

Lean Improvement at the UK Highways Agency

Derek Drysdale -Divisional Director
Lean Improvement
Highways Agency UK

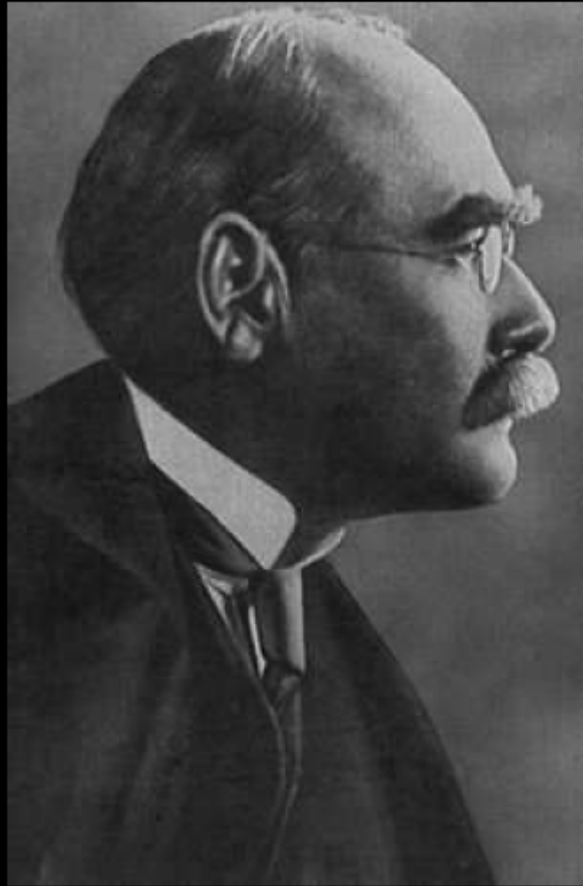
Our Lean Journey

“our story so far and
what next!”

Derek Drysdale



**Relentless search
for perfection!**



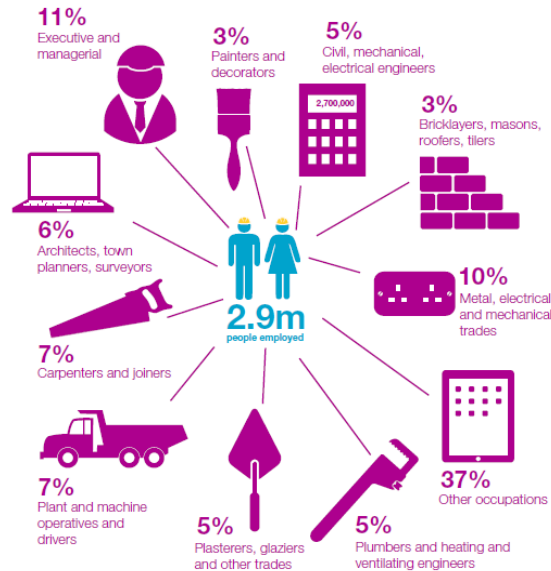
*I tell this tale,
which is strictly true,
Just by way of convincing you
How very little,
since things were made,
Things have altered
in the building trade*

Rudyard Kipling



HM Government

Construction



There are **2.9 million** jobs filled in the Construction Industry, circa 10% of all jobs (in over 280,000 businesses)



The **UK has the sixth largest green construction sector in the world**. Around 60,000 jobs are expected to be supported by the insulation sector alone by 2015

£90bn

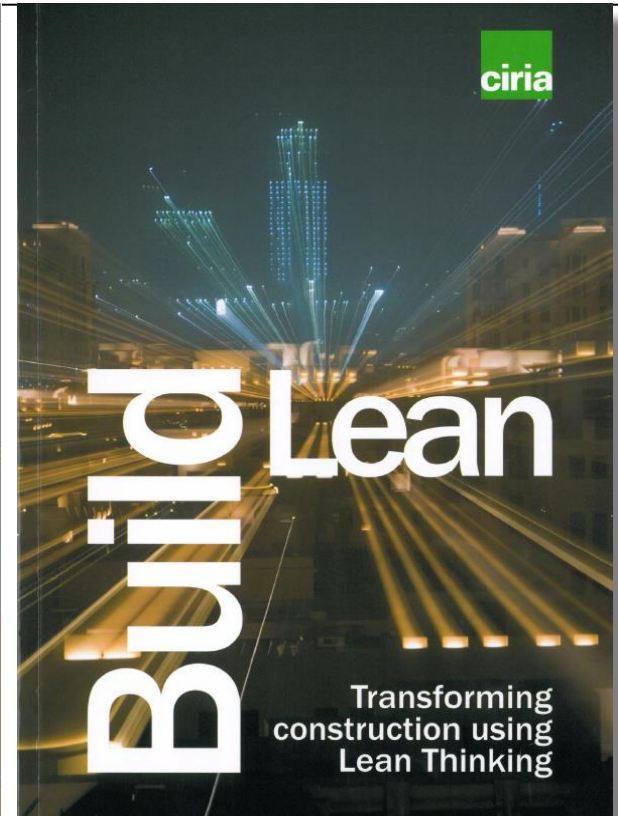
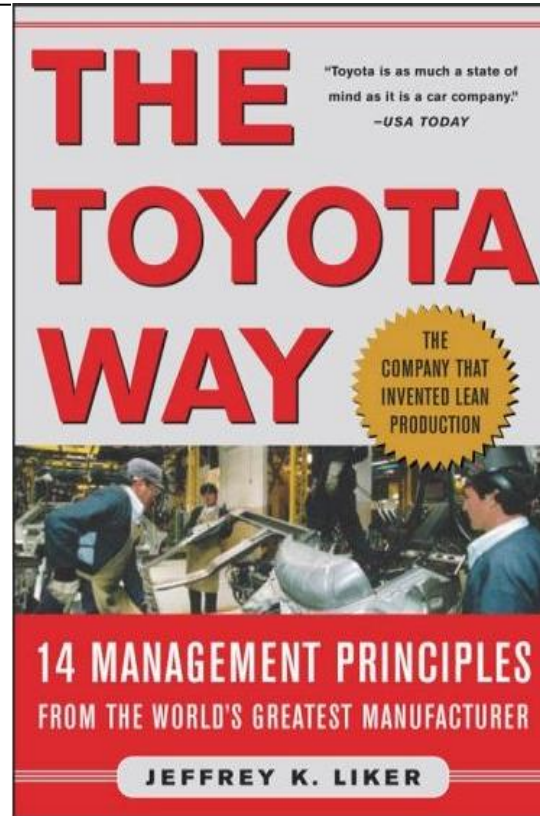
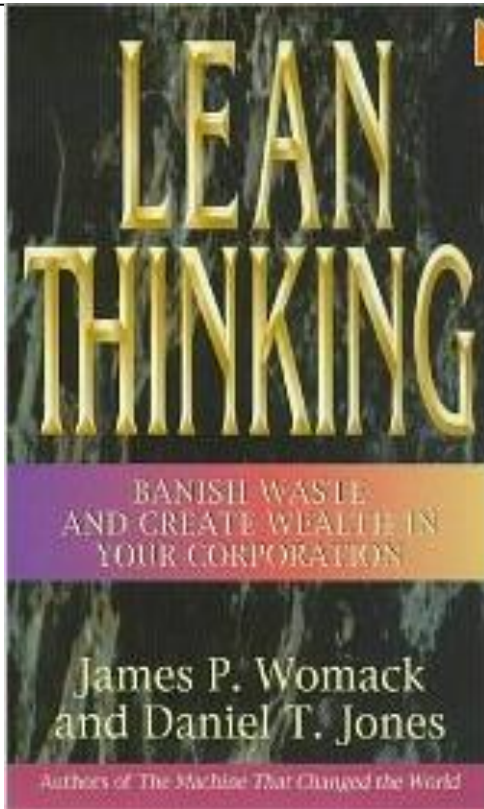
Construction contributes nearly **£90bn** to the UK economy, 6.7% of the total



Global construction output is forecast to increase from around \$8.5 trillion today to **\$12 trillion in 2025***

