



# **Deploying Lean across a £2.5bn business**

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**Divisional Director Lean Improvement**

[Lean in the Public Sector Conference 2015 - Barcelona](#)

The Highways Agency  
Strategic Road Network



- 4,300 miles (40% Motorway & 60% APTR).
- 9,000 bridges, 9,000 other structures and 34,000 drainage assets.
- 34% of all road travel and 67% of lorry freight travel.
- 4 million vehicles use the network daily.
- 6000 incidents/month
- Asset valued at over £100 Billion

# Our Lean Journey

“working with our  
supply chain to achieve  
conscious competence  
in lean”



My Hypothesis!

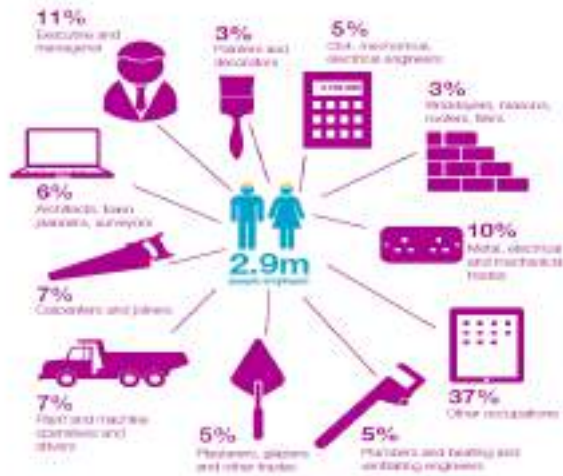
If clients don't ask for change  
they will not get it!





