



# **BUILDING A LEAN MANAGEMENT SYSTEM**

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# Who am I?



- Writer – with Jim Womack of **The Machine that Changed the World** and **Lean Thinking** books
- Researcher – formerly at Cardiff University, UK  
– on how to do lean everywhere!
- Founder of the non-profit **Lean Enterprise Academy** in the UK, which is a member of the **Lean Global Network** set up by the **Lean Enterprise Institute**
- We publish workbooks on the building blocks of lean, and support these with advanced level workshops
- We mentor firms experimenting at the lean frontier
- We tell lean stories via our monthly email letters!

# Lean is Old and is not Japanese



- The Venetians understood “flow” production by 1400 – making one ship a day (so probably did the Chinese!)
- The French Army understood the need for interchangeable parts before 1789
- Brunel was making standardised parts in process sequence for the British navy by 1807
- Blanchard made rifles on automatically cycling machines laid out in cells in Springfield in 1818
- Ford developed the first complete **“flow production”** system at Highland Park, Detroit in 1914

# From Mass to Lean



- Ford went on to create **“mass production”** at the Rouge in 1927 - making huge volumes of parts for assembly globally – using big machines, big batches, and complex coordination as pull became push
- Toyota extended “flow production” to cope with variety – using simple machines with quick change tools, in process sequence pulled by customer demand
- **“Lean production”** was perfected by 1970 and extended across the whole enterprise and across the whole of Toyota City – as the **“Toyota Way”**

# Toyota's Lean Strategy



**“Brilliant process management is our strategy.**

**We get brilliant results from average people  
managing brilliant processes.**

**We observe that our competitors often get  
average (or worse) results from brilliant people  
managing broken processes.”**

**Which is why Toyota will be No 1 by 2010!**

# Lean Thinking



- The objective is to manage the business backwards from the customer definition of **value** - not forwards from your **assets** and **organisation**
- To create end-to-end and shared **primary processes** to design, deliver and support this value - with minimum wasted effort and time – together with the **support processes** to enable them
- And to build a **management system** to develop, sustain and improve these processes over time
- Be clear about customer **Purpose**, before designing the **Processes** and then organising the **People**

# Lean in the USA & the UK



- Toyota has had a very powerful demonstration effect in the USA (and the UK) and has created a large pool of people with hands-on experience of TPS
- There is no longer any debate that lean is the way forward for manufacturing – and almost every large firm now has a lean programme underway
- There is extensive support to spread lean to SMEs and lean is now beginning in services and healthcare
- After many years GM has its own lean assembly plants and has begun to spread lean across all functions

# Lean in Brazil



- Many of the best examples of lean in German and Swedish companies are in Brazil, not at home!
- Taiichi Ohno tried out many early pieces of TPS in the original Toyota plant in Brazil
- GM and Ford (Amazon) have launched new lean plant concepts in Brazil – with great success
- Brazil has the most active lean movement outside the USA
- There are signs that they will be followed by Turkey, Poland, India, Vietnam and China!

# Lean in Germany



- Has been a big disappointment – so far – I am surprised that so little was learnt from Porsche
- Growth by acquisition was a big distraction for the German assemblers – who are not immune from a big push by Toyota and Lexus into European markets
- The surprisingly high defect levels from suppliers shows that the focus on process has not been learnt
- Maybe we will now see a second wave of lean in Germany – with a retranslation of **Lean Thinking** and a new **Lean Management Institute** in Aachen