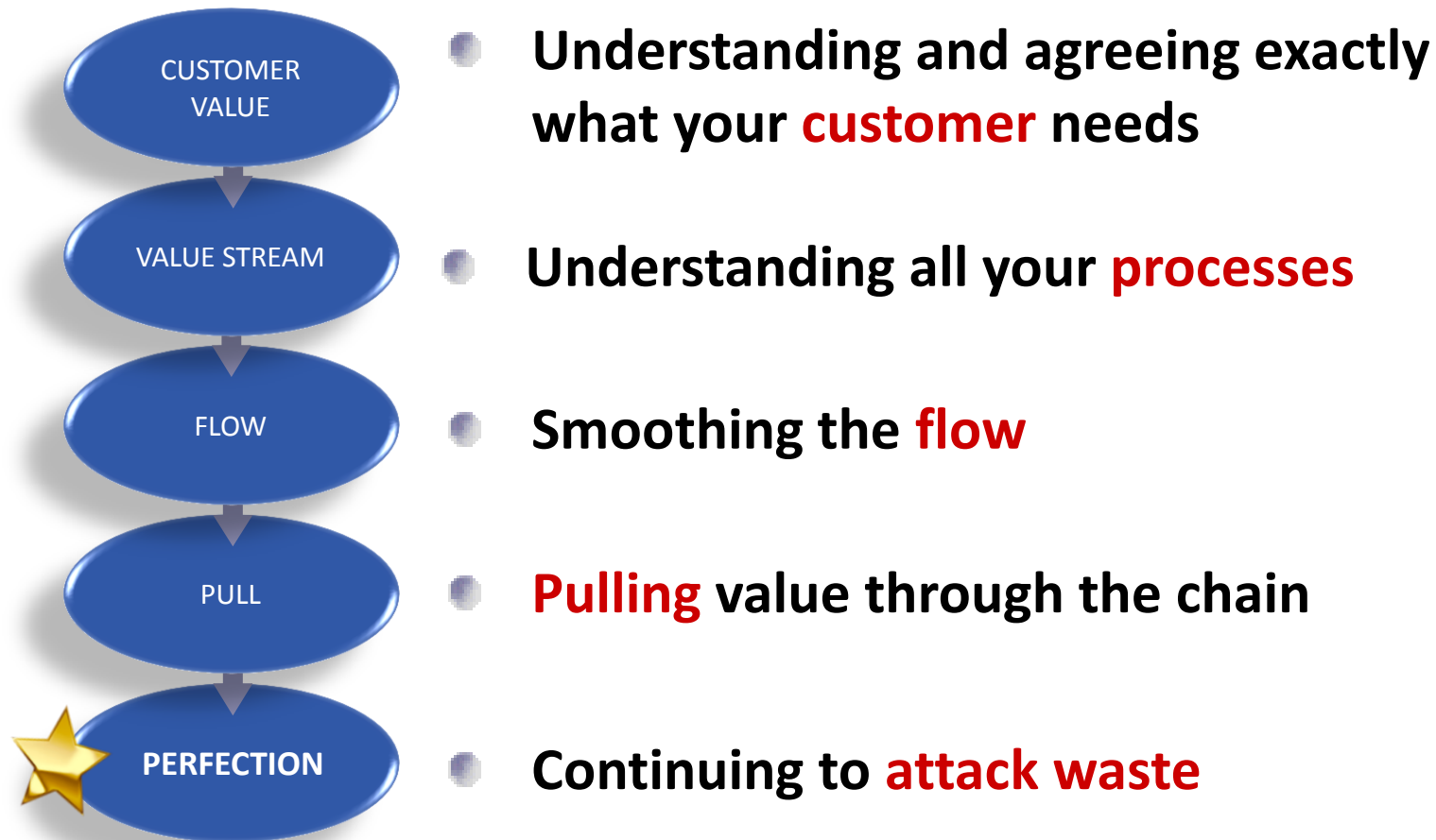
*Source: Global Construction 2025

Our Philosophy



The Client must engage with the Supply Chain to achieve continuous improvement!

Defining Lean Thinking?

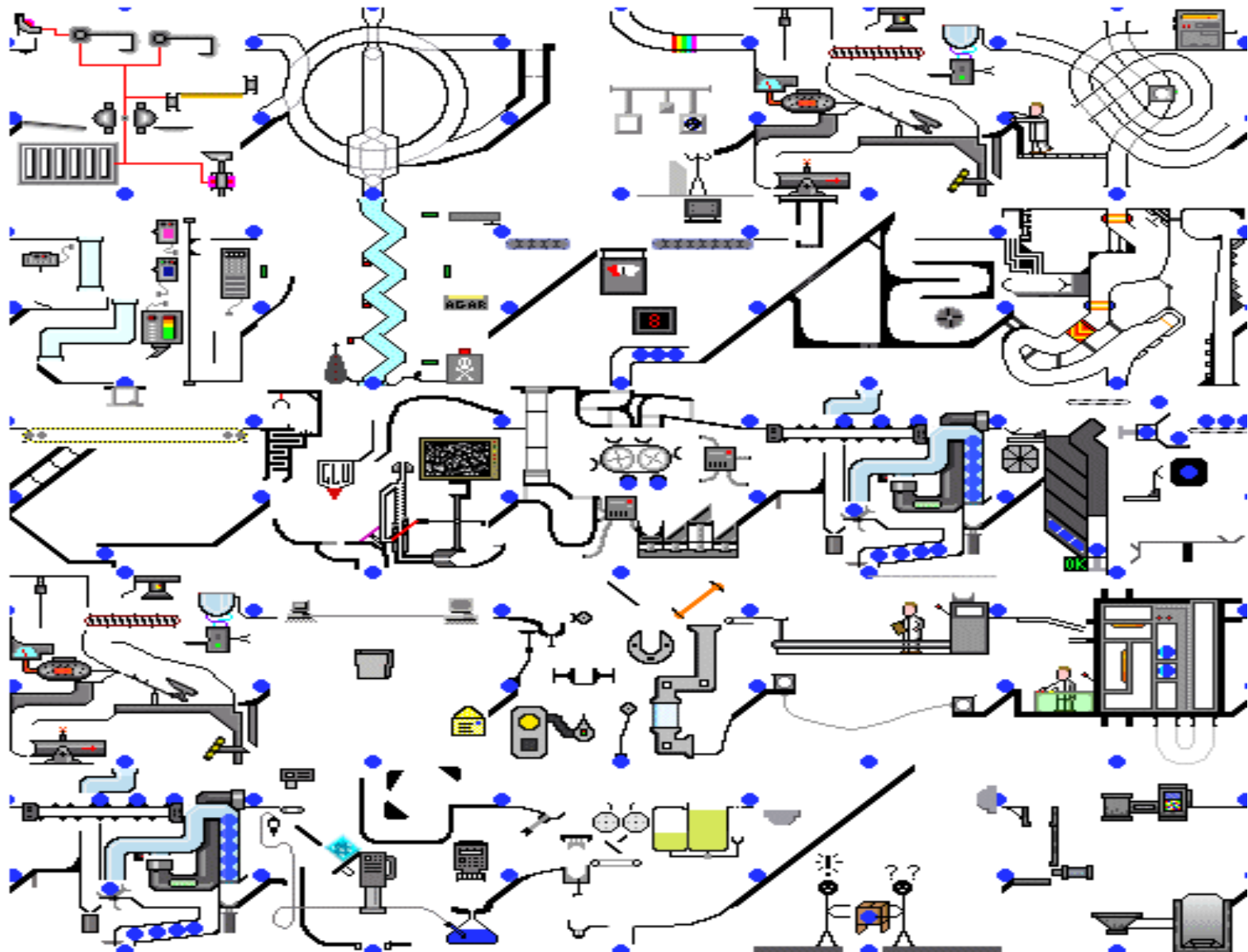


Principles now adopted world-wide in a variety of industries and professions

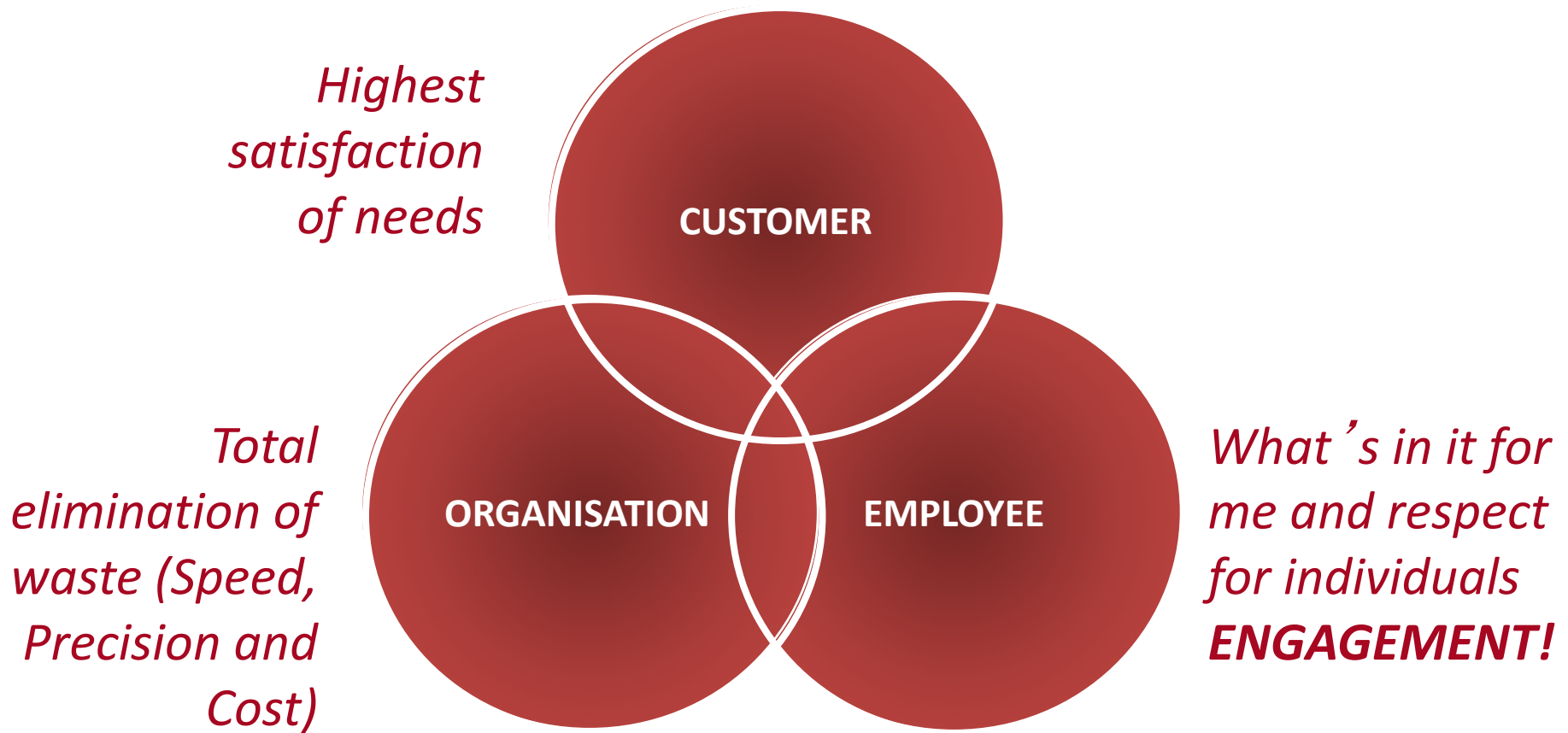
8 Wastes – Definitions

<i>Transportation</i>	moving materials from stores to work site
<i>Inventory</i>	stock piling of aggregates or imported fill
<i>Motion</i>	double handling materials
<i>Waiting</i>	a gang waiting for instructions or materials
<i>Over-Production</i>	completed surfacing too early which could then get damaged
<i>Over-Processing</i>	over complex capture of financial information that nobody then uses
<i>Defects/Rejects/</i>	resources wasted in doing it again
<i>Rework</i>	design changes causing re-work loops
<i>Skills-Misuse</i>	supervisor acting as a 'banks-man'

The Human Organism?



