non Added Value" (or "Waste").

In Lean applications, the HA identifies eight types of waste:

- Transportation.
- Inventory (Stock) excess.
- Motion excess.
- Waiting time.
- Over production or construction.
- Over processing and extra process steps.
- Defects or rejects.
- Skills misapplication.

1.0 Background and procedure for completing a self assessment

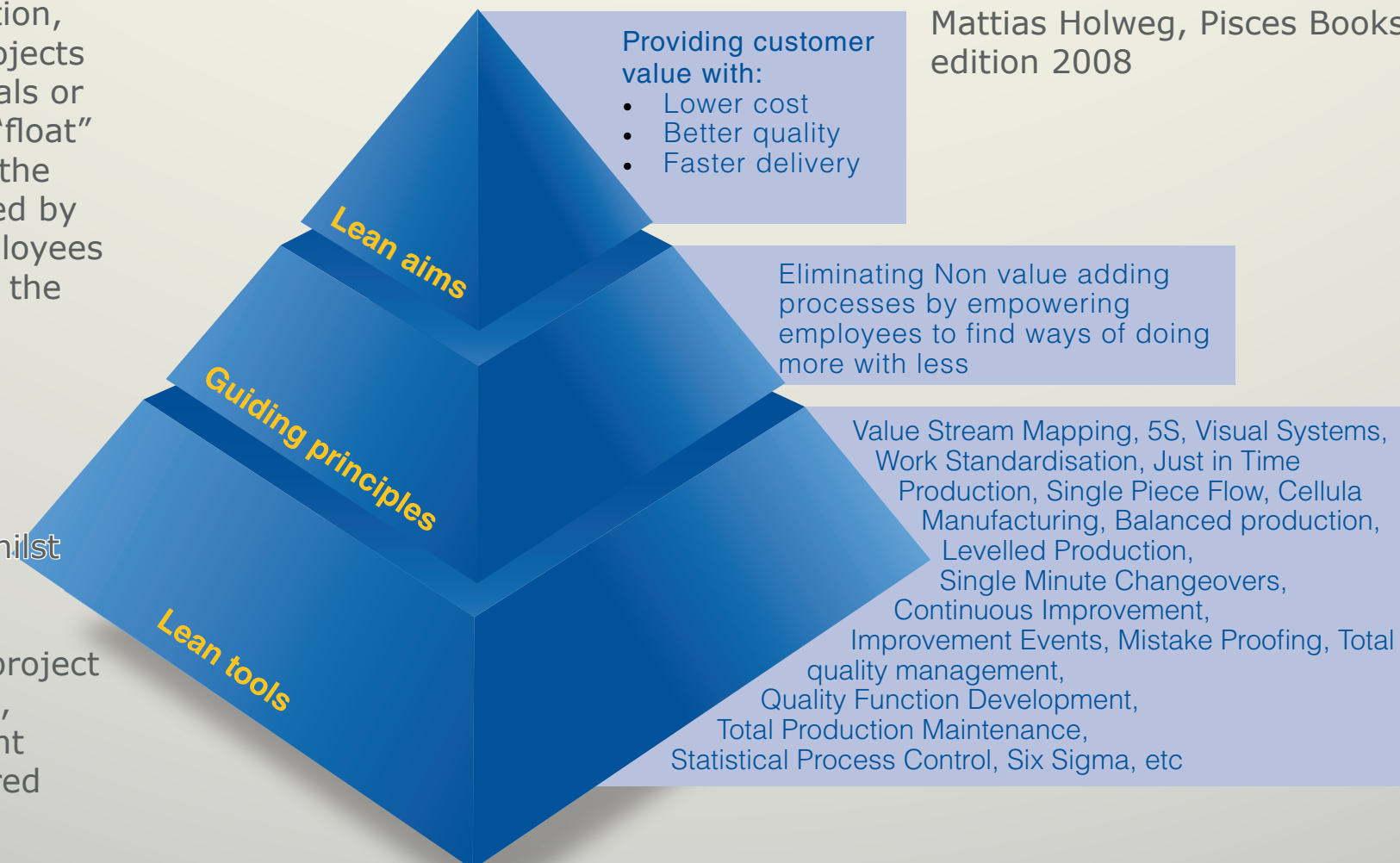
The aim is to minimise these wastes and develop new processes to maximise the added value. The definition of these wastes will vary depending on the type of process being analysed. For example, when manufacturing doors it will be obvious if more are being produced than is being demanded. However, in planning a project going through several iterations to ensure the best plan may look like over production or over construction but in fact reviewing the plans several times may well result in a better plan and therefore adding value. In addition, inventory (stock) in construction projects could be physical things e.g. materials or equipment etc. or could equally be "float" time in a programme. In summary, the aims of Lean are simple and achieved by maximising the capability of all employees using a range of tools depending on the process being investigated.

Successful implementation of Lean thinking has shown very significant results, improvements in excess of 25% in the areas of time, cost and quality often being demonstrated whilst improving employee satisfaction. In construction these tools will not be effective unless a sound system of project management is in place. In addition, there must be employee engagement created and a change culture nurtured and encouraged for success.

Lean transformation is the process by which organisations take these Lean principles and progressively, through a planned programme, ensure they are adopted to provide a more competitive capability.

A simple summary of these principles and some of the tools by which they can be applied is shown below. There are many books on Lean, for an initial understanding the following may be useful:

- **"Lean Thinking"** - James P Womack and Daniel T Jones, Simon and Schuster, initial publication 1996.
- **"Learning to See"** - Mike Rother and John Shook, the Lean Enterprise Institute, 2000
- **"The Lean Toolbox"** - John Bicheno and Mattias Holweg, Pisces Books 4th edition 2008



2. Assessment tool

The purpose of using the assessment tool is to provide an organisation with a structured means of assessing where it is in terms of implementing a Lean culture in its organisation. In following the procedure therefore it is advisable that people involved give frank and open contribution.

Some interpretation of the validity of evidence presented is inevitable and therefore using this tool will require organisations to have access to at least one person who has knowledge of the principles and practices of Lean. In addition, it is unlikely that Lean intervention evidence over five years old will be acceptable, unless there is further evidence of continual review and/or knowledge transfer from the intervention more recently.

For any particular sub-section the degree of maturity possible or desirable will vary depending on the organisation's position in the supply chain and the type of work being carried out. As an example, question 7.3 examines the degree to which mistake proofing is incorporated in processes. Whilst organisations striving to apply Lean principles would expect that this opportunity should be considered for all processes, the opportunity to do so is likely to be greater in offsite manufacturing parts of the supply chain compared to the construction site itself. Thus achievement of a level 4 on this issue may be unlikely if not impossible

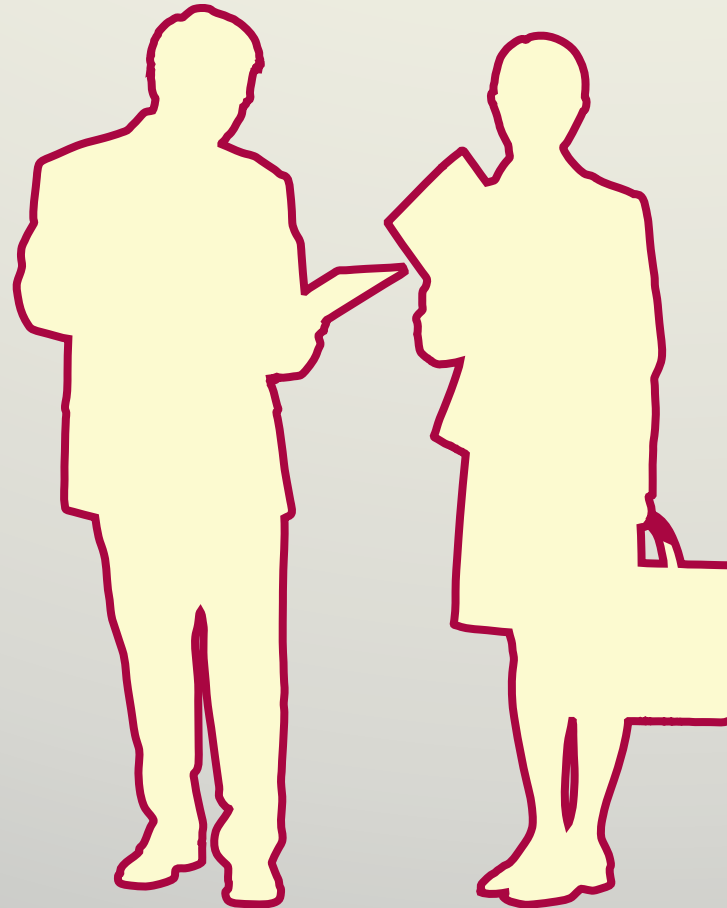
on a construction site; for an organisation making construction furniture a level 4 may well be a feasible objective.