# Understanding Lean



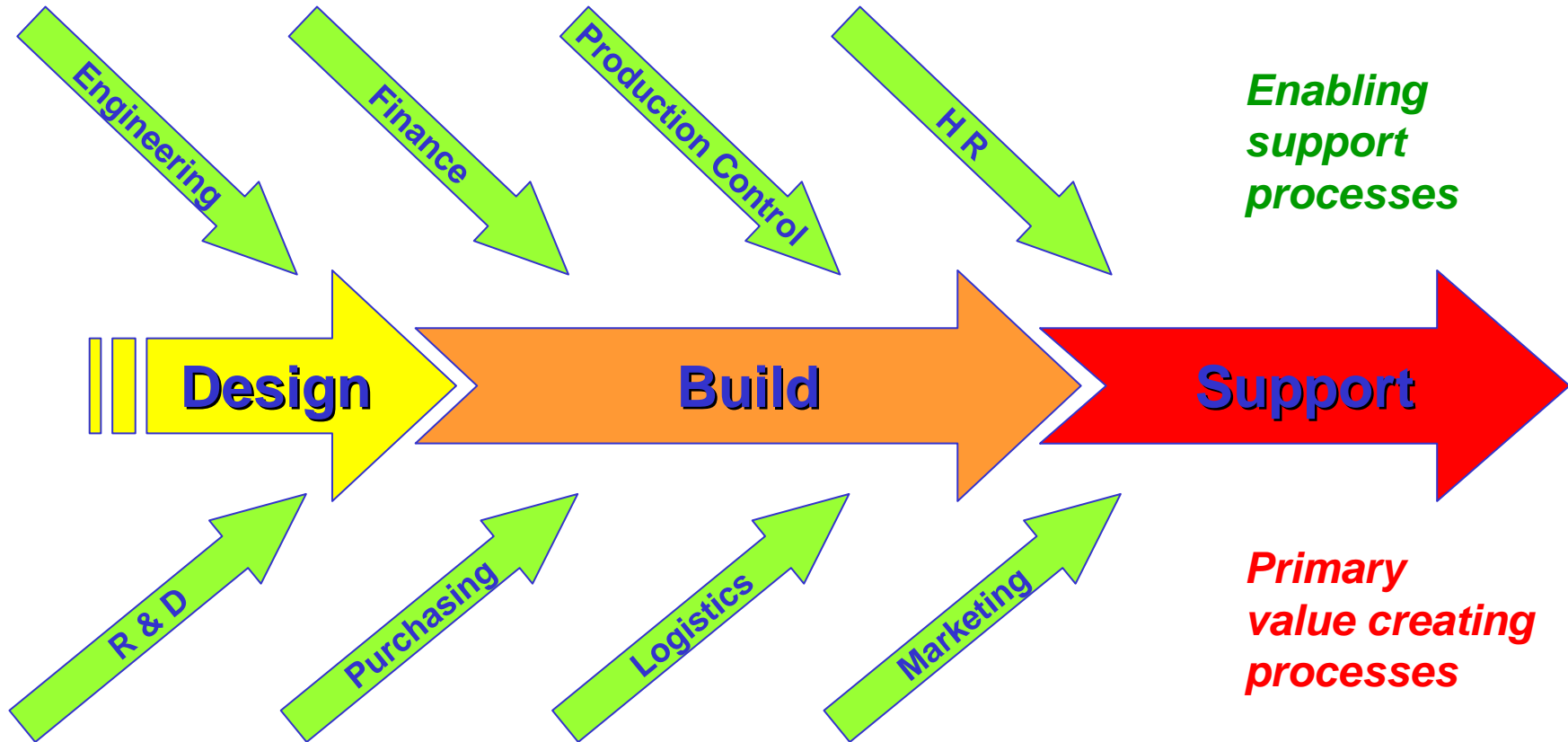
- Initially thought of as empowered teams and continuous improvement – Kaizen and TQ
- Then as a box of tools – 5S, SMED, TPM etc.- sometimes combined into a Production System
- Then as a more radical reconfiguration of individual operations – Kaikaku – all still **Point Kaizen**
- Value stream mapping introduced the visual language for **Flow Kaizen** and **System Kaizen**
- But bottom up Lean can only go so far – at some point it needs to be linked to a clear business case and led by top management – a **Lean Business System**

# Leaning Value Streams



- We need to see the organisation as a collection of processes
- We need to learn where we can begin with lean
- We need to learn how to lean a process
- We need a common way to manage value stream redesign
- Using a common language for seeing processes and problem solving
- While extending lean upstream and downstream
- And to the next generation product and process