The three stakeholders of Lean



For Lean to achieve sustained success, all three of these Stakeholders must feel the benefit





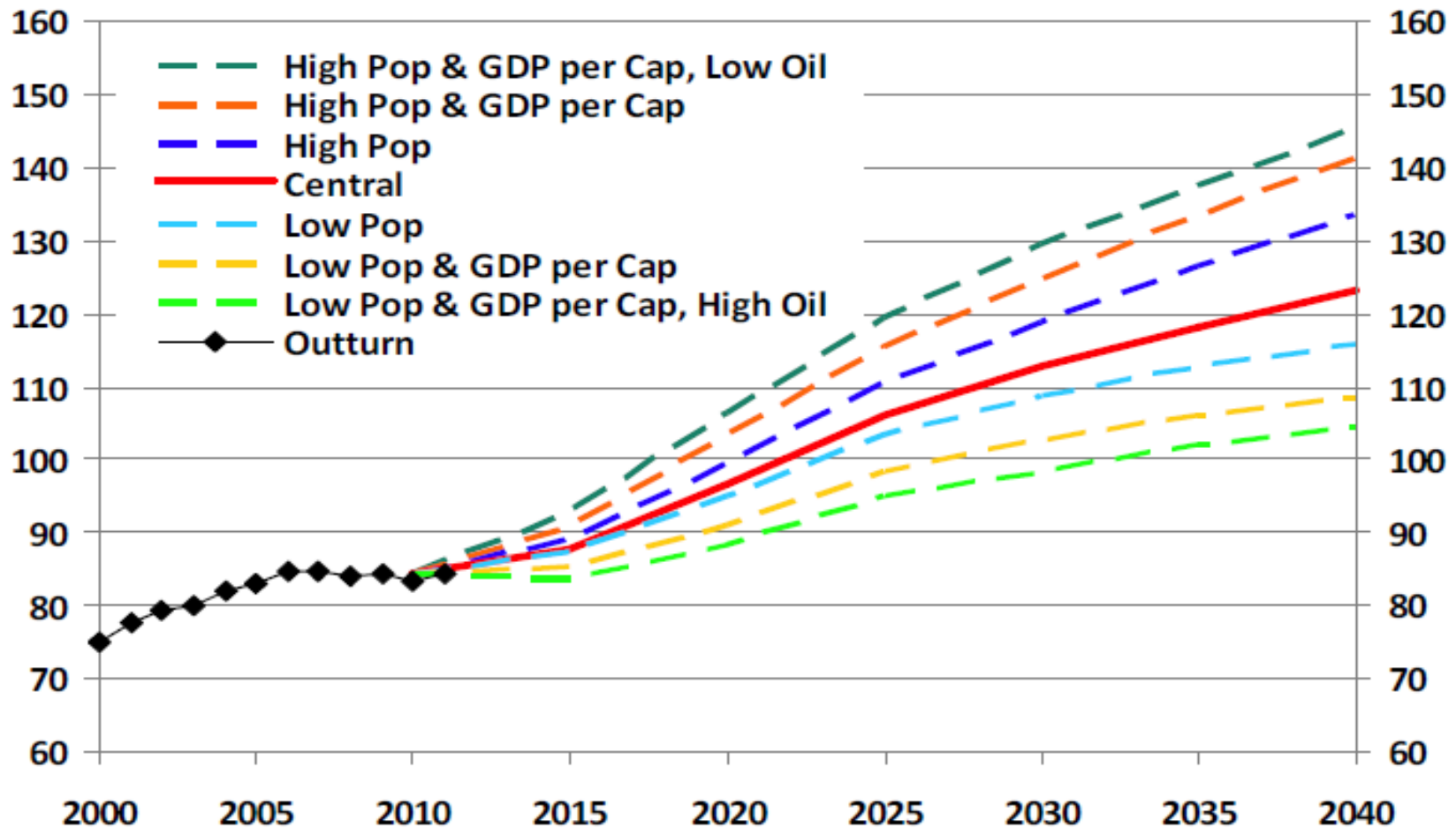




Smart Motorway

A lean journey – only just begun
Pressure on operating/ maintenance costs

Figure 2: England Traffic on the SRN (bn vehicle miles)





3500 Staff

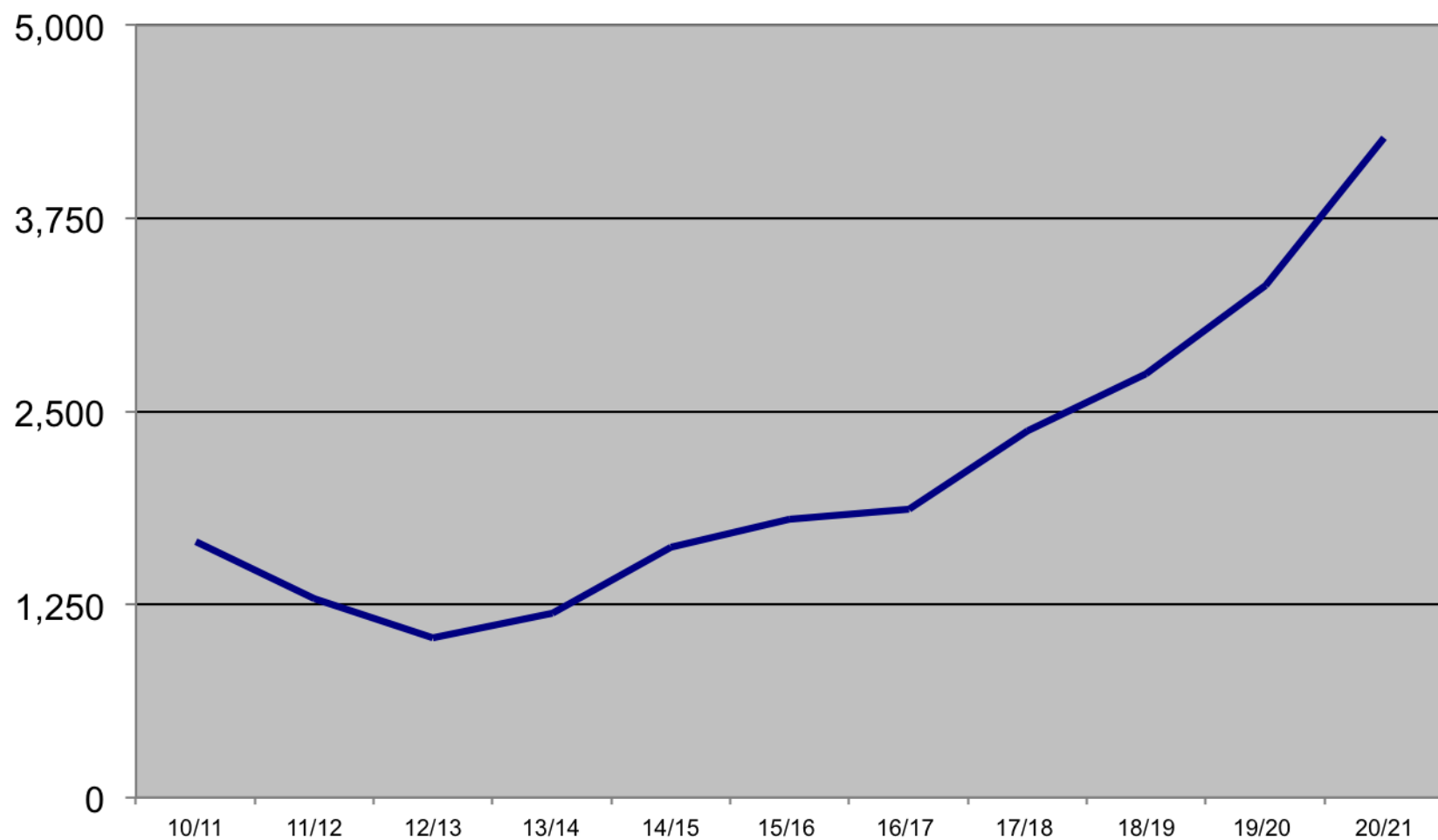
3.5bn Euro annual spend on

20 – 30% Budget reduction



£120m Efficiencies to date

Total HA Capital Investment Budget (£M)



Major Projects



**SMART
Motorways**



Highways Agency Lean Deployment

Maintenance



HA Business



Lean Deployment Strategy



Highways Agency invests \$3m per annum in developing our supply chain in lean thinking

Creating the right Environment

- Contractual incentives – ‘traditional or adversarial’ contracts don’t work!
- Develop relationships which are collaborative
- Strive to become an “Intelligent Client”
 - Engage with all levels of the supply chain
 - Understand the cost base
 - Measure Performance
 - Rewards which incentivise continuous improvement

1

Articulate and demonstrate the need clearly

2

Senior level sponsorship is vital

3

Get key opinion formers onside

4

Learn how to do Lean properly

5

Become self-sufficient in Lean

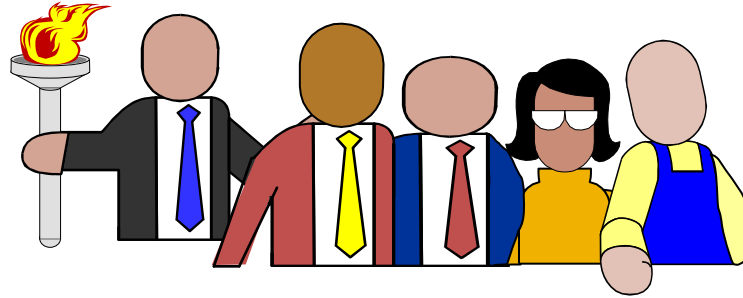
6

Use Lean as a staff engagement tool not just for eliminating waste



The Improvement Engine

RECOGNISE
OPPORTUNITIES



IMPACT!