The process itself is fairly straightforward and will require more or fewer man days to complete depending on the complexity and size of the organisation being assessed. The basic process is for individual group members of the assessment team carry out their own assessment and then as a group agree a consensus score. It is normal for there to be islands of excellence in most organisations; however this does not mean that the whole organisation is at that level. It is important therefore when

assessing the organisation that each level be considered as a gateway. In other words that an organisation must have passed the criteria for the gateway in all functions to gain the whole score.

Progress between whole scores may be demonstrated through scoring to one decimal place. For example, if the organisation possesses all of the criteria necessary for a score of '1' against one element, and is currently implementing some of the processes or behaviours necessary for a score of '2'; it may demonstrate this by scoring at quarter points between 1 and 2, depending upon where the organisation suggests it is on the progress between '1' and '2'.

The objective of the process is to highlight where actions need to be taken to improve and use this information to help drive the Lean adoption process. This process would normally be completed annually to monitor progress a suggested improvement plan template is included in section 6.



2. Assessment Tool

Taking a step by step route to completion therefore it is recommended that the following steps are used (to be read in conjunction with the Guidance Notes for Moderators and Assessors):

Step 1 – Decide on the boundary of the assessment i.e. a whole organisation, a particular division of an organisation or a specific department.

Step 2 – Appoint a facilitator. This should be a person who has sufficient knowledge of Lean principles to be able to provide guidance on interpretation. The facilitator should not be the head of the organisation being assessed as this could potentially influence the responses.

Step 3 – Select a group of people who can represent the key functions in the organisation being assessed.

Step 4 – Have an initial meeting (Allow 2 hours) to:

- Ensure that the assessment tool is understood and how to use it.
- Confirm the boundaries for assessment are clearly understood.
- Agree the timetable for completion and collation of individual scores.
- Set a date for the assessment meeting.

Step 5 – Individuals fill in the assessment tool gathering any data or evidence to support their view. This normally requires 5-7 working days.

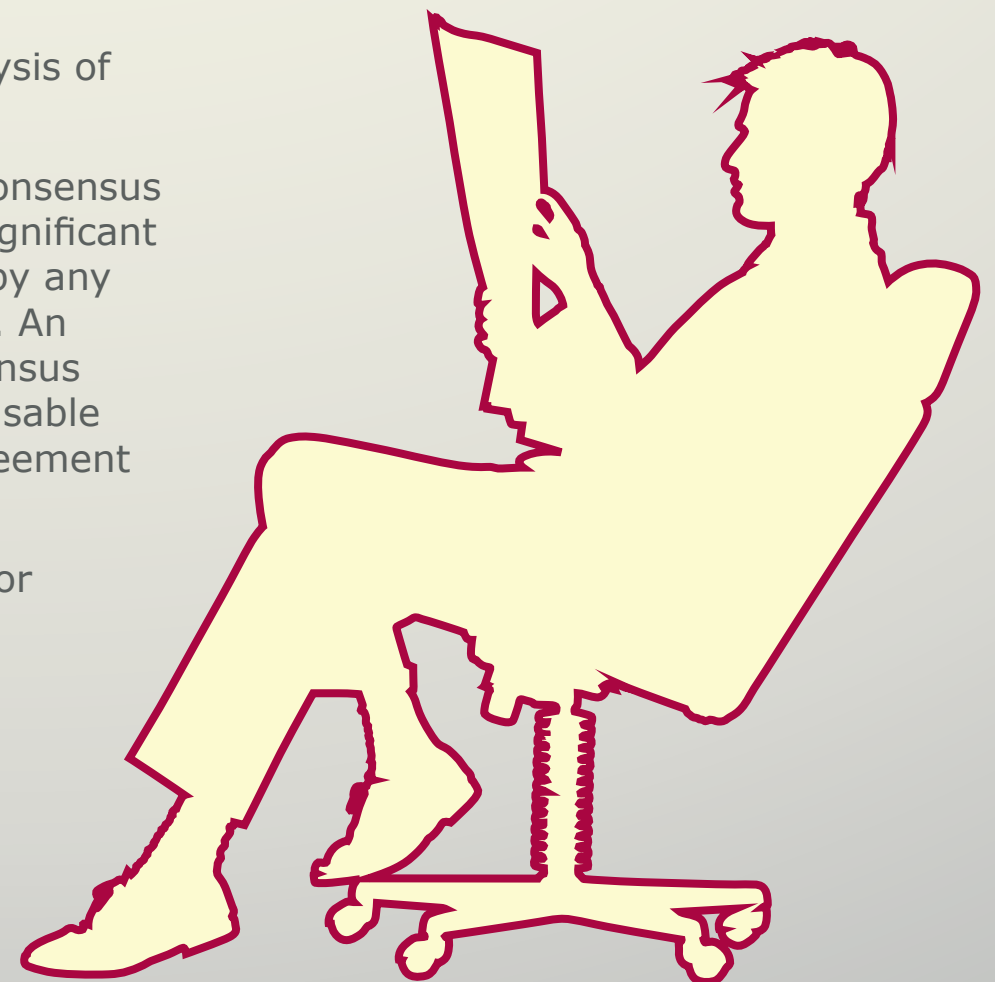
Step 6 – Facilitator collates results identifying areas where there is strong agreement and areas of wide disparity. (An Excel tool (HALMAT scoring spreadsheet) has been developed to automate the handling of this data)

Step 7 – Carry out assessment meeting to agree consensus (Allow 4-8 hours depending on organisation size and complexity)

The facilitator will provide an analysis of the results.

For each sub area the degree of consensus will be shown and discussion on significant differences of opinion, supported by any evidence gathered by participants. An agreement as to the overall consensus level will then be sought. It is advisable to tackle the areas of large disagreement first.

Step 8 – Facilitator collates scores for review and arranges date for next assessment.



3. The Highways Agency Lean Maturity and Assessment Toolkit

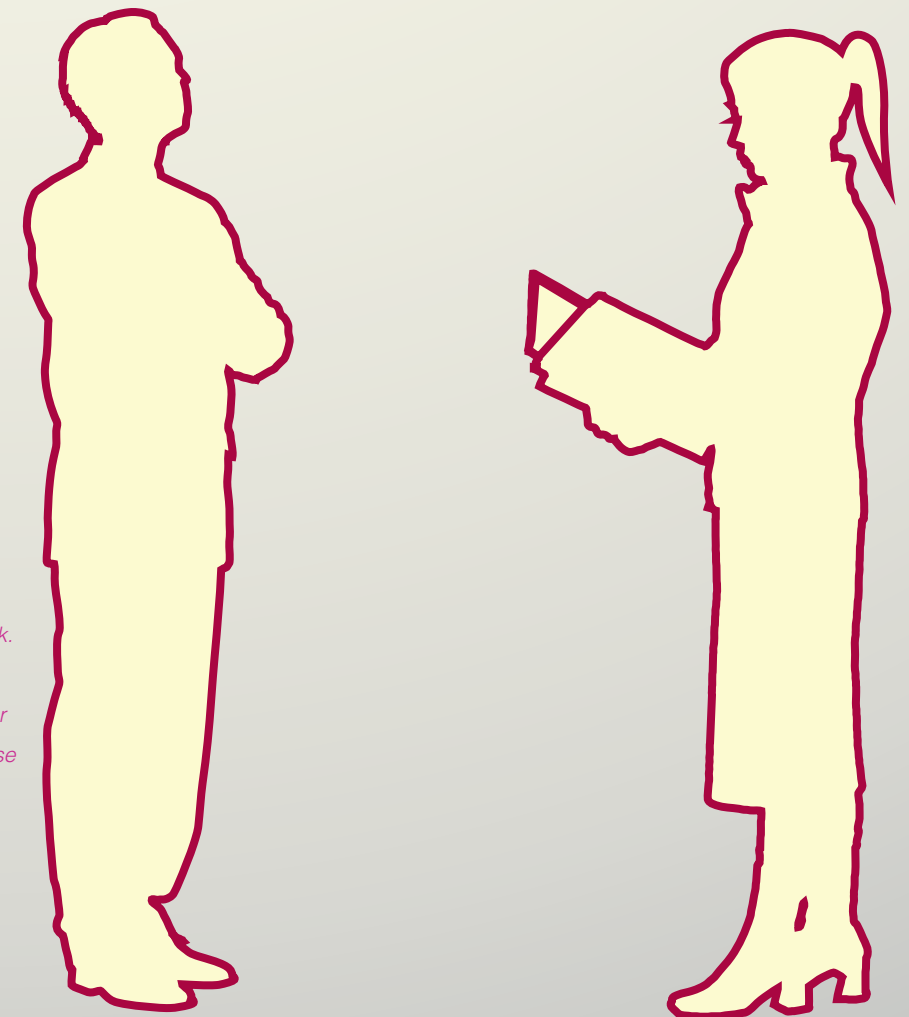
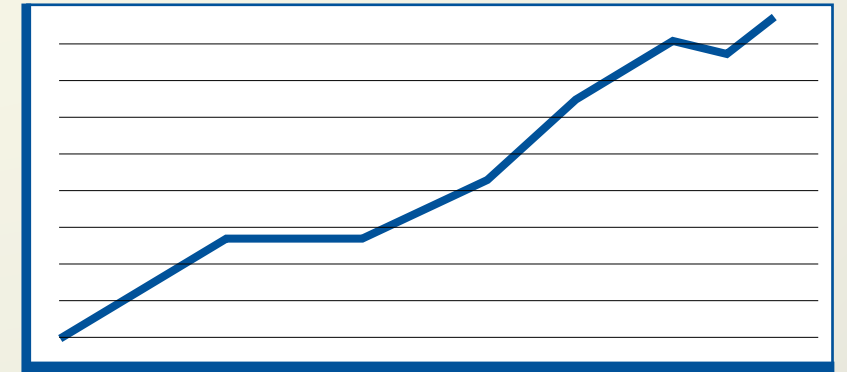
It is the aim of the Highways Agency to encourage their supply chain to adopt Lean principles to help foster a culture of continuous improvement for mutual advantage.