HM Government

# Construction



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

# 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\***

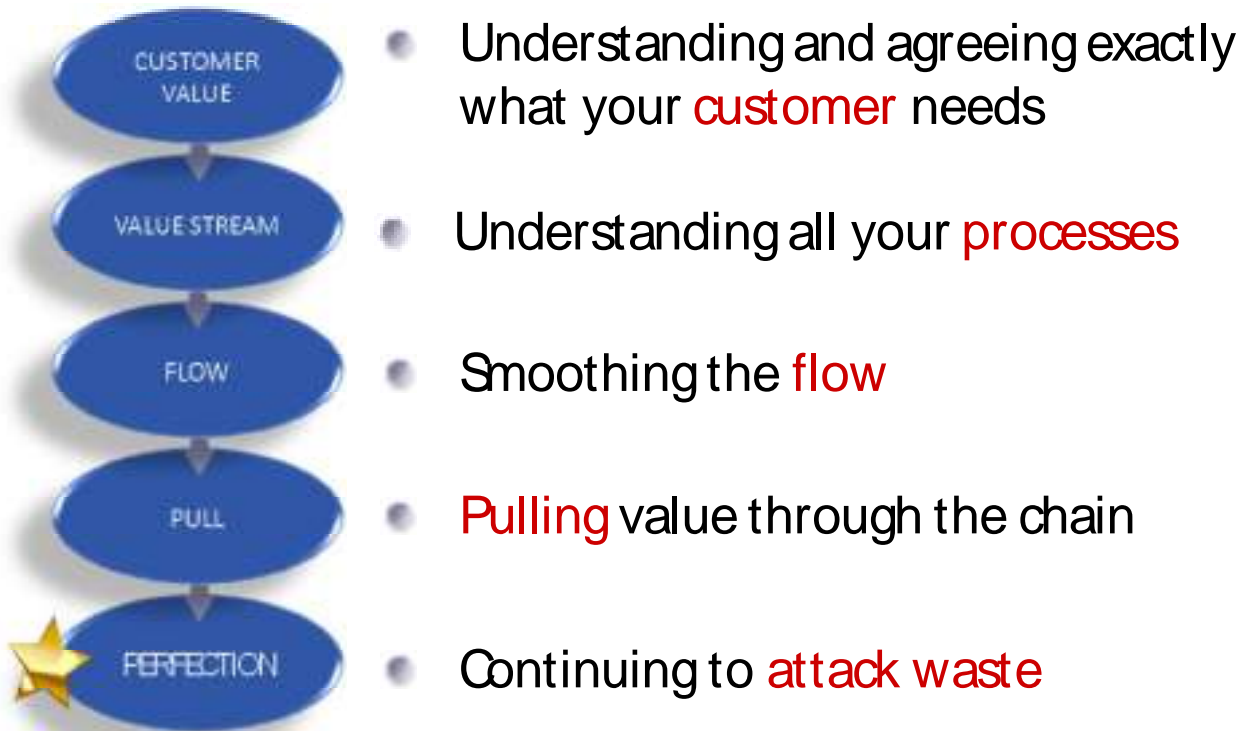
\*Source: Global Construction 2022



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

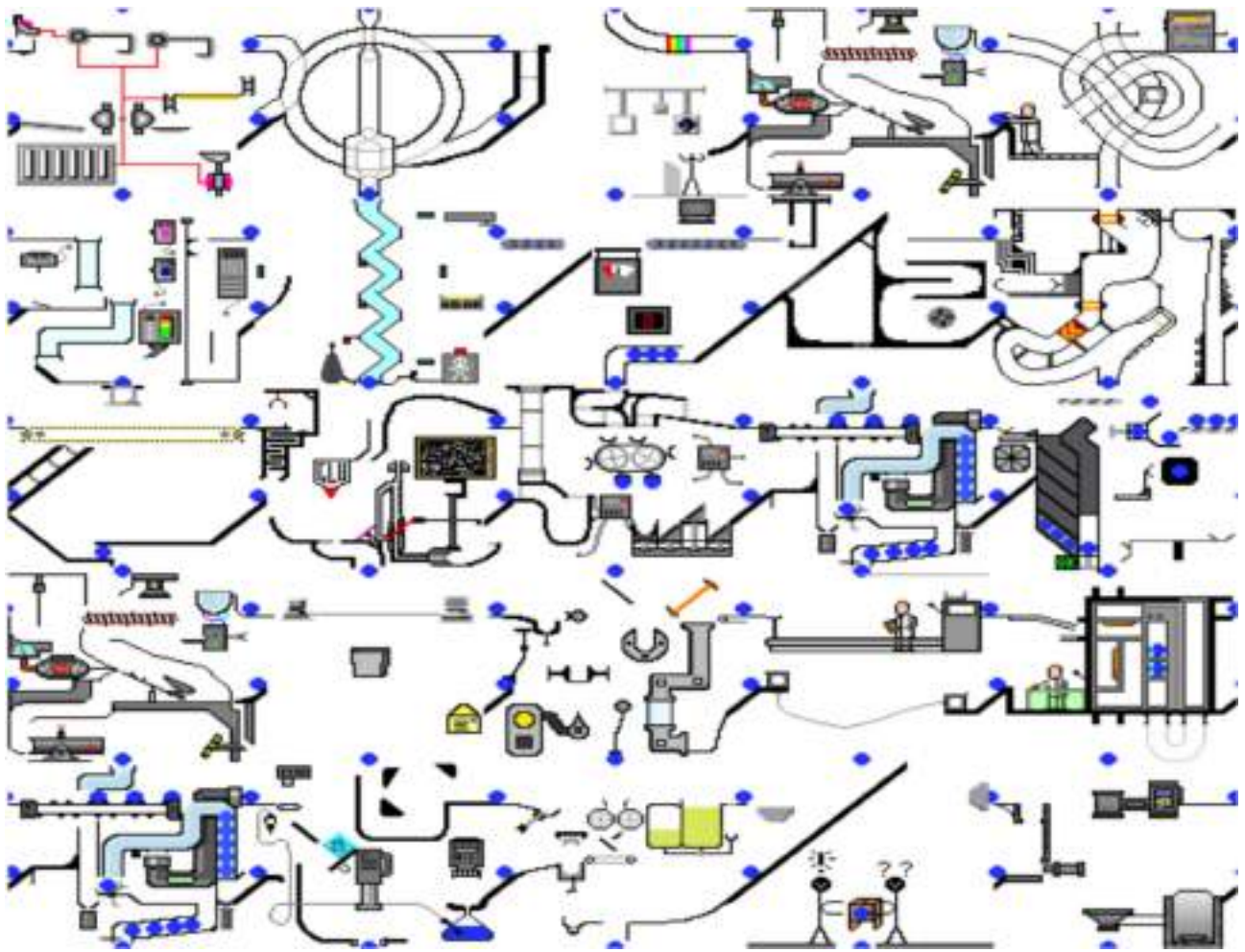
#findstrategy

# Defining Lean Thinking?

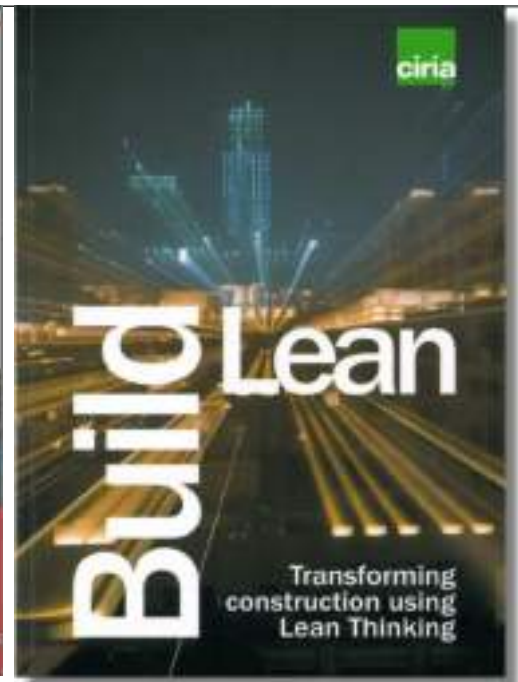
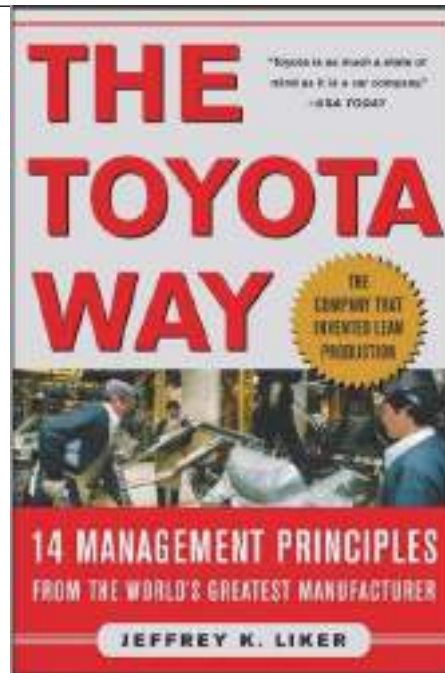
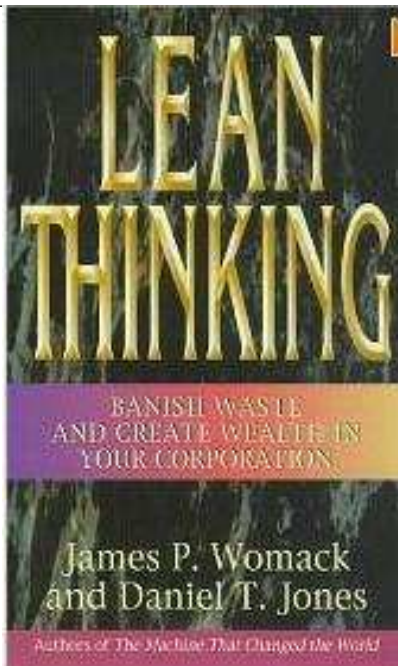