DEFINE

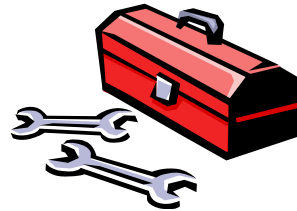
MEASURE

ANALYSE

IMPROVE

CONTROL

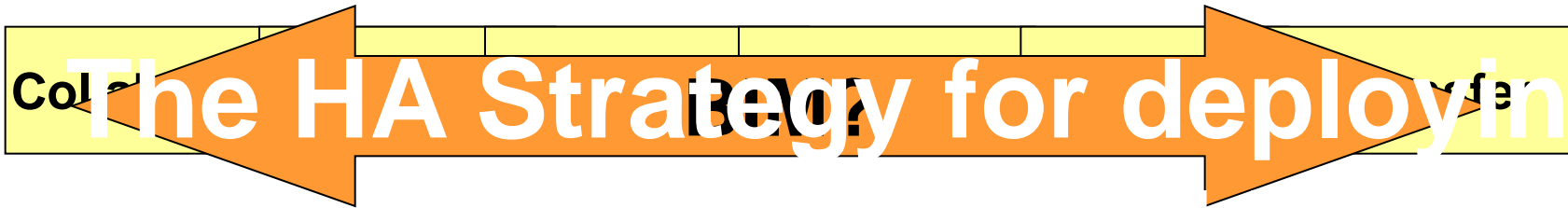
TRANSFER

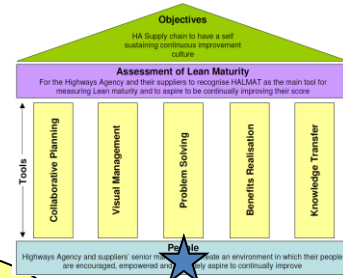
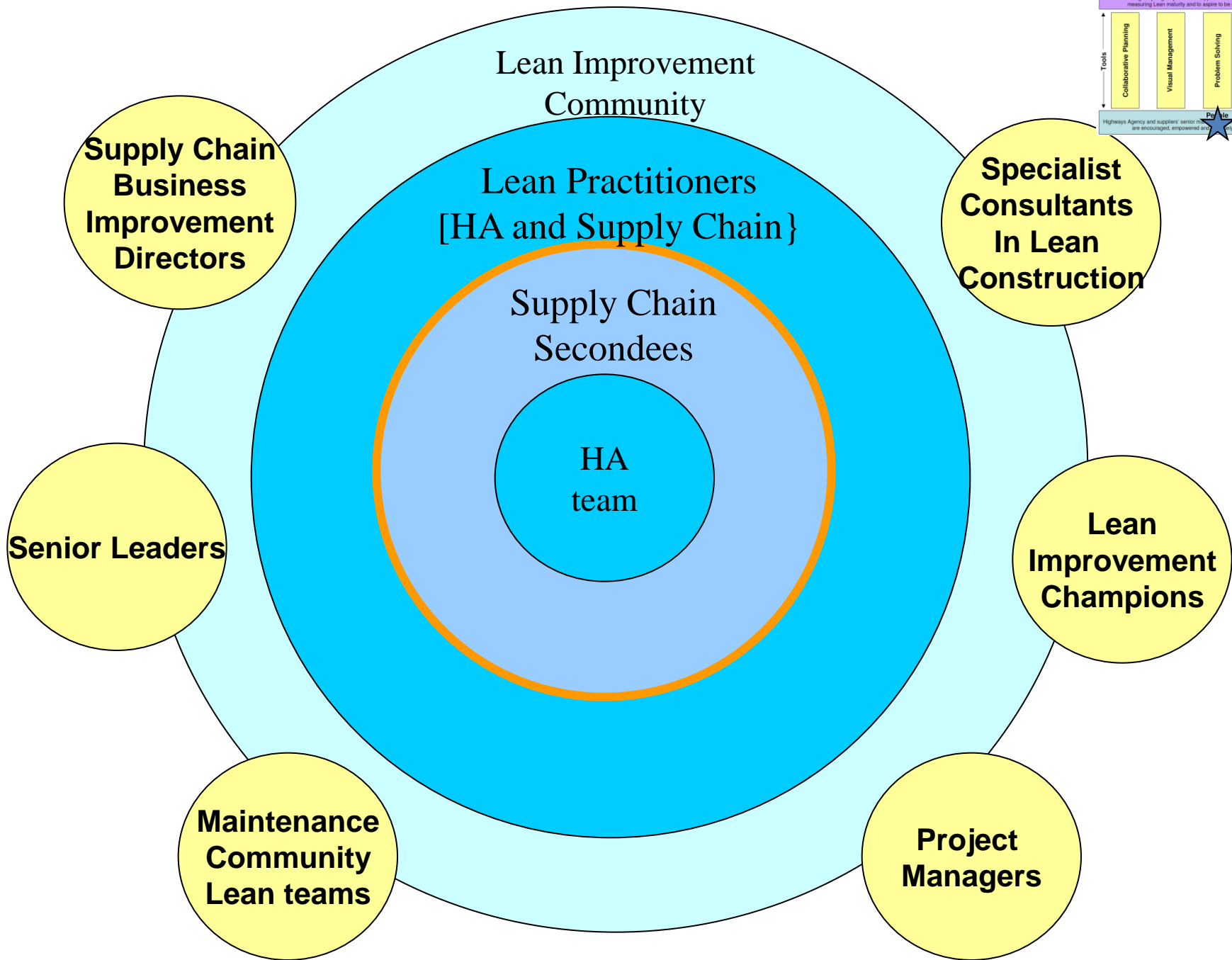


Tools and
Techniques

Lean – doing the right thing the right way

Lean Deployment Strategy







Highways Agency Development Route Map

A multiple stage approach to meet individual development needs

Basic Lean Awareness

1 day – 1 module

- Experience of Lean using practical exercises
- insight into how Lean thinking can be applied to your own processes
- To describe the Agency's approach to Lean Deployment
- Understand Lean principles and some of the basic tools

Lean Foundation

3 days – 1 module

- Understand concepts and language of lean
- Deliver simple projects with initial support
- Understand lean philosophy
- Start to challenge waste
- Receive attainment certificate on passing test at end of module

Lean Practitioner

6 days – 2 modules

- Understand concepts
- Able to use a range of lean tools
- Understand the DMAICT approach, Collaborative Planning and Visual Management
- Able to lead Lean Projects
- Apply learning on own project during the training
- Receive attendance certificate
- Receive certificate of competence on completion of project

Advanced Practitioner

4 days – 1 module

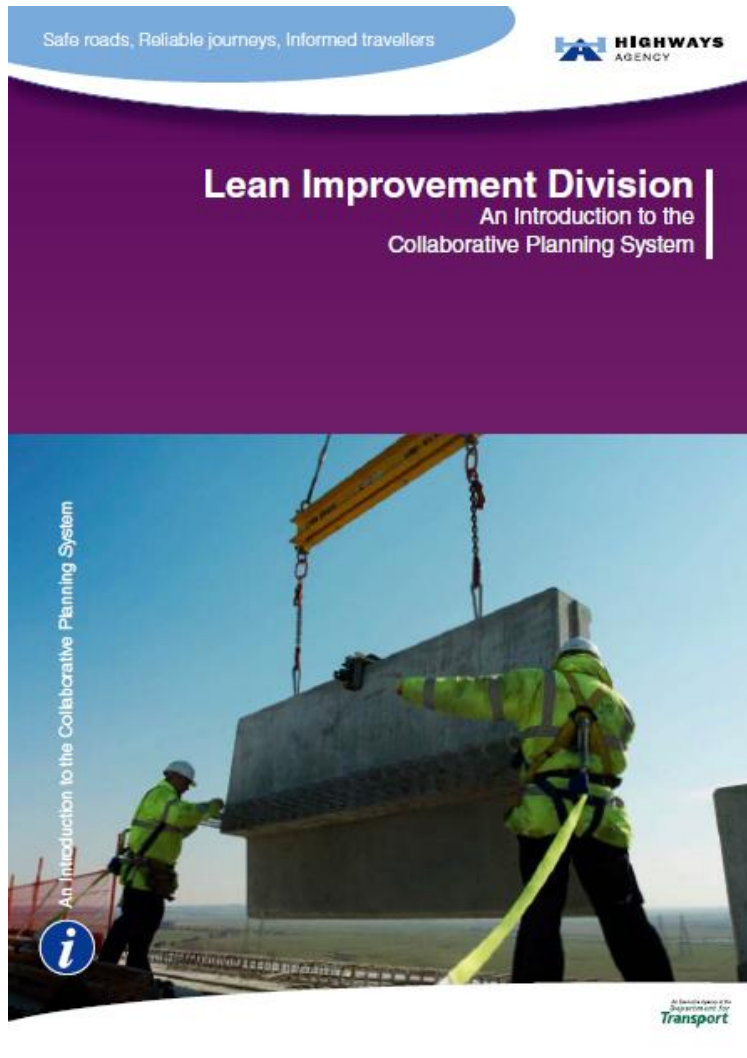
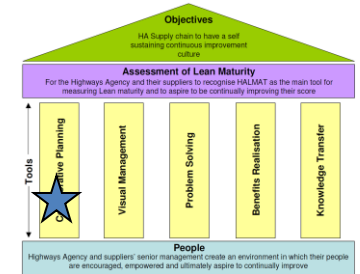
- Understand concepts Able to use a range of Lean Sigma data analysis tools
- Able to lead more complex Projects
- Able to train to Lean Practitioner level
- Apply learning on delegates own HA project Green Belt 'accreditation' by Black Belt following pass of examination, completion of GB project & production of Knowledge Transfer Pack