The purpose of this Lean Toolkit is to assist in this process. It has two main aims:

- To enable organisations to assess for themselves, using a series of exam questions, where their organisation, or the part of it which provides products and services to the Highways Agency, stands in terms of Lean implementation. It is based on a maturity matrix approach previously used in the Agency's Capability Assessment Toolkit (CAT3) together with adaptation from the Lean Enterprise Self Assessment Tool developed in 2001* towards a Lean transformation.
- To provide a structured method for the Highways Agency to carry out moderation of self assessments. This will also identify best practice in the application of Lean principles within their supply chain.

The tool has been designed for use across the Highways Agency's supply chain, covering the top tier companies and a wide range of different activities from design, consultancy, construction, production, maintenance, etc. In addition, it is meant to cover varying organisational formats from individual plc/ltd companies to joint ventures and partnerships. Thus, the applicability of all the toolkit's sections will vary as will the level of maturity required to meet the Highways Agency's needs. Nevertheless in most cases each section will have some relevance.

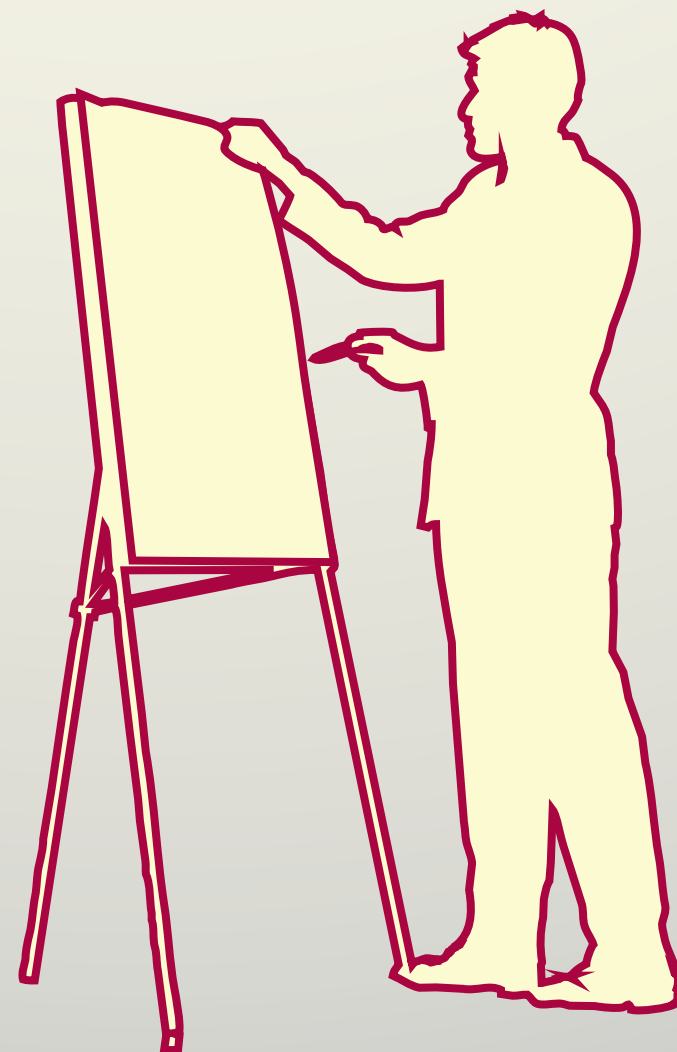
**Elements of the final development tool, HALMAT (Highways Agency Lean Maturity Assessment Toolkit) were derived from a currently published tool methodology called LESAT (Lean Enterprise Self Assessment Tool). The LESAT tool was developed and is copyright to the Massachusetts Institute of Technology and the University of Warwick. For the avoidance of doubt over the copyright and intellectual Property Rights of any element of HALMAT from LESAT, The University is keen for the HALMAT tool to be used by the Highways Agency to publish and use freely, as delivered, without fee or licence.*



The Assessment Toolkit

Areas of coverage of the assessment toolkit

1. Strategic use of lean
2. Financial, information, and procurement systems
3. Lean leadership
4. People development
5. Lean structure and behaviour
6. Collaborative working
7. Delivery of value
8. Standard work
9. Process flow
10. Process control and quality assurance



1.0 Strategic use of lean

- **Lean business strategy and plans**

- **Lean approach deployment**

- **Determining customer value**



The purpose of this section is to identify to what extent organisations incorporate Lean principles in their strategic and planning processes and the extent to which they ensure they are meeting customer expectations. It should be noted that for the purposes of this question, the term 'customer' takes the accepted

Lean definition that a customer is any process or body which receives output from a process under your operation. Therefore when considering maturity in this area, both the Highways Agency as customer AND other receivers of process output (such as site receiving design information) should be considered and evidenced.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
1.1 Is the delivery of business improvement through Lean performance management principles integrated as part of the formal strategic plans of the business?	Lean is not considered to be appropriate for achieving business performance improvement within the type of work delivered by the business. Improvement activities are uncommon.	Lean is recognised as appropriate for lower levels in the organisation, as a means of achieving improvement for physical processes. Improvement activities are common, but are fragmented.	The potential benefits of widespread use of Lean are recognised and understood by the senior management team. Implementation plans are in place and available but do not have objective links to formal performance measures or commercial targets within the business plan.	The deployment of Lean is incorporated as an integral part of the strategy for the business and its supply chain management. Strategic deployment and improvement plans are formally managed and are reviewed at senior level. Benefits achieved from Lean, in both operational and commercial terms, are included in business and strategic plans.	Strategic and business plans include clear operational and commercial targets to be realised through Lean activity to achieve growth, profitability and market position. Strategic business measures and targets cascaded down through the organisation and supply chain using a suitable policy deployment system. The majority of improvement activities are derived from analysis of the gap between current and target performance and are delivered using a disciplined Lean approach.
Indicative evidence	Implementation of Lean or other business improvement systems is included explicitly in the organisation's business and strategic plans. The necessary performance improvement gains from Lean 'management' are factored into business and strategic plans. Lean improvement activities are prioritised from opportunities identified from gap analysis of current and 'strategically' planned performance needs. Lean initiatives are co-ordinated and tracked with results "rolled up" and accounted against organisation wide milestones and targets.				

1.0 Strategic use of lean

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
1.2 Does your organisation demonstrate a long term commitment to adopting the deployment of an effective Lean performance improvement approach?	Little evidence exists of a formal approach to business performance improvement or the training of staff in Lean methodologies. Engagement in the HA HALMAT system is the organisation's only Lean deployment activity.	The organisation has endorsed a business improvement approach but its methodology is not clearly defined and deployment is inconsistent. Employees are encouraged to contribute and participate in improvement efforts but activities inconsistent and sustainability poor. Training in Lean implemented mainly in operational areas.	A business improvement approach with a clear operating methodology has been adopted and formalised within the business management and quality systems. Training has been provided to all staff in the use of the approach and the main improvement tool and techniques which it uses. All employee job role statements and performance reviews include the requirement for performance improvement contribution.	All teams throughout the organisation now operate an effective suite of Quality Cost and Delivery (QCD) performance measures and local targets. The improvement approach is used by each team as the means of delivering the local performance targets. Training plans are derived from performance improvement needs. Performance measures and targets used in supply chain management and HALMAT used tactically to facilitate improvement in supplier Lean capabilities.	All teams throughout the supply chain now operate a disciplined, effective Quality Cost and Delivery (QCD) performance management system to secure delivery of local performance targets and understand how their targets relate to the top level business aspirations. The improvement approach is used by each team with a clear, analytical focus on closing the gap to targets using a disciplined "Check-Plan-Do" cycle. Training plans are derived directly from performance improvement needs. HALMAT used with then followed up with support to achieve adoption of an effective improvement approach.
Indicative evidence	Strategic business improvement approach deployed and demonstrating year-on-year output measure improvements linked to corporate targets. Evidence of development of job role statements, appraisal systems and PDP systems to embed the requirement for individual contribution. Long term strategic Lean training plan in place linked to business improvement approach deployment and achievement needs. Evidence of prioritised statistical process data analysis where gap exists to target and that it has been put to use in business improvement. Full and detailed supply chain management system in place incorporating supply chain business performance improvement mechanism.				
1.3 Does your organisation employ a formal process for determining customer value?	The method of identifying what the customer considers to be value is unstructured and informal.	There is a structured process for defining value applied to selected customers. Measures are in place to evaluate performance in the delivery of customer value.	There is a well defined process for identifying how the organisation can best contribute to customer success. This process has clear links to the business strategy and is incorporated into most projects or programmes.	The definition of the customer value is well understood and is a major influence on the future direction of the business and strategic plans. Business level performance measures and targets reflect this. Key supply chain members now have a formal process in this area.	Competitiveness enhanced as customer value drivers become a significant driving force throughout the supply chain. Policy deployment system ensures that all local area and supplier performance measures and targets reflect the influence customer value has on business direction.
Indicative evidence	Organisation employs a formal process for determining customer value in measurable terms and setting appropriate improvement targets. A formal process exists to measure and assess customer satisfaction with process outputs. The organisation understands what constitutes success for the customers of its processes and sets strategic business targets which reflect this. Delivery of improved customer value evident throughout the organisation and its supply chain via policy deployment of appropriate targets.				