Principles now adopted world-wide in a variety of industries and professions

# The Human Organism?



# Our Philosophy

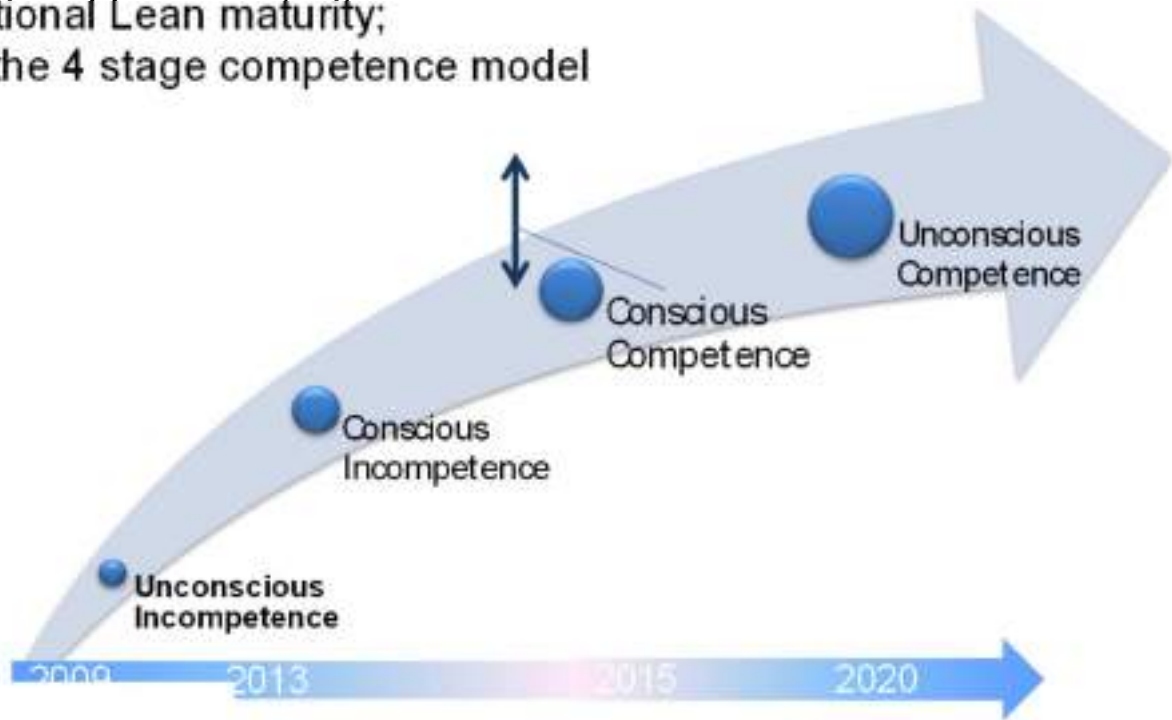


**The Client must engage with the Supply Chain to achieve continuous improvement!**



# The route map to a Lean Highways England and our Supply Chain

Organisational Lean maturity;  
applying the 4 stage competence model



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**

Major Projects



SMART  
Motorways



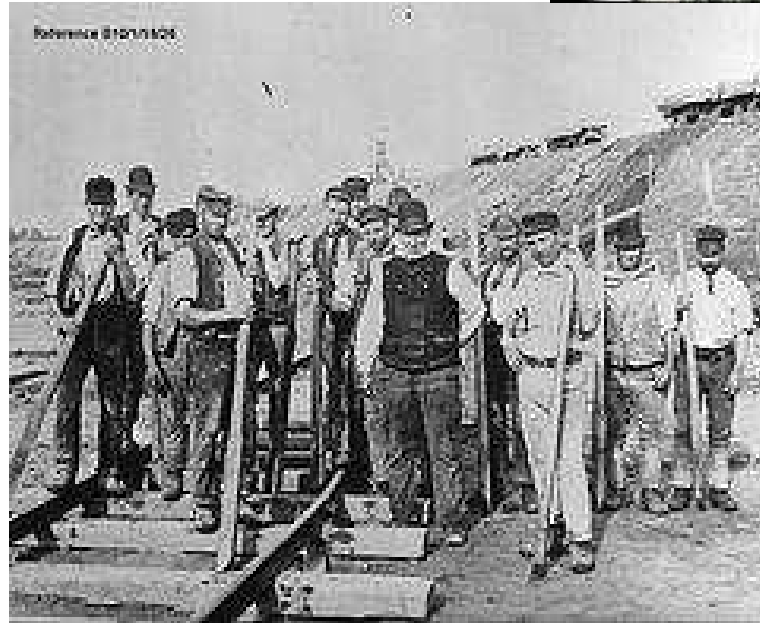
Highways England Lean Deployment

Maintenance



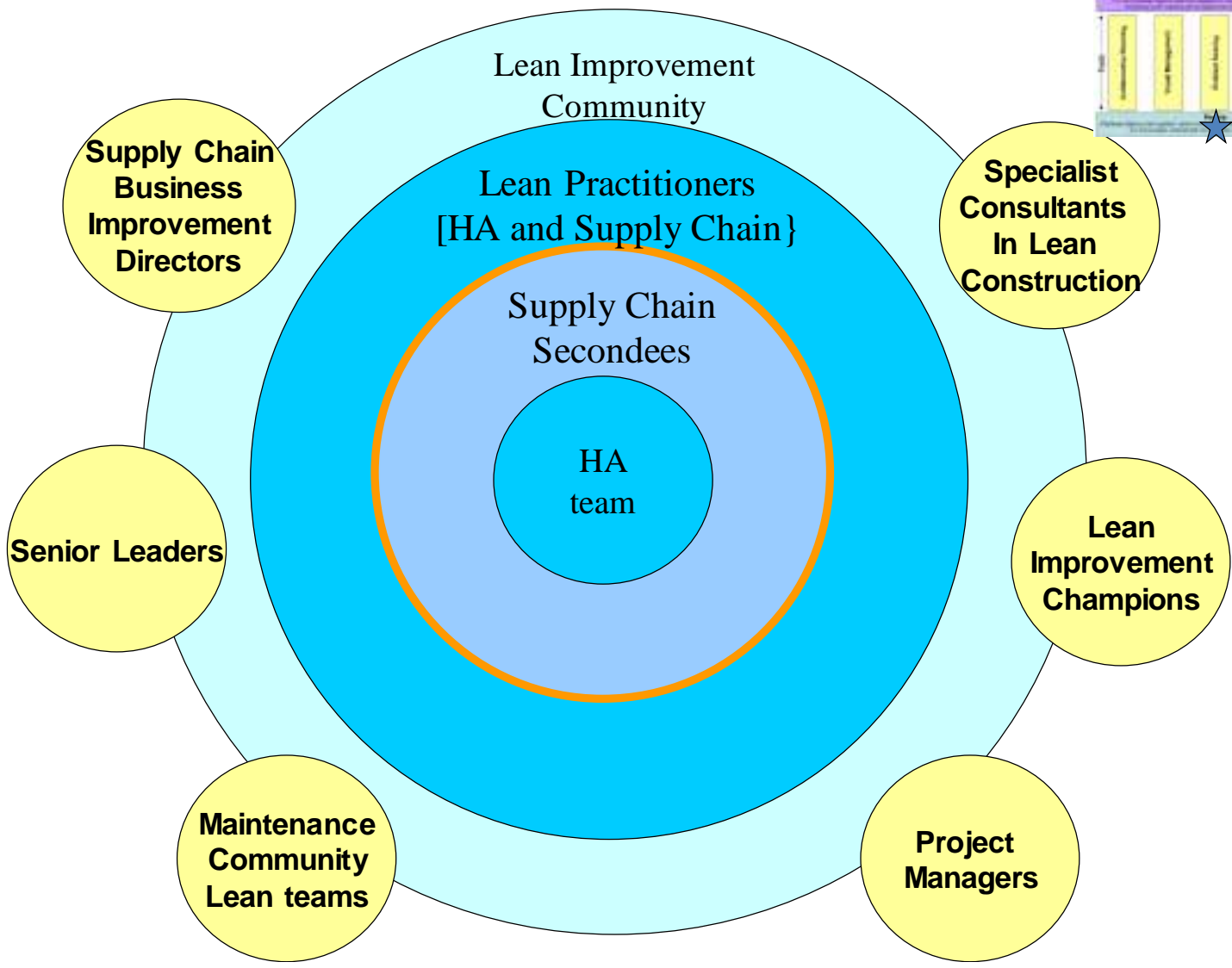
HA Business



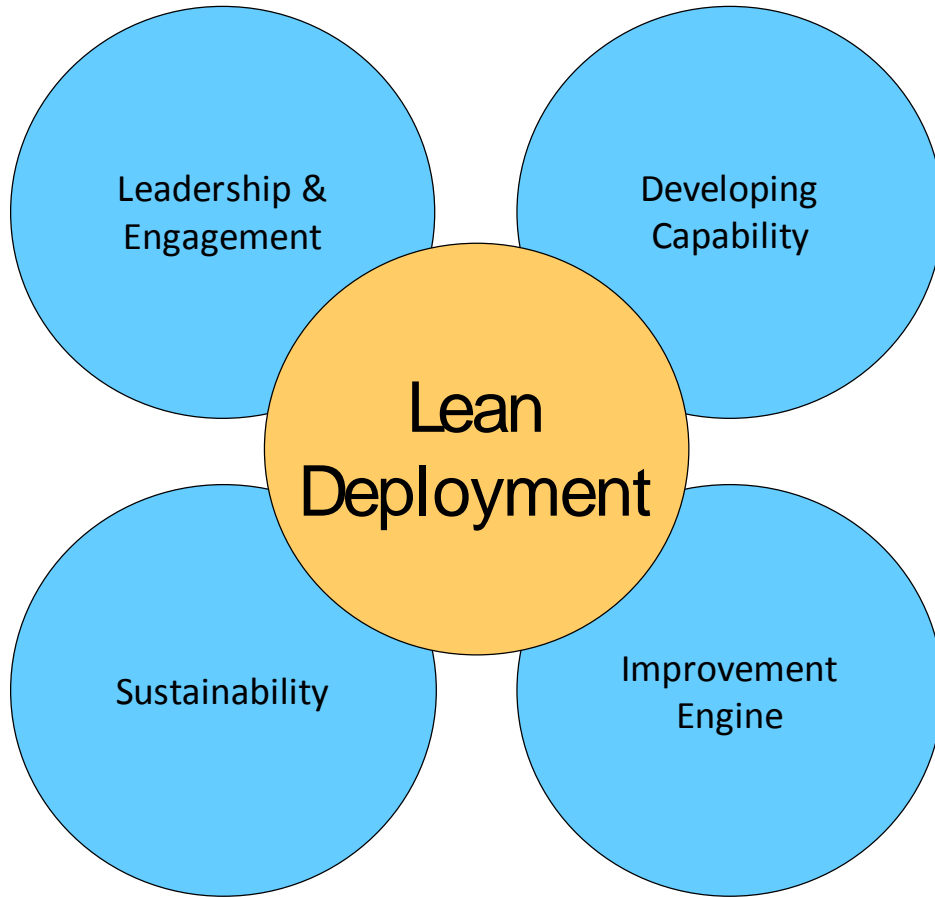








# Lean Deployment Strategy





# 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

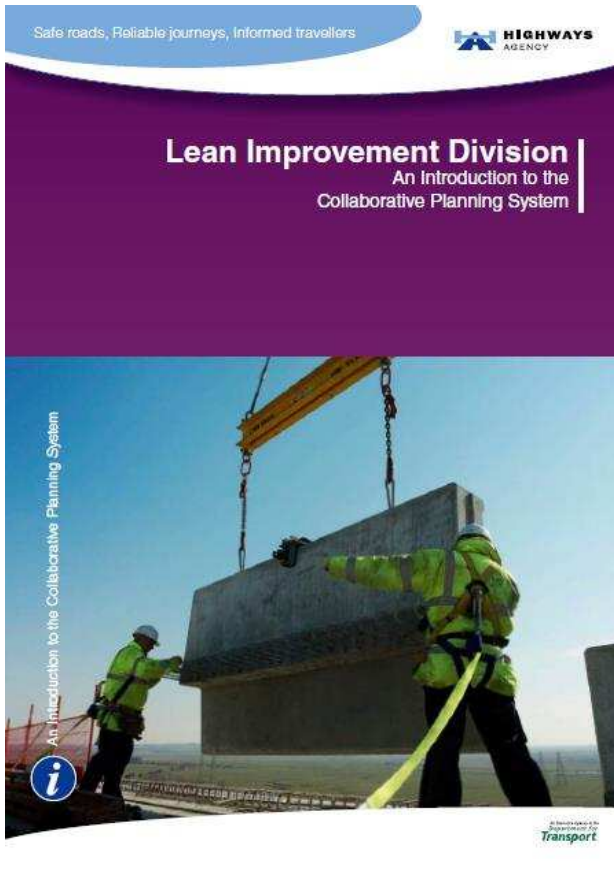
- Understand concepts Able to use a range of Lean Sigma data analysis tools