Master Practitioner

4 days – 1 module

- Understand concepts . Able to use the full range of Lean Sigma tools – including data analysis.
- Able to lead complex Lean and Six Sigma Projects
- Have the foundations to train to Green Belt Black Belt 'accreditation' by Master Black Belt following pass of examination, completion of Black Belt project production of Knowledge Transfer Pack and review with Master Black Belt

Collaborative Planning



The Collaborative Planning System

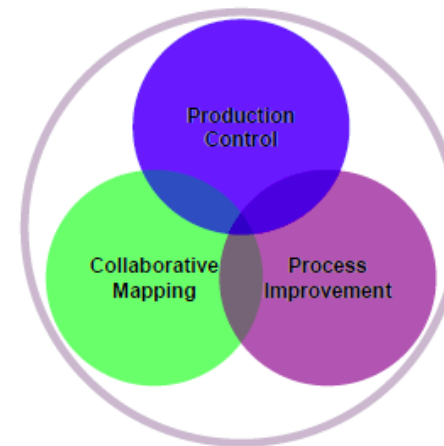
What is the Collaborative Planning System?

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 lookahead programmes
- Seeking continuous **Process Improvement** through the implementation and adoption of continuous improvement tools

The adoption of the above techniques has been proven to generate rapid improvement in team performance.

Figure 1 The Collaborative Planning System

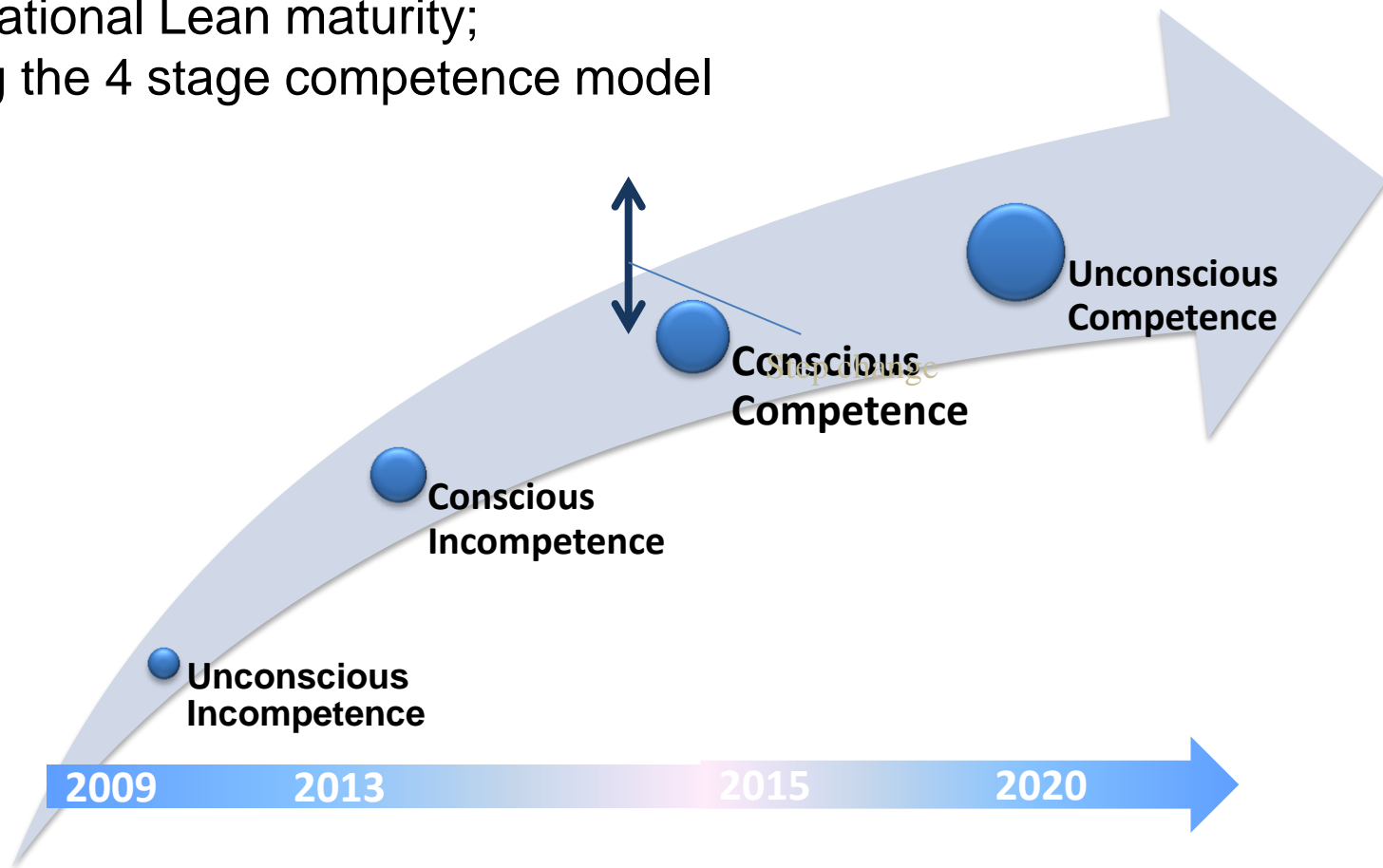


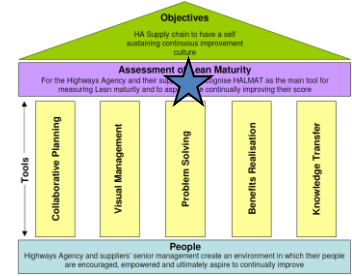
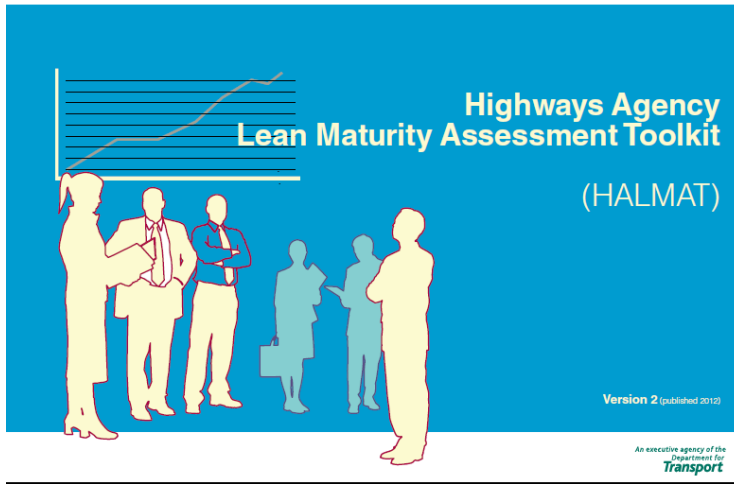
Collaborative Planning in the Supply Chain

Projects	Days required for CP in 14/15	CP Effective Rating (range = 1 (low) - 4 (High))	Collaborative Mapping	Weekly Production Control in Design	Weekly Production Control in Construction	Daily Last Planner
SR 10						
A23 Handcross - Warninglid		4	Y	Y	Y	Y
A46		4	Y	Y	Y	Y
M1 J10 - 13		3	Y	Y	Y	P
M62 J25 - J30		4	Y	Y	Y	Y
M4 J19-20 and M5 J15-17		3	Y	P	Y	Y
M6 J5-J8 (BBox Phase 3)		1	Y	P	P	N
A11 Fiveways - Thetford	5	4	Y	Y	Y	Y
M25 J5-6/7 (section 2)		4	Y	Y	Y	Y
M25 J23-27 (section 5)		4	Y	Y	Y	Y
M1 J32-J35A		4	Y	Y	Y	Y
M1 J28-31		4	Y	Y	Y	Y
Manchester Combined (M60 J8 - J12, M62 J18 - J20 & M60 J12 - J15)	20	3	Y	Y	Y	N
M1 J39-J42	10	3	Y	Y	Y	
A556 Knutsford - Bowdon	2	2	Y	Y		
Growth Projects						
A45/A46 Tollbar End	5	4	Y	Y	Y	Y
A453 Widening		3	Y	Y	Y	P
M1 J19 Improvement	20	4	Y	Y	Y	Y
A14 Kettering Bypass	5	3	Y	Y	Y	P
M6 J10a - J13		4	Y	Y	Y	Y
M3 J2 - J4a		3	Y	Y	Y	P
Pipeline Projects						
M25 J30	10	1	Y	N		
M4 J3 - J8	5	2	Y	Y		
A21 Tonbridge to Pembury	10	1	Y	N		
A160/A180 Immingham		2	Y	Y		
A19 / A1058 Coast Road		0	N	N		
A63 Castle Street	5	0	N	N		
Autumn Statement						
A1 Leeming to Barton	2	1	Y	P	P	
A5-M1 Link	10	1	Y	P	P	
A1 Lobley Hill		2	Y	Y		
Contingency Scheme's						
M6 J16 - 19		2	Y	Y		
M5 J4a - 6	10	2	Y	Y		
M4 J8 - 12		2	Y	Y		
M1 J16 - 19	4	2	Y	Y		
Total						