2.0 Financial, information, and procurement systems

- *Financial measurement systems*

- *Collaborative information systems*

- *Purchasing policy*



This section is aimed at evaluating the degree to which the key support processes (not in the direct work stream of delivery) are supporting the adoption of Lean principles.

(Other sections such as process standardisation are also applicable to these supporting processes).

The use of the term 'information' within this question refers to any and all information which the organisation would normally transmit within and without its boundaries to support the provision of service to the end customer.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
2.1 To what extent are Lean improvements supported by the company's financial measurement system and linked to the business' overall financial performance?	Finance system provides basic balance sheet and cost accounting data. Lagging information is reported through scheduled standardised reports. Specific requests for measures require extraordinary effort.	Initial efforts are underway to adapt or modify systems. Finance actively provides traditional financial information to assist users in planning Lean improvements.	Finance system is able to provide data and financial information to support and enable Lean activities at any level. Users are able to directly access and use financial information to make trade-off decisions or demonstrate the financial impact of completed projects.	Financial system scope is expanded to integrate financial and non-financial benefits of Lean improvements. Users are able to pull financial and other value creation information to support Lean decision analysis and estimate Lean impact upon bottom line financial performance and account for achievements delivered.	Financial systems provide seamless information exchange across the supply chain, with emphasis on value creation for all stakeholders. Users across the supply chain generate and share timely financial and performance data. Improvement trends in bottom line financial performance can be clearly linked by cause-and-effect to Lean activity.
Indicative evidence	Financial measures that strategically encourage Lean activity are used to proactively drive and then measure business progress and performance. The financial system enables a balanced set of financial and non-financial measures to assist decision-making and forecasting. The financial system has been overhauled to ensure fast and efficient processing of information as required and is accessible to users as needed. Work breakdown structure allowing consistent and timely capture of business costs and the reporting of financial benefits achieved by improvements.				

2.0 Financial, information, and procurement systems

- *Financial measurement systems*

- *Collaborative information systems*

- *Purchasing policy*

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
2.2 Are the information systems compatible with stakeholder communications and analysis needs?	The information infrastructure consists mainly of stand-alone systems. The need for systems integration is recognised but no improvement plan exists.	Elements of a common information infrastructure have been determined, and an implementation plan is under development. Maintenance of legacy systems consumes most IT resources.	The information infrastructure has been formalised and is in use in selected locations. Legacy systems are rationalised and aligned across the value streams.	An information infrastructure is deployed that supports seamless information exchange across the enterprise. Supply chain also required to achieve this same level of information exchange.	Information systems are fully interoperable and the pertinent information is easily accessible and usable across the extended supply chain (beyond the confines of any accepted JV/alliance environments).
Indicative evidence	<p>Compatible information systems and tools exist across the organisation.</p> <p>Information systems facilitate fast and effective transfer and retrieval of information required.</p> <p>Information systems and tools complement Lean processes and practices and are easily adapted to accommodate change.</p> <p>Information systems provide measures of operational performance, lean activity and improvement effectiveness.</p>				
2.3 Does the purchasing policy encourage developing a supply chain of the correct size and demographic to be effectively managed and participate in cooperative relationships to enhance value?	Large number of direct suppliers in a hierarchical structure. Supplier relationships are at arm's length and adversarial based on lowest bid contracts.	The supplier base has been rationalised to focus on key suppliers. Formal processes are in place for supplier assessment and approval. Long-term purchase agreements focus on cost reduction.	Supplier network is defined based on strategic analysis of value creation processes and key suppliers identified. Common objectives, roles and responsibilities are established and communicated.	Strategic outsourcing and make-buy decisions focus on achieving an optimal combination of core competencies and performance. Strategic alliances with key suppliers emphasise a high degree of information-sharing, risk-sharing and benefit sharing.	Supplier network is defined, developed and integrated to ensure efficient creation of value for enterprise stakeholders over the entire product/project lifecycle building durable competitive advantage. For some key specialist suppliers a differentiated set of strategies and practices are in place.
Indicative evidence	<p>The supplier network is defined between strategic and other providers enabling development to ensure efficient creation of value.</p> <p>Formal processes are in place for supplier assessment and approval, objective and subjective performance feedback and Lean assessment.</p> <p>Roles and responsibilities are clearly defined in contractual relationships and risk and reward shares agreed upon.</p> <p>Supplier expertise and capabilities complement enterprise core competencies; unnecessary overlap and duplication has been removed.</p> <p>Formal, recorded processes and/or training courses are in place for up-skilling change agents in the supply chain</p>				

3.0 Lean leadership

- Leaders encouraging and championing a Lean culture



The purpose of this section is to indicate to what degree organisation leaders are active in encouraging and mentoring Lean introduction.

LeanAdoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
3.1 Do all senior leaders and management within the organisation enthusiastically embrace the concept of Lean and support a transformation to a Lean culture?	Level of commitment among senior leaders and management is variable – some endorse while others may actively resist. Lean training completed by management team is inconsistent.	All senior leaders and management are committed to implementing Lean principles. All managers have completed some formal Lean training. Lean forms an element of the Personal Objectives for senior managers.	Senior leaders and management are championing the transformation to Lean within the organisation. Formal training has been completed for all leaders in managing to Lean principles. Lean forms an integral part of Personal Objectives and Personal Development Records for 'all' levels of management.	Senior leaders and management personally and visibly lead Lean transition. Adopting a Lean leadership philosophy is apparent at meetings at all levels organisation wide. Formal training has been completed for all leaders in managing to Lean principles. Senior management support of companies in the supply chain is evident. All leaders have personal objectives with measurable (QCD) targets and use Lean principles to lead their teams in their achievement.	Senior leaders and management mentor and foster Lean champions internally and throughout the supply chain. Senior managers have formal training in Lean Management principles and first line managers are formally trained in facilitating improvement projects. All leaders support and encourage the ongoing use of the company and supply chain's Lean approaches to achieving local (QCD) improvement targets.
Indicative evidence	Management provides leadership, support and recognition for positive actions. Senior management are champions in transforming the company and running projects. Formal, recorded training and education in Lean leadership principles and improvement tools apparent and available at all levels of management. Individuals are empowered and actively involved in improvement projects. Senior leaders actively communicate and demonstrate by example the company's expected Lean behaviours, and their benefits, to their teams				

4.0 People development

- *Training programmes*
- *Lean mentors*
- *Incentive systems*
- *Upskilling supply chain*



This section is aimed at evaluating the organisation’s commitment to providing its people with the necessary Lean skills, support, and motivation to support the organisation’s strategic Lean goals.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
4.1 Has the personnel department taken appropriate steps to ensure that suitable Lean skills are available within the organisation?	There is little coordination of education and training programmes to facilitate the development of a Lean capability and culture.	Education and training is made available covering basic Lean awareness and some operational improvement tools and techniques to support the organisation’s planned Lean projects.	Education and training programme has been designed and deployed covering Lean leadership, use of the company’s Lean Approach and the basic improvement tools and techniques to support the organisation’s strategy for Lean transformation.	Education and training at all levels, and in the supply chain, is periodically reviewed against the current gap between actual and target performance measures and developed to improve the alignment to, and effectiveness in, supporting the company’s business.	Education and training links directly to strategic plans with budgets and scope determined directly from business performance improvement needs. The programme also supports the upcoming needs of the supply chain Lean improvement plans.
Indicative evidence	Education and training programs are designed and managed to deliver the Lean capabilities required to achieve the business’s strategic plans. The application of Lean principles is learned in formal, recorded training and education is formally appraised and developed.				
4.2 Are resources and support made available to employees to contribute to Lean improvement?	Few resources are provided for process improvement or waste elimination. Some trained change agents within organisation but without authority.	Limited enterprise level resources are committed but often applied to the symptom rather than the root cause. Trained change agents are formally recognised and given reasonable authority.	Resources are allocated as required for execution of the Lean transformation plan and prioritised across the value stream. Experienced change agents are assigned to key areas.	A pool of earmarked resources is provided for Lean initiatives with minimal justification required. Change in teams is self generating and change agents support by request. Supply chain also required to achieve this same level resource availability.	Lean specialists used to deliver strategic, business level, Lean projects and tactically to assist teams where achievement of local performance improvement targets are not hitting plan. Change agents are the providers of Lean knowledge and skill for transformation of the supply chain.
Indicative evidence	Lean change agents with appropriate authority, operate throughout all areas and cross-transfer Lean implementation experience. Process for developing “Lean Black Belts” and other change agents has been established. Lean specialists / Change Agents responsive to strategic and local area improvement support demands. A formal process for ensuring time is made available to employees to carry out improvement work is in place and understood. The incentive systems are compatible with supporting Lean principles.				