- Able to lead more complex Projects
- Able to train to Lean Practitioner level
- Apply learning on delegates own HA project Green Belt 'accreditation' by Black Belt following pass of examination, completion of GB project & production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

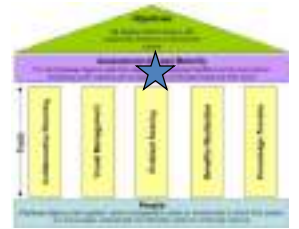
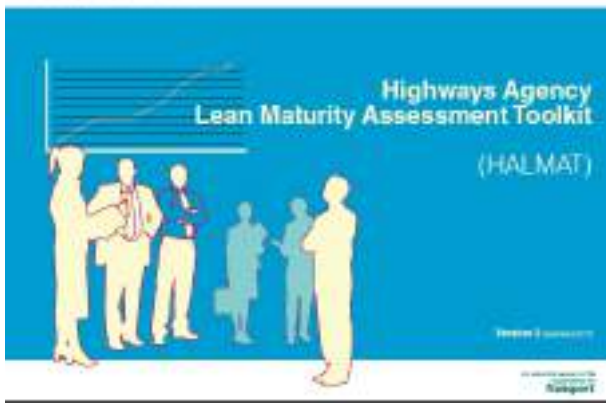


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# Collaborative Planning in the Supply Chain

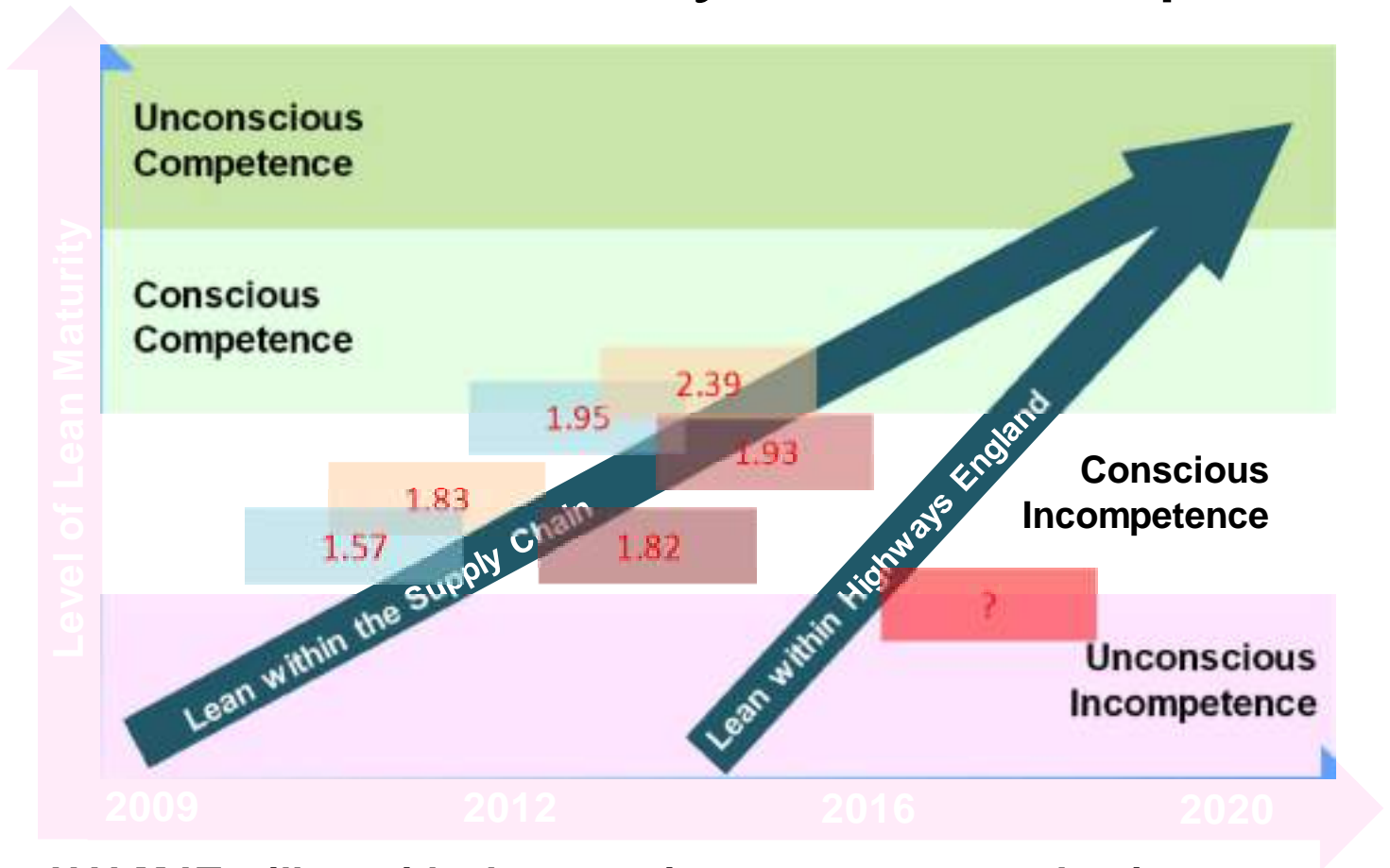
Projects	Days required for CP in M15	CP Effort Rating (range = 1 (low) - 4 (high))	Collaborative Mapping	Weekly Production Control @ Design	Weekly Production Control @ Contract	Daily Last Planner
<b>SR 10</b>						
A23 Handcross - Watlington		4	Y	Y	Y	Y
A46		4	Y	Y	Y	Y
M1 J10 - 13		3	Y	Y	Y	Y
M62 J25 - 130		4	Y	Y	Y	Y
M4 J19-20 and M5 J15-17		3	Y	Y	Y	Y
M6 J5-J6 (Box Phase 3)		1	Y	Y	Y	Y