The route map to a Lean Highways Agency and our Supply Chain

Organisational Lean maturity;
applying the 4 stage competence model

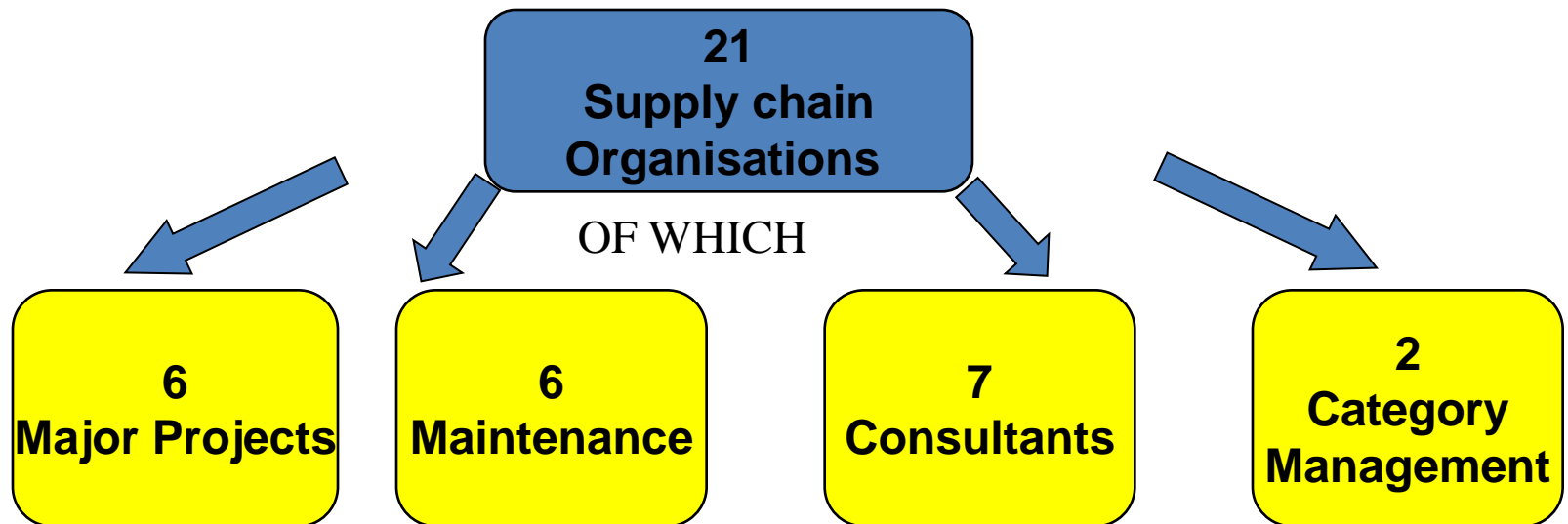




- 0 = Lean not yet introduced**
- 1 = Improvement in patches of the organisation**
- 2 = Lean is aligned to organisational strategy**
- 3 = Organisation plus supply chain engaged in Lean**
- 4 = Organisation is very mature and striving towards perfection**



In 2012/13 the following organisations
underwent the HALMAT process
(Highways Agency Lean Maturity Assessment Toolkit)



2011-12

Range
1.28 - 2.40
Average
1.83

Range
1.25 – 1.87
Average
1.57

Range
1.31 – 2.43
Average
1.82

No category
Management
Assessments
In 2011/12

2012-13

Range 1.97 - 2.63

Average **2.39**

Range 1.31 – 2.3

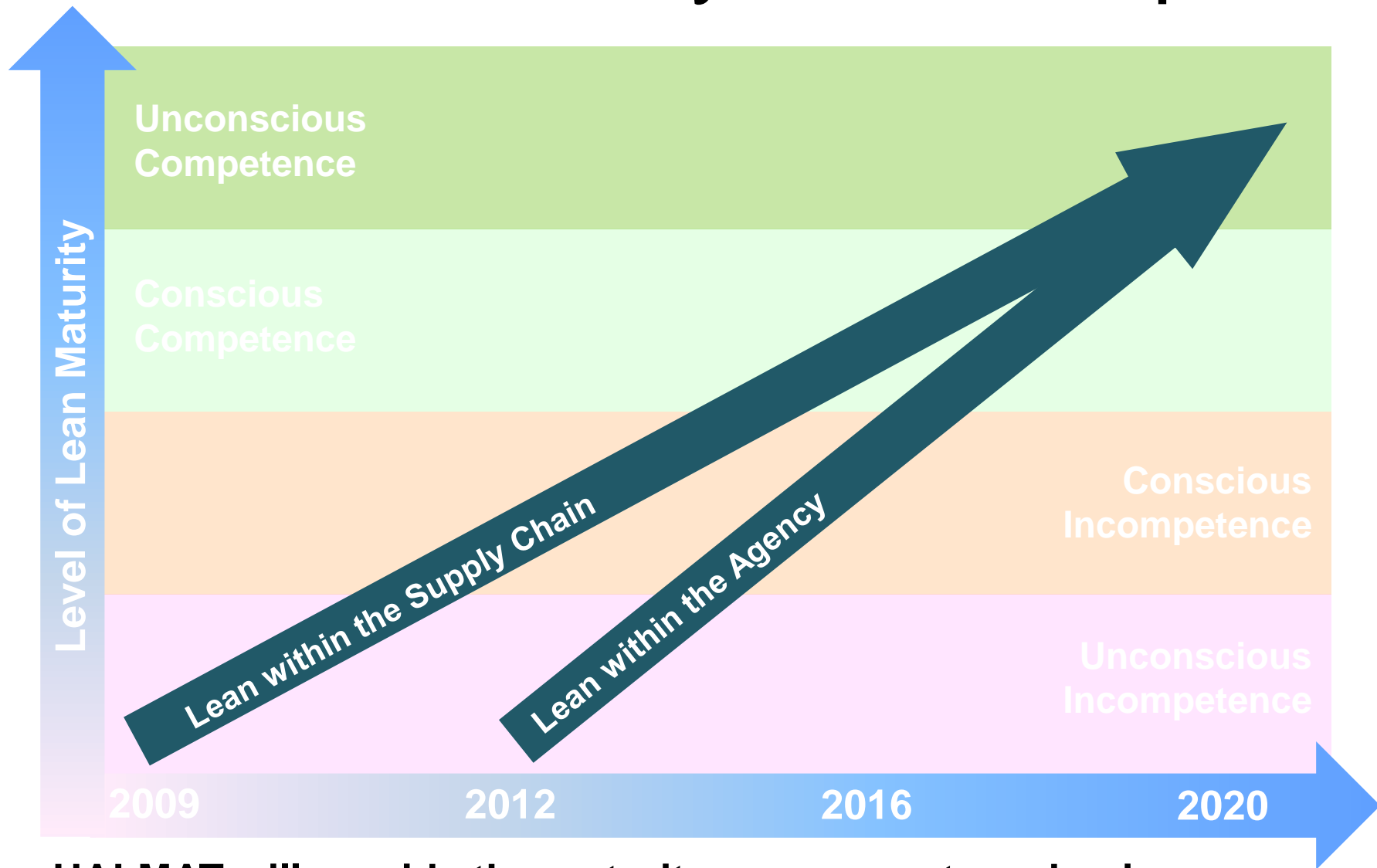
Average **1.95**

Range 1.53 – 2.41

Average **1.93**

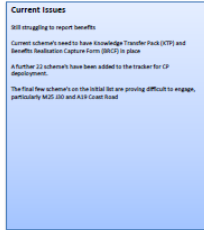
Group needs to be
larger before
range and average
can be
provided

Lean Maturity Route Map



HALMAT will provide the maturity assessment mechanism

Status Report



Some Examples

Safe roads, Reliable journeys, Informed travellers



A1 Dishforth to Barton Improve Motorway Communications D

Purpose:

- Maximise the output rates for installation of communications ducting

Deliverables:

- Root causes of delay and poor efficiency identified
- Procedures and Controls for sustained improvement
- Documented process
- KPI's and monitoring / reporting procedures identified

Improvements to Date:

- Now using 9m length pipes rather than 6m re productivity
- Reduction in air testing based on failure rate
- Activity sequence revised to install concrete associated issues

Benefits to Scheme:

- Reduced number of joints saving £15k in coll
- Productivity benefits based on 30km remaini reduction to programme
- Potential productivity increase of 15% by red

Transferability to other schemes:

- Significant reduction in H&S risk (man hours reducing/eliminating air testing
- 280km of buried cable to be replaced with du 9m lengths used.

Safe roads, Reliable journeys, Informed travellers



A46 Newark to Widmerpool Efficiencies in Chamber Constr

Objective:

Update drainage chamber construction to reduce waste in labour and materials.

Stakeholders:

Main contractor (Balfour Beatty)
Designer (Scott Wilson)
Materials (Polypipe)
Installer (Parkway, Rouse)
Supplier (Burdens)

Deliverables:

New chamber type enabling leaner, safer on-site construction

Target Benefits

- Installation of pipes and chambers by a single gang
- Eradicated need for wet trades
- Eradicated need for in-situ concrete cutting
- Reduced component weight / improved manual handling
- Transferable solution
- Preliminary estimate of £200-250k saving on this scheme, primarily from increasing labour efficiency.