5.0 Lean structure and behaviour

- *Lean culture promoted*
- *Employee empowerment and innovation*



This section is intended to test the degree to which companies have structured their organisations to maximise team working and employee empowerment

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
5.1 Has the organisation, its policies and processes been revised to promote, encourage and support Lean behaviour?	The organisation operates as functional or in the case of joint ventures inter-company silos. Relationships tend to be determined by organisational role.	Initial efforts are underway to identify functional / inter company barriers and understand their full implications.	Partially deployed cross-functional organisational processes are aligned with the organisation's processes.	Extensive cross-functional processes are implemented across the organisation. Mutual respect and trust exists across functions and cross company. Functional units now serve as knowledge centres for skill retention.	Cross-functional, process-based orientation is aligned across the supply chain. Team structure, skills and resource levels, processes, performance measures and targets derived directly from value stream requirements. Stakeholders modify behaviour to enhance supply chain performance and share benefits.
Indicative evidence	Functional / cross company barriers have been minimised. There is extensive use of cross-functional processes across the organisation. Integrated teams used for problem solving and projects. Career progression potential exists across both processes and functions. Commercial systems encourage and support Lean behaviour.				
5.2 Is prudent 'initiative taking' encouraged at all organisational levels to create value-adding innovation?	Centralised decision-making occurs in a hierarchical structure with limited delegation of authority. Innovation initiatives are sporadic and decision making is initiative averse.	Appropriate structure and training is being put in place to enable empowerment. Initial efforts are underway to develop systems, processes and procedures for fostering innovations.	The culture of the organisation and its management systems supports limited decision-making at point of application and need. Innovation initiatives are underway in selected areas; measures for assessing impact are in use.	Decision processes are continually refined to increase accountability and ownership at point of use. Process owners appointed to collect, review and agree process improvement achievements. Innovation initiatives are flourishing and safe, prudent initiative taking is encouraged and recognised.	Appropriate decision-making across the supply chain is delegated to the point of application. Process owners manage the risk, development and dissemination of best practice. Comprehensive innovation programme is implemented and positive results recognised across the supply chain.
Indicative evidence	Managers and supervisors serve as mentors and educators, promoting lower level decision-making. Respected Process Owners, chosen from user experts, safely manage process developments and dissemination of improvement achievements. The extent and types of empowerment are tailored to match the situation allowing effective decision-making closest to the point of use. Innovation is recognised, monitored and rewarded. Innovation is transferred across the business, and supply chain, in order to set new 'standards' from which further innovation is launched				

6.0 Collaborative working

- *Evaluating customer needs*
- *Integration of teams*
- *Simplified processes*
- *Early engagement of stakeholders*



The purpose of this section is to evaluate the extent to which the design of projects and the provision of services to construction or highway maintenance programmes is taking account of customer requirements, encouraging flow, reducing waiting time, inventory or buffer and life cycle costs. An example of upstream and downstream processes which should be well coordinated to deliver value with minimised waste would be project planning, design and construction. It should be noted that for the

purposes of this question, the term 'customer' takes the accepted Lean definition that a customer is any process or body which receives output from a process under your operation. The term 'execution' has been used in this question – this is used to mean the physical delivery of the final product of the overall system to the 'end customer' (likely the Highways Agency); be that a physical construction project, a product, a maintenance activity, or a service.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
6.1 Are the Planning / Design / Construction teams integrated, working to an understood process, operating concurrently to reduce project / cycle critical path lead time and encourage flow?	Customer inputs are captured only at the beginning of the development. Past performance not evaluated. Execution issues are considered late in planning/design with little or no concurrency.	Customer inputs are considered qualitatively through top-level liaison and occasional reviews with consideration of past performance. Execution issues are considered earlier in planning/design, but in an ad hoc manner. Supplier and cost considerations are limited.	Customers are formally represented on Integrated Product/project Teams (IPT) within the organisation and feedback mechanisms exist to facilitate timely design/planning iterations incorporating knowledge from past performance. Execution issues considered by multi-functional teams including upstream and some downstream disciplines and key suppliers.	The customers are actively involved with the IPT which will include key suppliers at multiple levels to jointly improve the effectiveness and quality of the product/project and process design. Priorities of customers are quantified as early as possible in design/planning, and used for process evaluation and improvement.	The customers are routinely involved with IPT across the supply chain with effective, continuous communication. Sharing of benefits is well established; value quantification and tradeoffs are a continuous and automatic part of the process. Customers' values in the supply chain are quantified, and balanced via tradeoffs, as a continuous part of the process.
Indicative evidence	Customer inputs are sought and used actively throughout the development process. Designs satisfy customer value requirements, without unnecessary functionality. Constructing products and projects is easier to achieve and have lower life-cycle costs than previous history. There is early consideration and incorporation of customers' issues throughout design development. Suppliers actively engaged for input into processes at an early stage. The scope of considerations integrated into designs has been extended to include construction, serviceability and cost implications. The process has been simplified to minimise the number of handover points. Collaborative planning is being extensively deployed				

7.0 Delivery of value

- **Value stream performance management**



The purpose of this section is to identify if the organisation is analysing the key processes which deliver end customer value in order to identify waste. It should be noted that for the purposes of this question, the term 'end customer' is the end receiver of the overall supplier service. In most cases this will be the Highways Agency, but may be defined differently if the Agency and supplier

deem it appropriate and advantageous to do so. In addition, where there is reference to 'Value Stream Mapping', the expectation is not that the supplier will be required to use the tool in its purest sense at all times; the expectation will be that the supplier can demonstrate appropriate elements of VSM will be used at appropriate times to create an advantageous result.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
7.1 Is the performance of the organisation's key value streams evaluated and is improvement of this performance actively managed?	There is little understanding of the need to map and analyse the organisation's main processes and business streams.	The performance levels of key processes are understood and initial value stream analysis underway to identify, prioritise and deliver improvement to end customer value.	The relative extent to which each key value stream influences the delivery of customer value and economic performance for the organisation is understood. Principal current value stream(s) are analysed, allowing the identification of critical interactions. Significant opportunities for eliminating waste and creating value are identified and aligned with the business objectives.	Depth and breadth of knowledge of value stream analysis and supporting processes exposes interdependencies across the organisation. Value stream mapping used tactically to address performance improvement opportunities. Supply chain is required to have analysed value stream performance.	The ongoing performance of value streams and their interdependencies is evaluated and managed across the organisation and its supply chains. Value Stream Mapping is used effectively to deliver step changes in performance as opportunities are identified.
Indicative evidence	Process in place to identify key value streams, evaluate performance and prioritise value streams to be analysed (or mapped). An effective Value Stream Mapping capability has been developed and is used tactically to improve key processes. Key value streams of major end customers and projects have been analysed (and mapped where necessary) and hand over points and interfaces clearly defined and managed effectively.				

8.0 Standard work

- **Processes, tools and systems standardised**



The purpose of this section is to identify the degree to which processes and methods have been standardised across the organisation in order to enable structured continuous improvement.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
8.1 Have processes, tools and systems been standardised across all sites and departments where appropriate?	Processes, tools and systems which could be standard vary by programme, work centre, project, service activity and product line.	Key processes in the organisation have been identified that could benefit from standardisation. High leverage opportunities for common tools and systems have been identified. Initial deployment of standardisation evident in a few areas.	Key processes' areas across the organisation have completed effective process standardisation activities to ensure capture of current best practice in standardised method. Plans are in place for achieving common tools and systems and have been implemented to varying degrees across the organisation.	Process, tool and system standardisation and reuse is consistently employed across the organisation wherever appropriate and advantageous. Process owners in place to manage compliance and improvement to standard operation processes. Supply chain is required to evidence consistent process standardisation and common tools and system implementation.	Supply chain interface processes have been standardised wherever appropriate and advantageous. Compatibility of tools and systems with those of organisation partners in the supply chain.
Indicative evidence	<p>The experienced workforce plays a significant role in devising optimised standard processes and practices for the organisation, which are adhered to and regularly updated.</p> <p>Process improvements are documented in a concise and easy to use standard format and transferred.</p> <p>Processes are standardised where applicable throughout the supply chain.</p> <p>5S (or 5C) workplace control clearly apparent in office, site or production environment.</p> <p>Policies have been established and deployed that require the use of common tools and systems throughout the organisation.</p> <p>Common tools and systems provide easy access and reuse of knowledge across the product or project life cycle.</p> <p>The use of common tools and systems provides enhanced compatibility between processes and aids employee transfer between jobs.</p> <p>Standard design, construction, production and delivery solutions are being used wherever possible.</p>				

9.0 Process flow

- *Processes aligned to actual demand* • *Customer pull* • *Maintenance and capacity schedules* • *Planning systems*



The purpose of this section is to assess the degree to which processes are being designed to encourage flow and balance resources. This will apply to all processes including design, purchasing etc not just construction

or production. Note that the term 'inventory or buffer' within this question may also be construed to refer to time, or any form of information which normally flows through the organisation's processes.