A11 Flyways - 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 J20-31		4	Y	Y	Y	Y
Manchester Combined (M60 J8 - J12, M62 J18 - J20 & M60 J12 - J15)	20	3	Y	Y	Y	Y
M1 J39-J42	10	3	Y	Y	Y	Y
A656 Knutsford - Bowdon	2	2	Y	Y	Y	Y
<b>Growth Projects</b>						
A46/A46 Tober End	3	4	Y	Y	Y	Y
A453 Widening	20	3	Y	Y	Y	Y
M1 J19 Improvement	20	4	Y	Y	Y	Y
A14 Kettering Bypass	5	3	Y	Y	Y	Y
M6 J10a - J13		4	Y	Y	Y	Y
M3 J2 - J4		3	Y	Y	Y	Y
<b>Pipeline Projects</b>						
M25 J35	10	1	Y	Y	Y	Y
M4 J3 - J6	5	3	Y	Y	Y	Y
A21 Tonbridge to Pembury	10	1	Y	Y	Y	Y
A106/A166 Birmingham		3	Y	Y	Y	Y
A197/A1056 Coast Road		0	Y	Y	Y	Y
A83 Castle Street	8	0	Y	Y	Y	Y
<b>Autumn Statement</b>						
A1 Leeming to Barton	2	1	Y	Y	Y	Y
A8 M1 Link	10	1	Y	Y	Y	Y
A1 Lutterly Hill		3	Y	Y	Y	Y
<b>Contingency Scheme's</b>						
M6 J18 - 19		3	Y	Y	Y	Y
M5 J4a - 9		3	Y	Y	Y	Y
M1 J9 - 12	10	3	Y	Y	Y	Y
M1 J10 - 19	4	3	Y	Y	Y	Y
<b>Total</b>						