Safe roads, Reliable journeys, Informed travellers



A1 Dishforth to Barton Improvement Maximising Blacktop Laying Efficiency

Objective:

- Maximise Laying Rates
- Increase utilisation of Plant and Labour
- Ensure Delivery to Programme

Deliverables:

- Maximised Productivity/Efficiency
- Root causes of delay & poor efficiency identified
- Procedures and Controls for sustained improvement
- Capacities and Constraints Identified.

Improvements to Date:

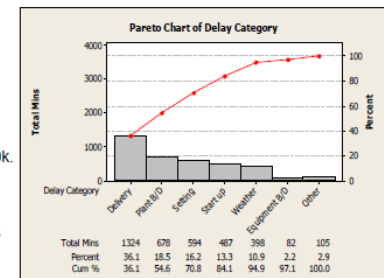
- Paver theoretical capacity is 330 tonnes/hr, however each individual coating plant can only produce 100 tonnes/hr. By changing the supply method and working time, paver gang working hrs have been halved and output doubled.
- New working procedures at shift start-up increased paver working time by over 8%.
- Mitigation plans and improved communications have minimised delay associated supplier plant breakdown.

Benefits to D2L:

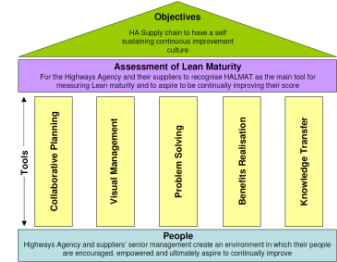
- 100% increase in productivity.
- 17 day reduction to programme.
- Saving of 34 Gang working days.
- Estimated savings in excess of £600k.

Transferability to Other Schemes:

Evaluation of 2 shift working suggests a potential saving of £1.4m for similar sized scheme.



'Awaiting Delivery', 'Plant Breakdown' and 'Delay before Start of Laying' accounts for 70% of all recorded delay




Knowledge Transfer

- Lean practitioners develop a knowledge transfer pack to capture lessons learned and ensure benefits can be applied to other schemes.

Safe roads, Reliable journeys, Informed travellers

HIGHWAYS AGENCY

M40 Junction 15 (Longbridge) Bypass




Project Delivery Knowledge Map

bre CLIP

Safe roads, Reliable journeys, Informed travellers

HIGHWAYS AGENCY

A14 Corridor Traffic Management Scheme




Transfer Pack and Commissioning March 2010

Birse Civils

Safe roads, Reliable journeys, Informed travellers

HIGHWAYS AGENCY



Area 4 Continual Improvement Consolidate Opportunities – Knowledge Transfer Pack

Balfour Beatty Mott MacDonald

PartnerNET

15 | June | 2010
Security Alert Heightened  HIGHWAYS AGENCY

Welcome, HOUSLS | [Portal Settings](#) | [Log Off](#)

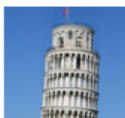
Search: Everywhere

- Home
- HA Whistle blowing
- EnvIS
- HD 45
- Memorandum of Understanding
- Supplier Engagement
- TTD Information Security
- NTIS
- HA Enterprise Architecture
- CCTV
- Traffic Learning Centre
- Pilots and Trials
- Safety Operational Folder
- Features
- NMM & RWSC
- Highways Agency Toolkits
- Maintenance Community
- Forward Planning Guidance
- Major Projects Community
- SfM

- LEAN Improvement
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 - 02 - Lean in the HA
 - 03 - Success Stories
 - 04 - Meet the Lean Team
 - 05 - Our Lean Partners
 - 06 Lean Jargon Buster
 - 07 - Files & Discussions

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What is Lean?



Lean is a world recognised technique for building a continuously improving business. The core principle of Lean is to maximise efficiency - delivering more for less.

[Learn More](#)

Lean in the Highways Agency



In April 2009, the Highways Agency Lean Improvement Division was created. The group focus is on delivering the benefits of Lean by applying the principles to HA processes.

[Learn More](#)

Success Stories



Lean Improvement has a history of successes around the world and in several industrial sectors. Check out some of the stories the Lean Improvement Division has chosen to highlight.

[Learn More](#)

Meet the Lean Team



The Lean Improvement Division consists of a core team of Lean Improvement Officers as well as secondees from the supply chain and other directorates in the Agency.

[Meet the Team](#)

Our Lean Partners



The savings made through Lean improvement methodology would not be possible without the co-operation and innovation of our supply chain partners.

[Meet our Partners](#)

File Store & Discussions



Lean Partners can up and download project files in this area. In addition, the discussion forum is an excellent place to share best practice and ask questions. You'll need a PartnerNET account to access the Lean Community.

[log in now](#)

Last updated: 02-Jun-2010

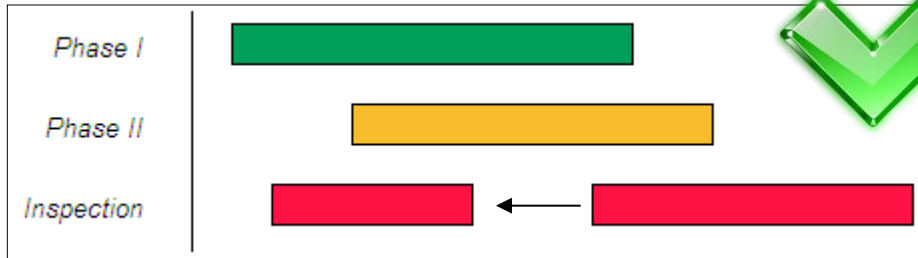
Feedback is always appreciated. If you have a suggestion you'd like to make on any aspect of this Community, please fill in the form below and click on 'Send'. Alternatively you may [click here](#) to use your own email system. Please note, your email system may prompt you for confirmation after clicking on send, choose 'OK' to continue.

Name:	<input type="text"/>
Query/Comments:	<input type="text"/>

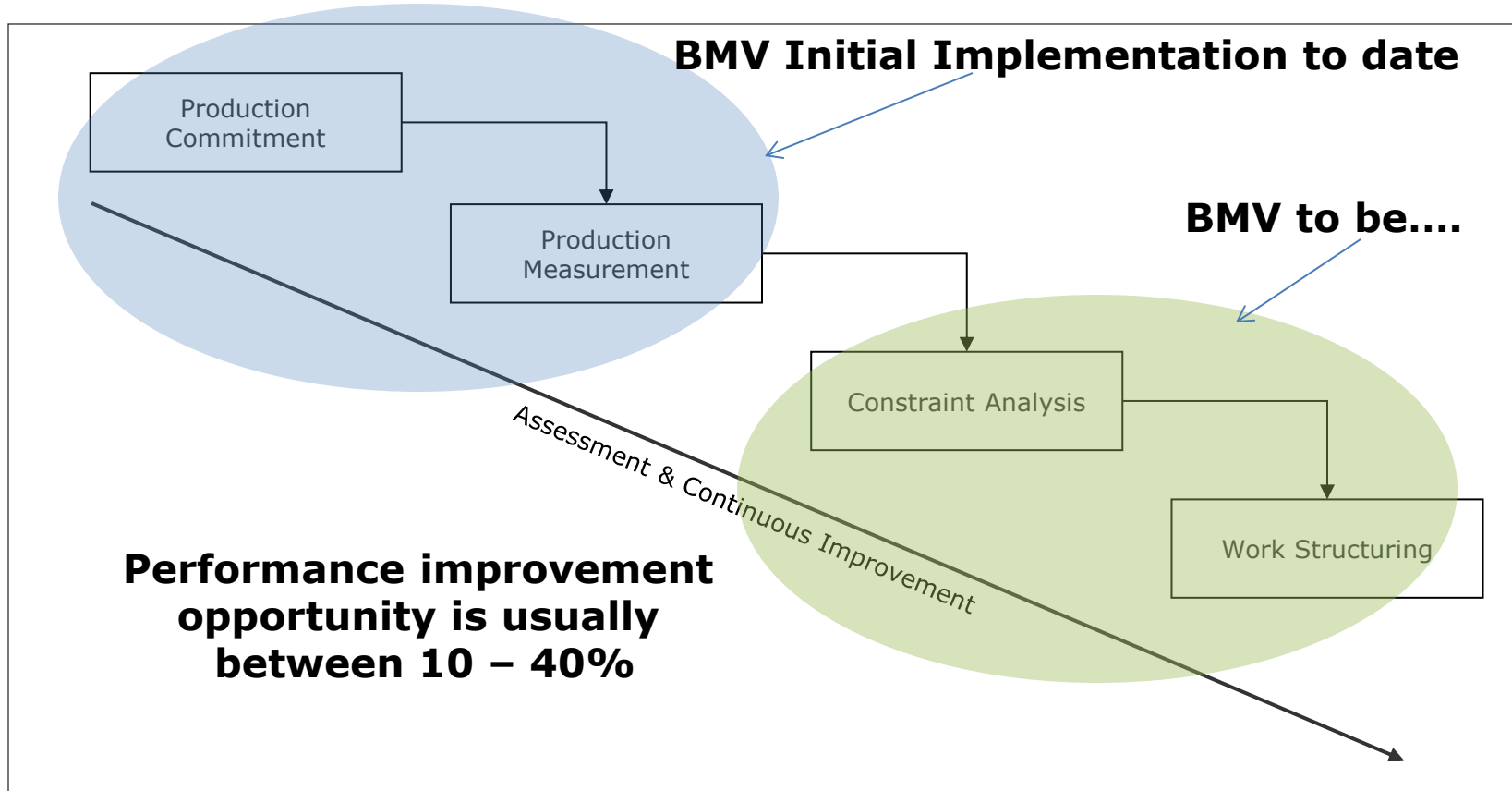
Trusted sites

Collaborative Planning

- Collaborative Planning is a technique that can reduce idle 'float' time on a project.
- This results in a more efficient programme, which can bring significant savings.
- Successfully used at Bidston Moss and M40 J15