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
9.1 Are processes planned and designed along value streams, aligning demand to customer pull with flow and minimum waste in all aspects of delivery, design, construction, and maintenance?	Flow between processes is disjointed. Individual processes are rarely adapted to suit flow and inventory/buffer levels are periodically changed. Streams often grouped by type of process rather than along the value stream. Push scheduling commonly utilised with little integration with supplier processes. Lead -time estimated from schedule or project plan with no visual management.	A few key processes are aligned for flow and stability improved to reduce inventory/buffer levels. Individual activity processes are partially adapted to suit flow. Most processes are scheduled via a system, with all linked sub-processes working to a common rate.	Key processes within value streams are ordered to enhance flow and reduce inventory/buffer levels. Insofar as possible, just-in-time systems link internal and external processes. Lead time consistent, easily determined and visible to all. In other functions outside the value streams, key processes are fully adapted and others partially adapted to complement flow.	Majority of internal and a few external processes are adapted to enhance value stream flow and minimise distance travelled, inventory/ buffer levels or time delay. Most processes are adapted and integrated to complement flow. Supply chain is required to evidence adaptation of processes to enhance value. Processes are stable throughout the internal and external value stream. Pull scheduling is utilised throughout the organisation.	Process flow throughout all value streams (internal and through the supply chain) is continuous, in time with actual demand, with distance travelled and inventory/ buffer levels minimised. Information is always available to enable decision making when required to enhance flow. Processes are fully adapted and integrated to optimise flow. Due dates are visibly monitored and real time target achievement visible.
Indicative evidence	The activities are levelled and resources balanced with short and controlled lead times. Bottlenecks are understood and where possible (on repetitive work) material flows just-in-time in one-piece, or very small, batches. Low idle or waiting time with low level of rework. Metrics are gathered to monitor flow, analysed and acted upon. Batch sizes are small and processes are stable. Customer demand (internal or external) is used to regulate (pull) product/project or resource allocation as required. Co-ordination of day-to-day supplies by employees. Tools such as collaborative planning are used effectively.				

10.0 Process control and quality assurance

- *Process variation reduced*
- *Root cause analysis*
- *Mistake proofing*
- *Maintenance*



The objective of this section is to assess the degree to which processes are being controlled, analysed and designed to reduce variability and thus the number of defects, in turn reducing rework and inspection. For the purposes of this question (and all of this tool) the

definition of the word defect shall be the accepted Lean definition of any process output that does not meet customer value specifications, or that leads to the realisation of one or more of the eight wastes.

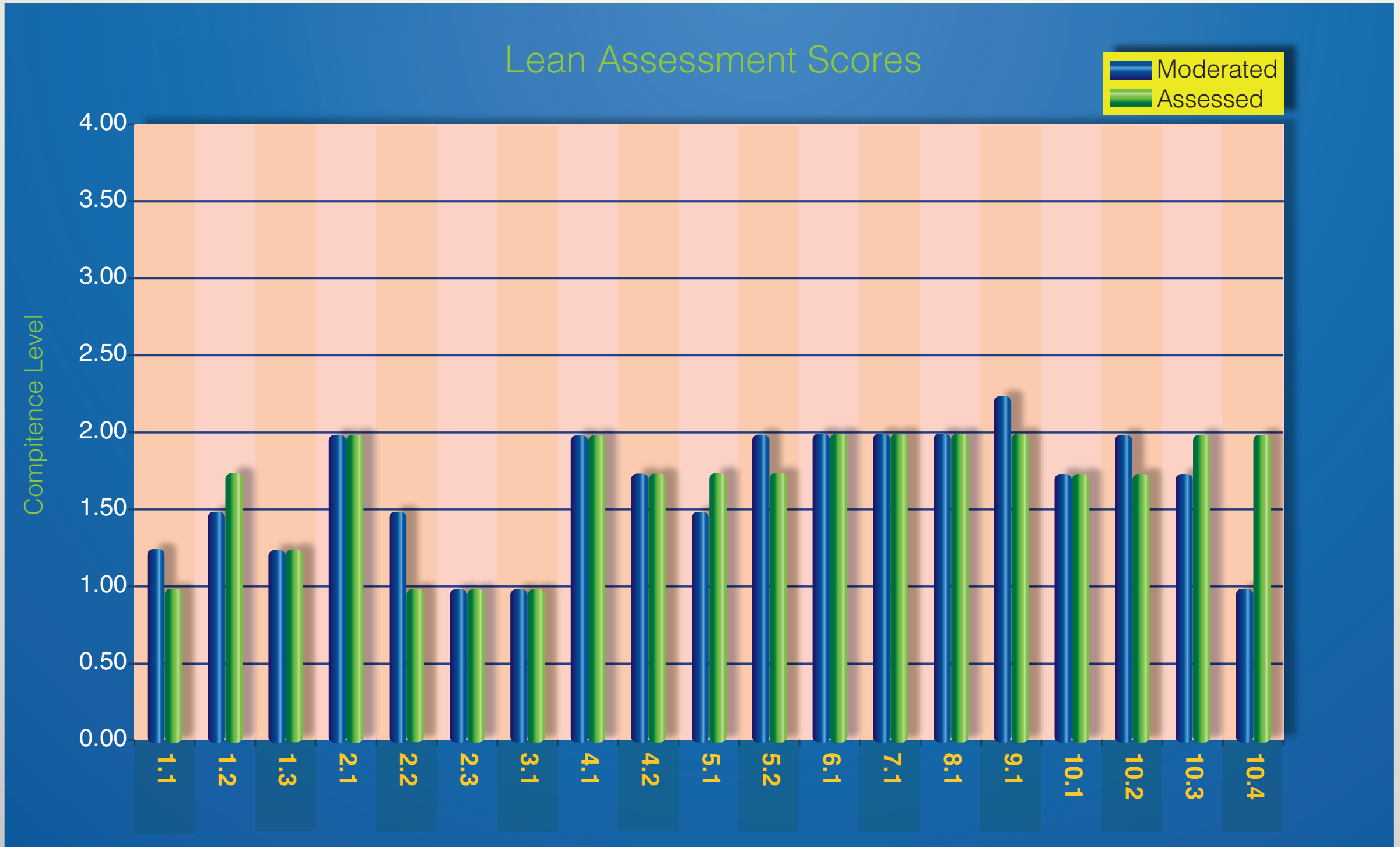
Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
10.1 Is process variation continually reviewed and reduced in all processes throughout the organisation? (using tools such as Six Sigma)	There is limited use of variation reduction tools and methods. There is some evidence of the understanding of variation and its effects in parts of the organisation.	There is evidence that sources of variation are being identified and analysed. Initial efforts are underway to reduce variability.	A formal approach has been defined for the application of variation reduction techniques to improve customer value. This has been implemented in many parts of the organisation.	Considerable benefits are realised from a managed programme directed to reduce variation in those processes and practices across the organisation where impact is most harmful. Supply chain also shows evidence of effective process variation reduction.	The variation reduction actions are applied in a formal, prioritised programme and show long term improvement trends for the selected processes. A clear history of benefits of reduced variation is evident across the supply chain.
Indicative evidence	System in place to monitor and demonstrate impact of process variation and used to prioritise application of variation reduction process. Process ownership and visual displays of process variation enable quick and easy identification of adverse trends. Variation reductions achieved enable short predictable lead times for information and material flow.				
10.2 Is the root cause of defects analysed and are processes updated with lessons learned?	Little direct feedback of performance issues to source. Quality issues managed and resolved independently of realisation processes.	Mechanisms exist to relay performance (quality, delivery and cost/efficiency) issues back to the source periodically. Quality is checked as part of production/service process.	Issues relating to the realisation process are relayed directly to source and corrective action taken frequently, pooling resources from all necessary functions.	Issues relating to realisation are relayed directly to source and all functions/contractors work as one to solve source problems with key value streams using a disciplined process. Supply chain is required to evidence use of root cause analysis and report on benefits realised.	All issues relating to realisation are relayed directly to source and immediate and effective corrective action taken by all functions/contractors working as one to solve source problems across the supply chain.
Indicative evidence	A formal process is in place to record and manage performance problems and monitor effectiveness of corrective actions. Root cause identification is routinely used to identify source problems and effectively and permanently resolve them. A lessons-learned log is in place and used to improve future processes.				