- 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



# Lean Maturity Route Map



**HALMAT will provide the maturity assessment mechanism**

- MAINTENANCE
- MAJOR PROJECTS
- CONSULTANTS
- Highways England

# Over 300 Case Lean Projects



Safe roads, Reliable journeys, Informed decisions

**A1 Dishforth to Barton Improve Motorway Communications**

**Purpose:**

- Maximize the output rates for installation of communications during

**Deliverables:**

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

**Improvements to Date:**

- Now using 6m length pipes rather than 3m in productivity
- Reduction in all testing based on failure rate
- Activity sequence revised to install concrete associated issues

**Benefits to Scheme:**

- Reduced number of joints saving £10k in cost
- Productivity benefits based on 30km remain reduction to programme
- Potential productivity increase of 75% by real

**Transferability to other schemes:**

- Significant reduction in H&S risk from heavy industry eliminating air testing
- 200m of buried cable to be replaced with duct in lengths used

Safe roads, Reliable journeys, Informed decisions

**A66 Newark to Widmerpool Efficiencies in Chamber Construction**

**Objective:**

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

**Stakeholders:**

- Main contractor (Salfour Beatty)
- Designer (Scott Wilson)
- Minivan (Poyper)
- Installer (Powers, Route)
- Supplier (Bardine)

**Deliverables:**

New chamber type existing layout, water 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 casting
- Reduced component weight / improved manual handling
- Transportable solution
- Preliminary estimate of £200-250k saving on the scheme, primarily from increasing labour efficiency.

Safe roads, Reliable journeys, Informed decisions

**A1 Dishforth to Barton Improvement Maximising Blacktop Laying Efficiency**

**Objective:**

- Maximize Laying Rates
- Increase utilization of Plant and Labour
- Ensure Delivery to Programme

**Deliverables:**

- Estimated Productivity/Efficiency
- Root causes of delay & poor efficiency identified
- Procedures and Controls for sustained improvement
- Capabilities 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%
- Logistics plans and improved communications have minimized delay associated supplier joint breakdowns

**Benefits to G&C:**

- 100% increase in productivity
- 17 day reduction to programme
- Saving of 34 Gang working days
- Estimated savings in excess of £200k