# The Process Organisation



***Every process has a customer – and can be leaned!***

# Where Can You Lean?



- Begin by filtering your portfolio of products or tasks
- Start to create flow on the things you do regularly:-
  - On high-volume parts with regular demand
  - Or on low volume parts made on simple tools
  - Or on the design and quotation of one-off products
  - Or on frequently performed tasks in the office
- Then work to incorporate less frequent products or tasks – modularising them, quicker changeovers, etc – while challenging the need for the long tail
- The end objective is to be able to produce to customer demand – Every Product Every Interval

# How Can You Lean?



**Much faster response and throughput times, higher quality on time, at much lower cost**

*Separate capacity planning from production instructions*

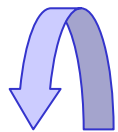
*No created demand amplification*

**Reflexive pull  
All the way back to raw materials**

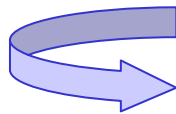
*Combine steps where you can to flow*

**Levelled and released in small quantities**

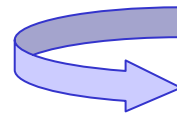
**Demand signals direct from the customer's point of use**



**Small quantities of parts delivered frequently**



**Production pulled from every upstream step**



**To only one pacemaker process**



**Uninterrupted flow back to the customer's point of use**

*No warehouses, only Cross-Docks and Mixed-model Milk Runs*

*Every step is:-  
Valuable  
Capable  
Available  
Flexible  
and Adequate*

*With just the right  
Standard  
Inventory of:-  
Cycle stock  
Buffer stock and  
Safety stock*