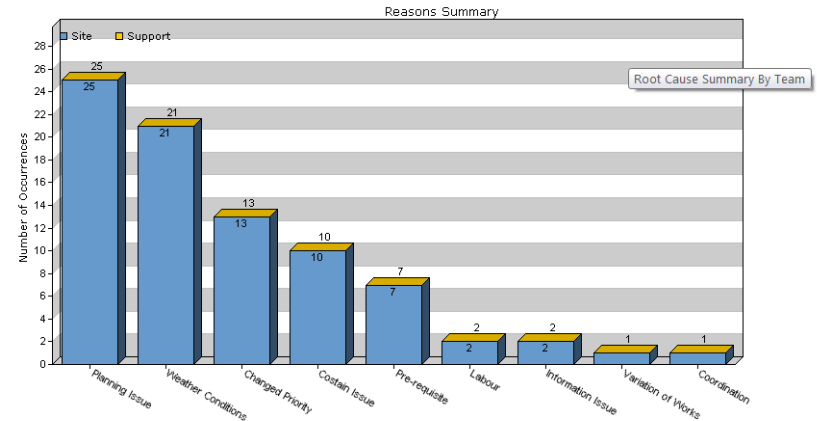
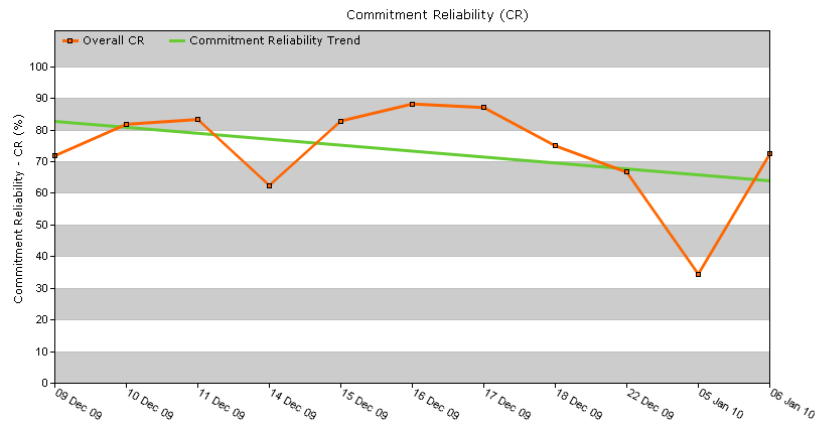


SPS|PM Implementation Process

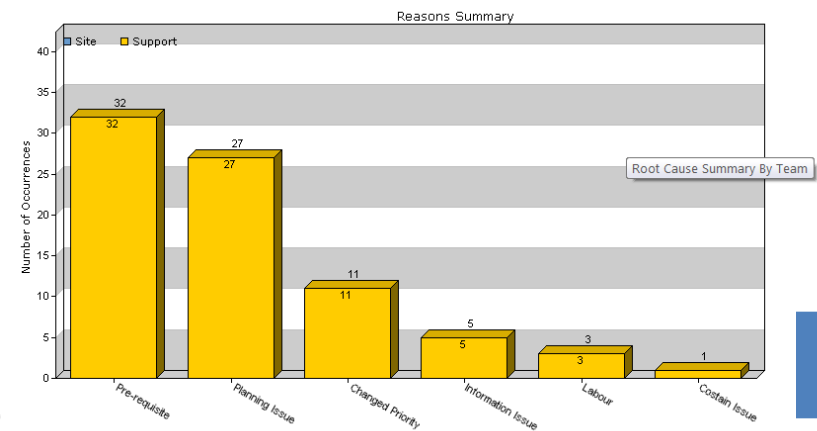
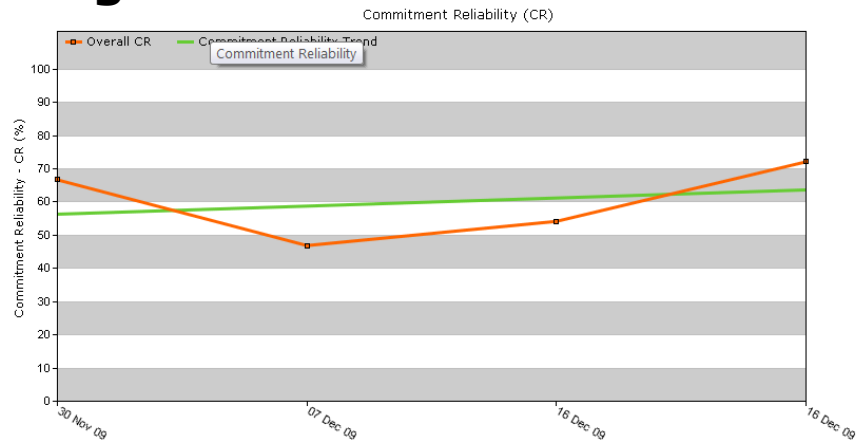


Reliability & Reasons

Construction



Design:



Visual Management

- An easy two-way communication tool for workforce and management.
- Placed in a prominent location and updated regularly.

Lean Sigma Project

4.2 Earthworks Process Implementation

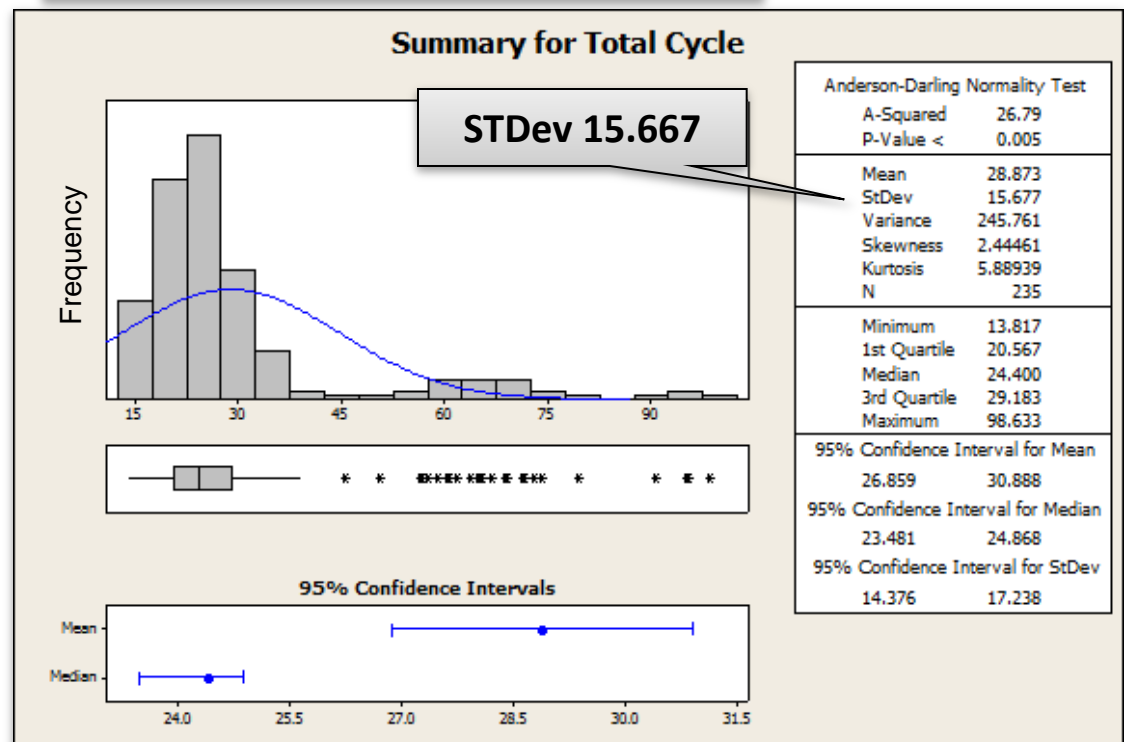
October 5

Total Truck Time October 5

The high variation in cycle time is attributed to a number of things:

- Haul distance
- Break downs
- Delays and disruptions on haul route.

Further observe and analysis is needed to narrow down the cause of variation.



Motorway Communications Ducting





Our Vision

- Delivery of measurable efficiency improvements
 - Time compression /Cost
 - Safety
 - Carbon
- Develop industry capability using lean thinking (Adapted Toyota Production Model)
- Significant industry shift towards continuous improvement

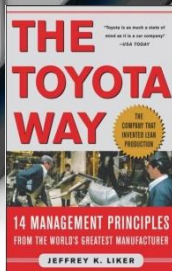
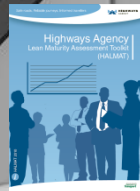
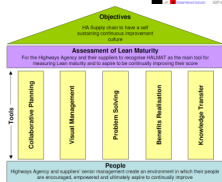
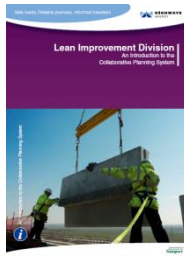


What next?

2025

Collaboration

Construction = Production



Industrial Strategy: government and industry in partnership



Construction 2025

Prof Steve Peters

CREATOR OF THE **GROUNDBREAKING** MIND MODEL



"The mind
programme
that helped
me win my
Olympic Golds"
Sir Chris Hoy

The
**MIND
MANAGEMENT**

Programme for
Confidence, Success and Happiness

**Changing
Behaviours!**

What next other than more of it?

- Focus on value especially from design (products)
- Improving all our processes
- Customer experience
- Shorter faster roadwork's – a challenge to us!
- Synchronizing decision making at the work face?
- BIM and lean
- What else?



Thank You

More Information & Contact details

<http://www.highways.gov.uk/specialist-information/lean-improvement/>

<http://leanconstruction.org.uk/#>

Lean Construction Institute UK