**Transferability to Other Schemes:**

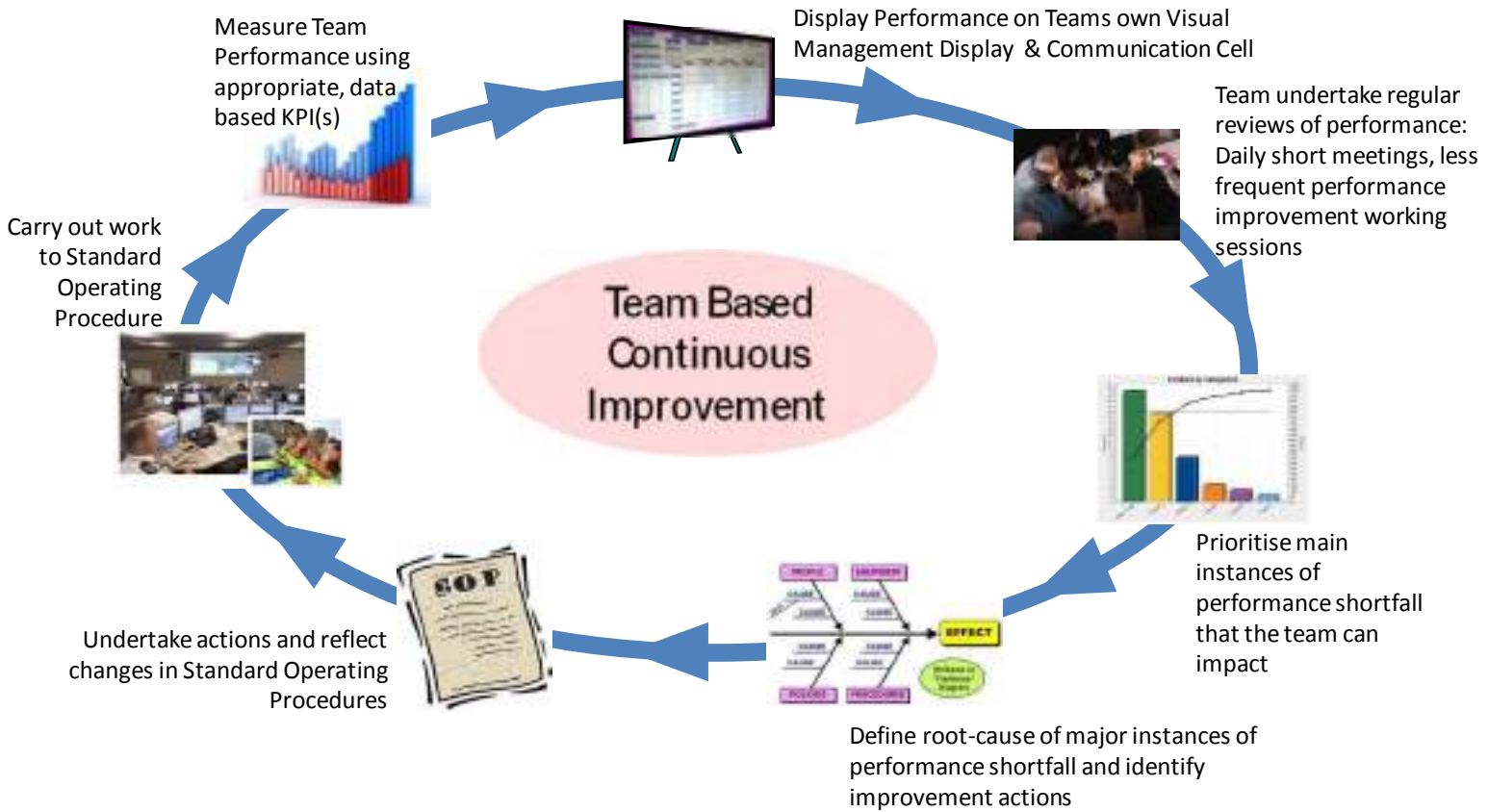
Evaluation of 2 shift working suggests a potential saving of £1.4m for similar sized schemes.

Working Delivered, Plant Breakdowns and Delay before Start of Laying accounts for 70% of all reviewed delay