*No warehouses, only Cross-Docks and Mixed-model Milk Runs*

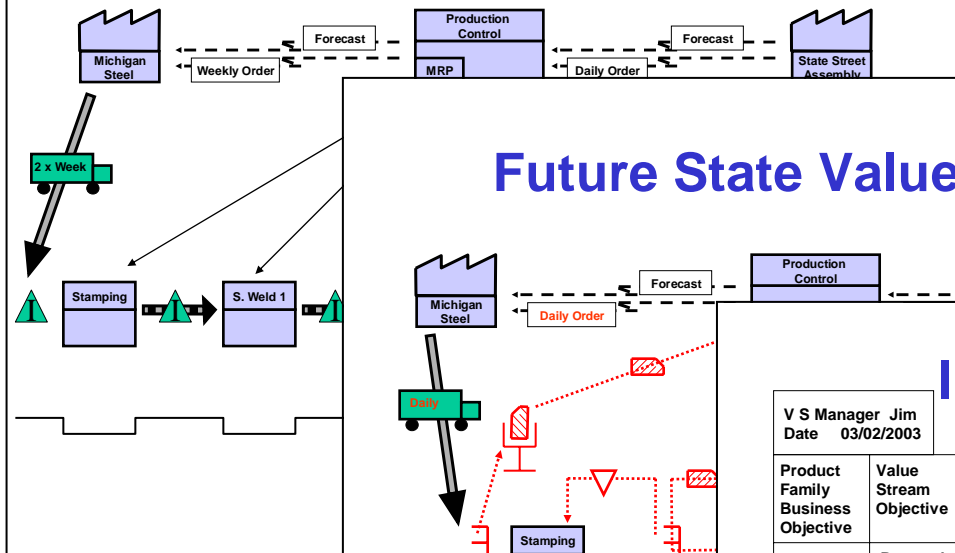
# Managing Flow Kaizen



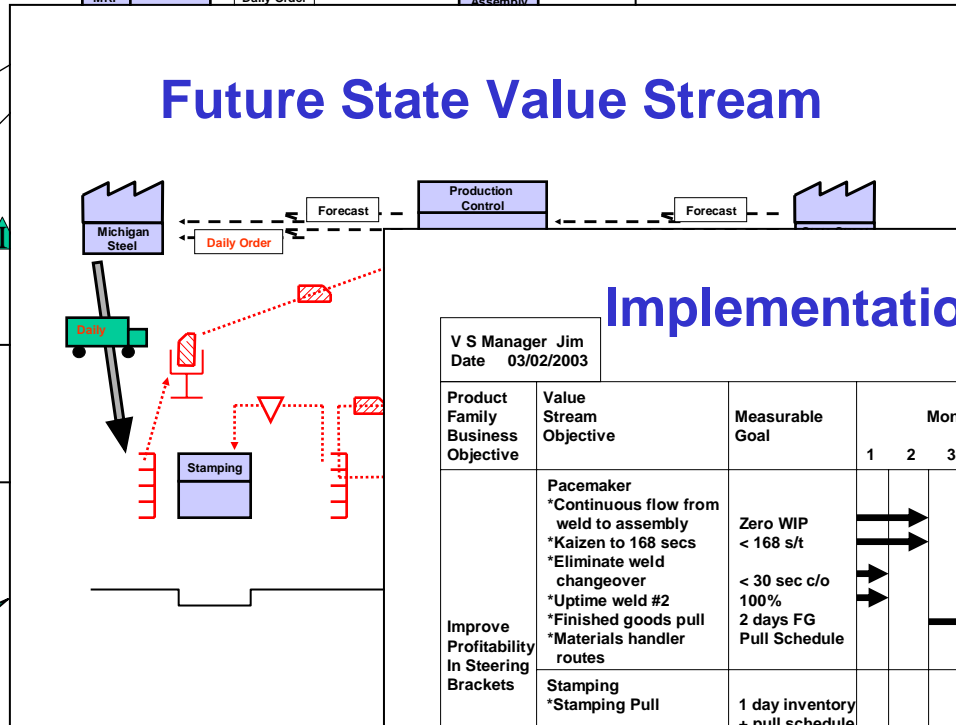
- Appoint a Value Stream manager to lead – with end to end responsibility for a product
- Develop a clear understanding of customer value and the business case
- Map the current value stream and ask the key questions to envisage a future state
- Develop a plan, implement it, measure progress, standardise, sustain
- Then spread this new way across all similar activities and plants
- Go through the cycle again, extend to other lines, to your whole supply chain and to the next generation products



## Current State Value Stream



## Future State Value Stream



Check progress and stabilise

## Implementation Plan

V S Manager Jim Date 03/02/2003		Product Family Steering Brackets											
Product Family Business Objective	Value Stream Objective	Measurable Goal	Monthly Schedule									Person in Charge	
			1	2	3	4	5	6	7	8	9		
Improve Profitability In Steering Brackets	Pacemaker *Continuous flow from weld to assembly *Kaizen to 168 secs *Eliminate weld changeover *Uptime weld #2 *Finished goods pull *Materials handler routes	Zero WIP < 168 s/t  < 30 sec c/o 100% 2 days FG Pull Schedule	→	→									John Dave Sam Mike Sue James
	Stamping *Stamping Pull *Stamping changeover	1 day inventory + pull schedule batch size 300/160 pieces c/o < 10 min				→	→						Fred Tim
	Supplier *Pull coils with daily delivery	daily delivery < 1.5 days of coils at press									→		Graham

Ask the key questions

# Using a Common Language



## Acme Stamping Steering Bracket Value Stream Improvement

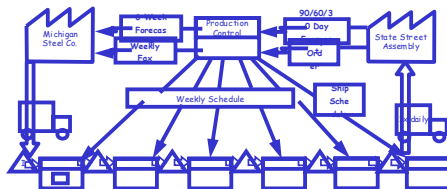
### Background

- Acme supplies stamped steel steering brackets (LH & RH) to State Street Assembly. The product goes through 5 manufacturing processes & shipping.
- The customer uses 18,400 pcs/month & requires daily shipments in pallets of 10 trays of 20 brackets. A pallet is either all RH or LH.

### Current Situation

- Lead time for steering bracket from coil steel to shipment = 23.6 days
- Of 23.6 days, only 188 seconds are spent making a bracket.
- Large inventories of material between each process.
- Long changeover times, downtime in welding.