10.0 Process Control and Quality Assurance

- *Process variation reduced*
- *Root Cause Analysis*
- *Mistake proofing*
- *Maintenance*

Lean Adoption Question	Capability Levels				
	Level 0	Level 1	Level 2	Level 3	Level 4
10.3 Is mistake proofing (where possible) incorporated in processes and considered in initial design?	Problem areas identified and issues resolved on an ad hoc basis.	Problem areas are being addressed and a few processes have evidence of basic mistake proofing efforts.	Key processes have some level of mistake proofing applied and the range of tolerance for acceptable quality is known.	Organisation maintains high levels of process repeatability along all value streams, with mistake proofing used routinely. Supply chain is required to evidence use of mistake proofing and report on benefits realised.	
Indicative evidence	High levels of process stability are maintained by utilising mistake proofing. A formal, effective process exists for mistake proofing. Incorporation of mistake proofing in structure/process design is apparent. Employees' skill base broadened to reduce reliance upon inspection to catch defects.				
10.4 Do you ensure that the equipment you rely upon to deliver customer value is in a condition to contribute to quality and provide a high level of availability with maintenance schedules and capacity evaluated?	Reactive or breakdown maintenance is widely used. Employees have no responsibility for equipment. Capacity assumed to be available by contracting out to third parties.	Planned maintenance is applied in line with process needs to prevent most stoppages and ensure process tolerances are maintained to acceptable quality ranges. Key equipment current capacity register in place, including third party suppliers.	Data capture used to plan maintenance. Employees inform maintenance of possible problems. Employees contribute towards process conformance. Project plans or factory or project scheduling in place to objectively manage availability or performance of equipment.	Employees proactively maintain equipment and process conformance using a formal maintenance management process (such as TPM). Maintenance called in only when problems are outside operator capability. Supply chain also required to maintain process conformance. Plans recognise capacity issues and include contingency to manage risk. Supply chain also required to achieve this same level of planning.	
Indicative evidence	Service and maintenance schedules available and visible for all plant. Performance records available for all key plant and equipment. Formal process in place to ensure Total Product Maintenance philosophies are being applied where possible. Programme risks and resource requirements balanced to assure optimal flow throughout the life cycle of the product or project. Capacity and risk registers maintained.				

* - UK Lean Aerospace Initiative 1998-2003 available at www2.warwick.ac.uk/fac/sci/wmg/research/lean



A graph showing both supply chain assessed scores and Highways Agency moderated scores.

(Note: these scores are made up for demonstration purposes and are not based on any supplier's actual scores). This graph typically appears in the feedback report received by the supply chain assessors from the Highways Agency moderators.

4. HALMAT self-assessment scoresheet (with weighting)

		Assessor's (Initials):												Assessed	Moderated	Min	Max		
Matrix sub-sections					A	B	C	D	E	F	G	H	I	J	Score	Score	Score	Score	
1.0 Strategic Use of Lean 15.0%	1.1	Previous		Current											0.00	0.00	0.00	0.00	
	1.2	Previous		Current											0.00	0.00	0.00	0.00	
	1.3	Previous		Current											0.00	0.00	0.00	0.00	
	1	Average	0.00	Average											0.00	0.00	0.00	0.00	
2.0 Financial, Information and Procurement Systems 15.0%	2.1	Previous		Current											0.00	0.00	0.00	0.00	
	2.2	Previous		Current											0.00	0.00	0.00	0.00	
	2.3	Previous		Current											0.00	0.00	0.00	0.00	
	2	Average	0.00	Average											0.00	0.00	0.00	0.00	
3.0 Lean Leadership 15.0%	3.1	Previous		Current											0.00	0.00	0.00	0.00	
	3	Average	0.00	Average											0.00	0.00	0.00	0.00	
4.0 People Development 15.0%	4.1	Previous		Current											0.00	0.00	0.00	0.00	
	4.2	Previous		Current											0.00	0.00	0.00	0.00	
	4	Average	0.00	Average											0.00	0.00	0.00	0.00	
5.0 Lean Structure and Behaviour 6.7%	5.1	Previous		Current											0.00	0.00	0.00	0.00	
	5.2	Previous		Current											0.00	0.00	0.00	0.00	
	5	Average	0.00	Average											0.00	0.00	0.00	0.00	
6.0 Collaborative Working 6.7%	6.1	Previous		Current											0.00	0.00	0.00	0.00	
	6	Average	0.00	Average											0.00	0.00	0.00	0.00	
7.0 Delivey of Value 6.7%	7.1	Previous		Current											0.00	0.00	0.00	0.00	
	7	Average	0.00	Average											0.00	0.00	0.00	0.00	
8.0 Standard Work 6.7%	8.1	Previous		Current											0.00	0.00	0.00	0.00	
	8	Average	0.00	Average											0.00	0.00	0.00	0.00	
9.0 Process Flow 6.7%	9.1	Previous		Current											0.00	0.00	0.00	0.00	
	9	Average	0.00	Average											0.00	0.00	0.00	0.00	
10.0 Process Control and Quality Assurance 6.7%	10.1	Previous		Current											0.00	0.00	0.00	0.00	
	10.2	Previous		Current											0.00	0.00	0.00	0.00	
	10.3	Previous		Current											0.00	0.00	0.00	0.00	
	10.4	Previous		Current											0.00	0.00	0.00	0.00	
	10	Average	0.00	Average											0.00	0.00	0.00	0.00	
Maturity Score	Weighted															0.00	0.00	0.00	0.00
Maturity Score	Un-Weighted															0.00	0.00	0.00	0.00
Weighting Check	100%																		

5. Glossary of terms

Activity – A unit of work that has a beginning and an end, occurs over a period of time, and consumes input(s) and produces output(s).

Backflow – A condition in which a part, product/project or design is returned to a previous stage due to a defective condition.

Balanced scorecard – An analysis technique and management instrument that translates an enterprise's mission and strategy into a comprehensive set of performance measures to provide a framework for strategic action. The scorecard may gauge organisational performance measures across several perspectives such as: financial, customer/clients, internal business processes, learning and growth.

Collaborative planning – The collaborative planning system is about enabling teams to deliver the same amount of work but with less resource. It involves doing three things: **Production control** - Enabling better productivity through effective resource and information management. **Collaborative mapping** - Enabling better planning through the creation of process-based look ahead programmes. **Seeking continuous process improvement** - through the implementation and adoption of continuous improvement tools

Consensus – A state where group members support an action or decision, even if some do not fully agree with it. A consensus decision is made after aspects of an issue, both positive and negative, have been reviewed or discussed to the extent that everyone openly understands, supports, and participates in the decision.

Cross functional management – A process designed to encourage and support interdepartmental communication and cooperation throughout an organisation, as opposed to command and control through narrow departments or divisions. The purpose is to achieve organisation targets, such as quality, cost, and delivery of product or projects and services by optimising the sharing of work. (Ref.6)

Culture – Shared characteristics such as values, behaviors and beliefs that distinguish the members of one group from those of another. Organisational culture includes the common set of beliefs, sentiments, priorities, attitudes, perceptions, operating principles and accepted norms shared by individuals within an organisation. Cultural change is a major shift in these organisational characteristics.

Customer/client – A stakeholder who is a recipient of a product/project or service produced by an organisation. Customer/clients may be internal or external to the organisation. External customer/

clients, those in the marketplace, are the reason an organisation exists. Internal customer/clients are the reason a functional area or department exists – an interdependent department, or a downstream user in the value chain. When services rather than product/projects are provided, customer/clients are often called clients.

Customer/client value – Essentially customer/client value is something a customer/client is prepared to pay for, a product/project (which might be a road) or service, which will provide the means to satisfy the outcome that the customer/client wishes, i.e. something the customer/client is prepared to pay for.

Cycle time – The time required to complete one cycle of an operation. If cycle time for every operation in a complete process can be reduced to equal the demand (takt) time, product/projects can be made in single-piece flow.

Employees – All of the individuals employed by the organisation including full time, part time, temporary and contract employees. This does not include sub contracted labour from other organisations.

Enterprise – Any corporate or business-unit organisation with a distinct mission, market segment, suite of product/projects or services, customer/client base, profit/loss responsibility and set of competitors. The purpose for the organisation's existence is to perform its mission and achieve associated goals.

Supply chain – All businesses along the value stream that contribute to providing value to a customer/client – this SPECIFICALLY includes the organisation’s suppliers involved in providing value to the customer/client.

Five S (5S) or Five C (5C) – This is a five step process developed by the Japanese as an essential step in organising a workplace to enable standard processes to be introduced to enable sustainable continuous improvement. The English interpretation of the original Japanese 5S words for the five steps are Sort, Set in Order, Shine, Standardise and Sustain. The 5C’s are an alternative English version the five steps being Clear out, Configure, Clean and check, Conformity, and Custom and practice.

Flow – The progressive achievement of tasks along a value stream so that a product/project or service proceeds from design to delivery providing materials or information into the hands of the customer/client with no stoppages, rejects or backflows.

Continuous flow production/construction – Items or information are produced and moved from one processing step to the next one unit-at-a-time. Each process makes only the one piece that the next process needs, and the transfer batch is one. Also called “single-piece flow” or “one-piece flow”. Contrast with batch-and-queue.