# Improving efficiency is not new!



# Deploying lean across Highways England





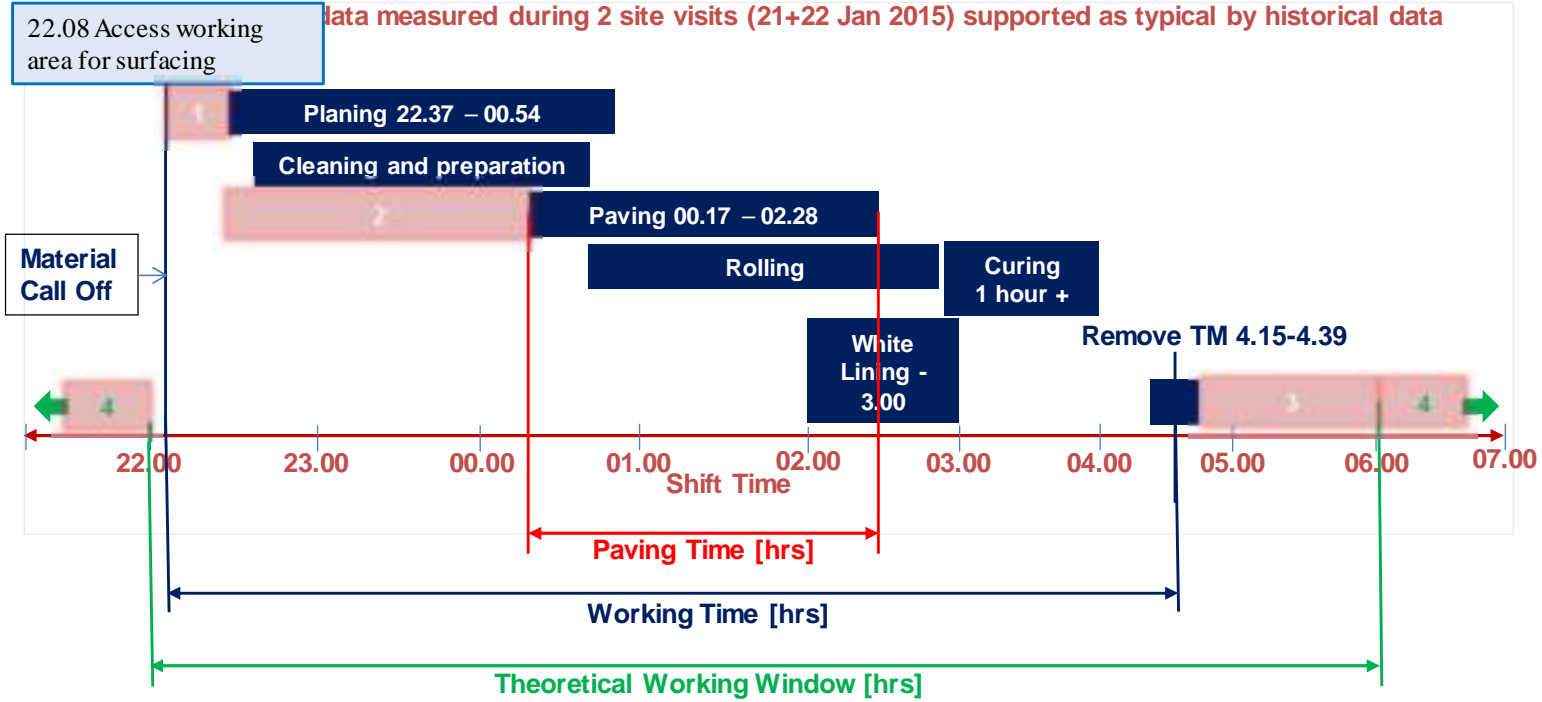


# Optimising Surfacing Productivity

## The 1000 T target

# Current state – What were the issues

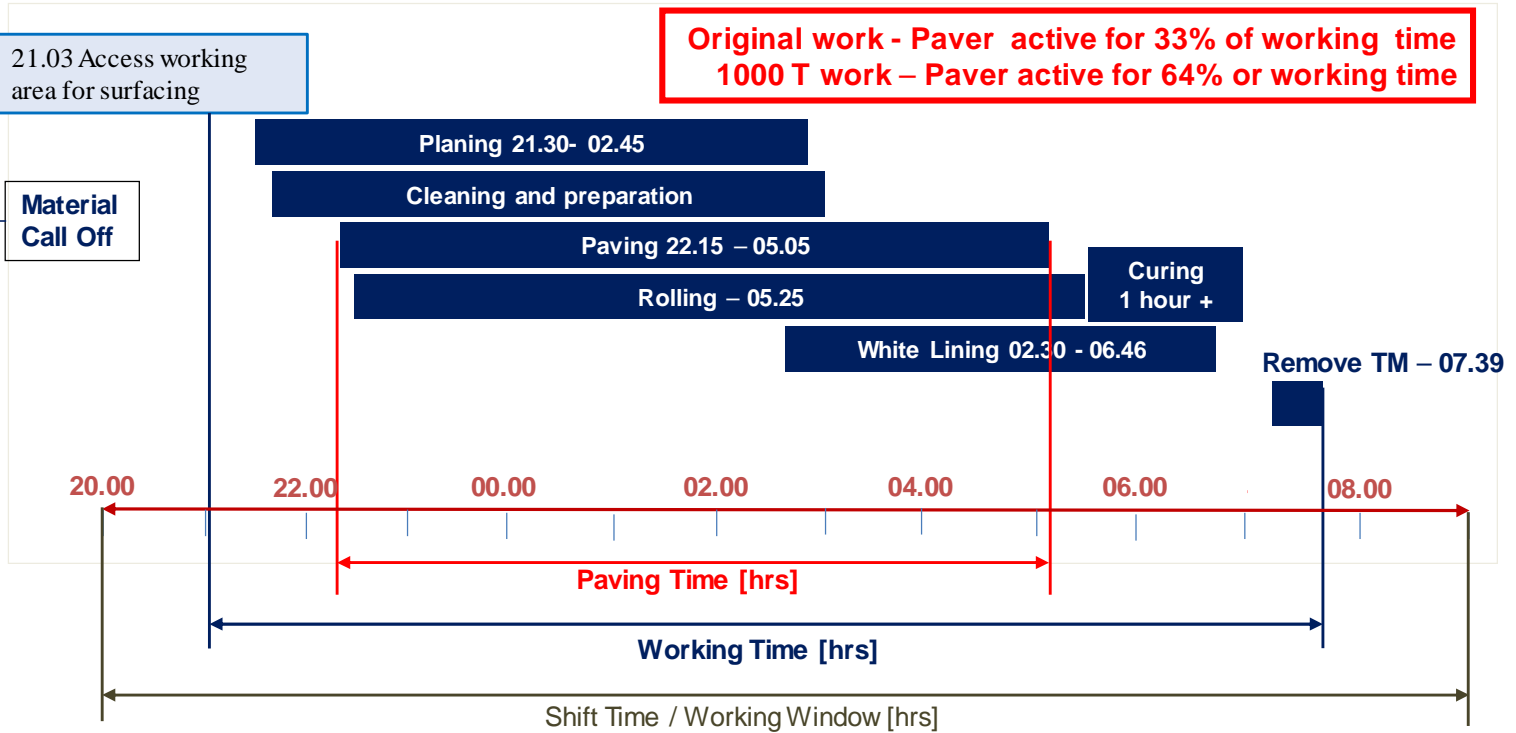
Data measured during 2 site visits (21+22 Jan 2015) supported as typical by historical data



## Top critical areas of Non Value Added

1. Why does it take nearly half an hour from close of motorway to start planing ?
2. Paver idle –Awaiting material –Why are we waiting ?
3. Off site nearly 1.5 hours before we need to be – can we extend paving further and get off later?
4. Are the working windows in line with contractually acceptable delay times – can they be increased?

## The outcome – 1024 T !



**Data:**

Shift Duration (staggered):	10 Hours
Theoretical Working Window 20.00-09.00:	13 Hours
Actual Work (TM on – TM off) 21.03-07.39:	10 Hr 36 Mins
Tonnage laid:	1024 T
Paving duration 22.15-05.05:	6 Hr 50 Mins

**Statistics (@ 45 mm thin surfacing):**

Average hourly tonnage laid:	137 T
Total meters laid:	938 m
Paving time of full working time	
- 6 Hr 50 Mins out of 10 Hrs 36	64%



# Lean Construction Research Alliance



To create improved project delivery to meet client needs and improved efficiency for constructors.

# 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
- Changing behaviors
- Gaining the support of Academia in developing new ideas?



# Thank You

More Information & Contact details

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

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

**Lean Construction Institute UK**

Image Credit: <http://www.flickr.com/people/29890539@N07/>