Improvement event/intervention – Part of the Lean toolkit and provides a mechanism for making radical and incremental changes to current processes and activities. They are often carried out within very short timescales focused on a particular problem or process. They are structured events carried out off the job where a small group of employees with relevant knowledge of the process or problem collect data and analyse it to determine an improved process or method and implement it. The events are often assisted by a trained facilitator.

Integrated product/project team – Construction requires design and manufacturing process design. An integrated product/project team carries out these processes as far as possible in a concurrent way. An integrated team therefore will consist of personnel from a range of functions designers, architects, project managers, purchasing experts, manufacturing engineers, key suppliers etc. jointly working together to achieve the desired outcome minimising waste and maximising value by ensuring that all factors are considered at the earliest possible stage and issues resolved.

Innovation – The practical transition of ideas into new product/projects, services, processes, systems and social interactions. This would include for example on site value engineering etc.

Just-in-time – Conveying only the items or information that are needed by the next process when they are needed and in the quantity needed.

Lead-time – The total time a customer/client must wait to receive a product/project or service after placing an order. If a manufacturing or construction system is running at or below capacity, lead-time and throughput time are the same. When demand exceeds the capacity of a system, there is additional waiting time before the start of production/construction or the next stage of say a design process, lead-time exceeds throughput time.

Lean change agents – People who have a good knowledge of Lean principles and their application. These people also have the capability to guide and instruct employees to develop their own capabilities in their own situation to apply appropriate Lean techniques to improve their processes.

Lean daily meeting – A term used in construction to describe a routine daily or weekly meeting of a group or cell of employees in order to communicate information and to track safety, programme progress, quality, cost, discuss problems and identify issues and resolve using problem solving techniques.

Mistake proofing – People are human and cannot be expected to do everything like a machine, exactly the same each time. It is also not necessarily their fault, as poorly-designed processes that require a great deal of attention can contribute severely to problems. The basic principles of mistake proofing (Poka yoke) advocate designing or developing tools, techniques and processes such that it is impossible or very difficult for people to make mistakes. It is a simple principle that can lead to massive savings.

Thus, for example, a plate that must be screwed down in one orientation only could have the screw holes in non-symmetrical positions so that it can only be screwed in the right orientation; or a petrol filler on a car not being able to receive a diesel nozzle. The principle can also be used in non-manual situations such as project management.

Non-value added – Any product/project, process or service that does not add value to the ultimate customer/client. (It is important to know that non-value added is not the same as “not necessary”, since some activities are required by law or are necessary for process control, such as inspection. These may not add value but are used to assess processes for control and improvement.

Overall Equipment Effectiveness – is a measure of the quality and availability of an organisation’s equipment. It is not restricted to operations alone as

it can measure any facility such as an IT system. The measure is Equipment Availability x Performance Efficiency x Output Quality and is used to measure the effectiveness of TPM.

Partnerships – A working relationship between two or more parties. Partners can include suppliers, distributors, joint ventures and alliances.

Performance measure – A dimension of an activity or process – quality, cost, cycle time, or other characteristic – that can be used to judge the effectiveness of efficiency of the process against a target or standard value.

Process – A sequence of activities which results in a product/project or service by producing required outputs from a variety of inputs.

Process variation – Every process has variation. Some variation may be the result of causes which are not normally present in the process. This is special cause variation. Some variation is simply the result of numerous, ever-present differences in the process. This is common cause variation.

Process stability – Process stability is defined as a state in which a process has displayed a certain degree of consistency in the past and is expected to continue to do so in the future. This consistency is characterised by a stream of data falling within control limits which are set specifically for the process being

monitored, using statistical techniques to measure data to ensure that processes are maintained within those limits.

Productivity – An overall measure of the ability to produce a good or service. It is the actual output of production/construction compared to the actual input of resources. Productivity is a relative measure across time or against common entities. In economics, the ratio of output in terms of dollars of sales to an input such as direct labour in terms of total wages.

Pull system – A planning system based on communication of actual real-time needs from downstream operations – ultimately final construction or the equivalent – as opposed to a push system.

Push System – A planning system that schedules upstream operations according to theoretical downstream needs based on a plan, which may not be current – as opposed to a pull system.

QCD – Quality, Cost and Delivery

Root Cause – Underneath the (apparent) **cause** of a problem, the real cause is often hidden. In every case we must dig up the real cause by asking why sufficient times to find the root cause. Otherwise countermeasures cannot be taken and problems will not truly be solved. E.g. my car won’t start, cause is a flat battery, why? Faulty alternator, why? Poorly adjusted fan belt etc,

Single-piece flow – A situation in which units proceed, one at a time, through operations in design, order-taking and production/construction, without interruptions, backflows or scrap.

Stakeholders – All those who have an interest in an organisation, its activities and its achievements. These may include customer/clients, partners, employees, shareholders, owners, government and regulators.

Strategic plan – This is a comprehensive statement of an organisation's overall mission, objectives and strategy. A detailed road map of the direction the organisation intends to follow in conducting its activities. Provides direction, concentration of effort, consistency of purpose, and flexibility as a business moves to maintain and improve its competitive position.

Strategic planning – The top-level management decision process that focuses on the overarching, long-range direction of the organisation and establishes the means by which that direction is reached. Includes defining top-level and subordinate missions, goals and supporting objectives, i.e., how the enterprise sees its purpose and where it wants to go. Provides the "big picture" along with a description of how goals and objectives are to be achieved and the indicators that will be used to measure performance and outcomes.

Statistical process control (SPC) – an optimisation philosophy concerned with continuous process improvements, using a collection of (statistical) tools for data and process analysis and making inferences about process behavior in order to take action to maintain process stability. It is used, for example, in the concrete industry to ensure consistency of mix. SPC does not refer to a particular technique, algorithm or procedure.

Takt time – The available production or construction time divided by the rate of customer/client demand. For example, if a customer/client demands 40 soil nails per day, and a contractor operates 8 hours per day, takt time is twelve minutes; if customer/client wants two new projects designed per year, takt time is six months. Takt time sets the pace of production/construction to match the rate of customer/client demand and becomes the heartbeat of any Lean system.

Total product/productive maintenance (TPM) – Based on the experience that equipment and process problems are the root cause of many of the unplanned events that reinforce a reactive Management style. Delivering reliable equipment alone, however, is not enough to deliver world-class organisation performance. TPM encompasses monitoring and improving the total integrity of the organisation's facilities by delegating as much maintenance work down through the people who add value - production/

construction and maintenance personnel alike. Its effectiveness can be measured by Overall Equipment Effectiveness (OEE) see above.

Value – A product/project or service's capability provided to a customer/client at the right time, at an appropriate price, as defined in each case by the customer/client.

Value-added activity – An activity or step in a process that adds value to an output product/project or service. Such an activity merits the cost of the resources it consumes. These are the activities that customer/clients would view as important and necessary. A value-added activity contributes directly to the performance of a mission, and could not be eliminated without impairing the mission.

Value-added time – Time for those work elements that transform information, product/project or service into value the customer/client is willing to pay for.

Value stream – The specific activities required to design, order and provide a specific product/project, structure or service from concept to delivery into the hands of the customer/client.

Value stream mapping/analysis – Involves defining a product/project family's/ business processes' material and information flows from beginning to end utilising a visual representation of every process identifying value adding and non value adding processes. This facilitates understanding of the current state and the development of the proposed future state. The difference between the two states becomes the basis for the Lean Transformation plan.

Visual management – is about communication and enabling teams to deliver performance improvement over time. It involves doing three things: Using **Primary Visual Displays**, Having **Stand-up Meetings** and Seeking continuous **Performance Improvement**; by measuring, monitoring and reviewing team performance

Waste – Any product/project, process or service which does not add value to the ultimate customer/client. In Lean applications, the Highways Agency identifies eight types of waste:

- Transportation (e.g. moving aggregate from depot to site)
- Inventory (Stock) excess (e.g. raw material, work in progress including design work and finished work not yet required and float in the programme, unused plant)
- Motion excess (e.g. excessive haulage roads on site)
- Waiting time (e.g. excavating plant waiting for spoil removal vehicles to become available)
- Over production/construction (e.g. making more than the customer/client wants)
- Over processing and extra process steps (e.g. unnecessarily high quality paint finish)
- Defects / rejects (e.g. fixing defects or scrap)
- Skills misapplication (e.g. appointing inappropriate people to business improvement roles)

6 HALMAT improvement template

Highways Agency Lean Maturity Assessment Toolkit (HALMAT) Improvement Plan (12 Month Journey)/(5 year journey)			
Organisation:		Assessment Date:	
Assessor:		Moderation Date:	
HA Moderator:		Feedback Date:	

HALMAT areas for improvement				
HALMAT tool area	HALMAT Ref.	Current Maturity	Target Maturity	Notes

Planned 'Improvement Events' to support areas noted above				Timeline (from date of Moderation)																
Improvement Project	Owner	Deliverables	HALMAT Ref.	Project programme (month)																
				1	2	3	4	5	6	7	8	9	10	11	12					