### Current State Map



### Analysis

- Each process operates as isolated islands, disconnected from the customer.
- Push system, material builds up between each process.
- Each process builds according to its own operating constraints (changeover, downtime etc.)
- Plans based on 90 & 30 day forecasts from customer. Weekly schedule for each department. System is frequently overridden to make delivery

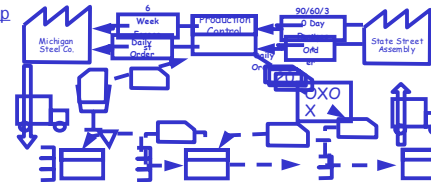
### Goals

- Improve profitability of steering bracket value stream.
- Reduce lead time - 23.6 days to 4.5 days.
- Reduce inventories:
  - Stamping 7.7 days to 1 day
  - Welding 6.5 days to 0 days.
  - Shipping 4.5 days to 2 days.

### Recommendations

- Create continuous flow through weld & assembly
- Establish TAKT time . Base the pace of work through weld & assembly on customer demand.
- Set new weld - assembly cell as pacemaker for entire value stream.
- Establish EPE\_ build schedule for stamping based on actual use of pacemaker cell & pull steel coils from supplier based on actual usage by stamping.
- Improve uptime in weld.
- Establish material handling routes for frequent withdrawal & delivery.
- Establish new production instruction system with Levelling Box.

### Future State Map



### Action Plan

Deliverables	Responsible	Review
CCF at pacemaker		
Kaizen each CT to > TT		
Weld uptime to 100%		
CO reduction to < TT		
Pull at pacemaker		
FG = 2 days		
KB		
Matl handling		
Levelling Box		
Pull from Stamping		
WIP = 1 day		
CO < 10 min		
Pull from supplier		
Info flow		
Daily delivery		
RM = 1.5 days		

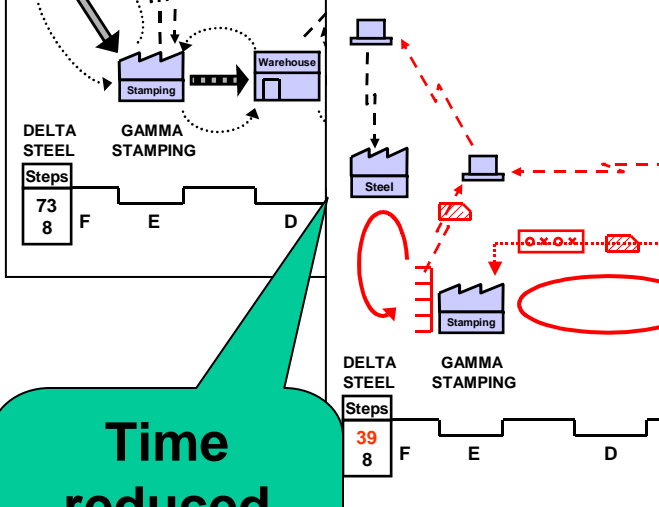
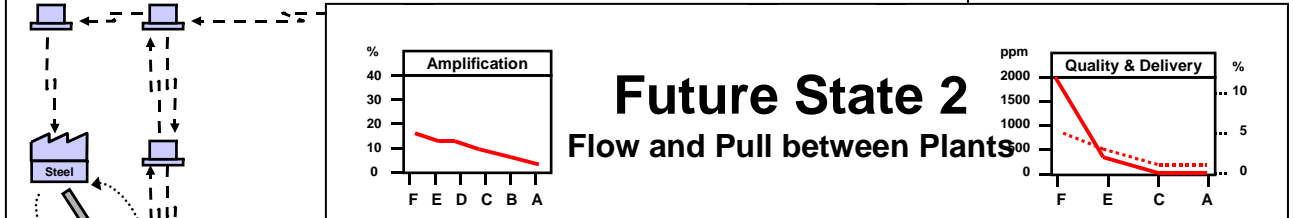
### Follow Up

- Reviews & involvement of related departments TBD
- Other functions: Production Control, Material Handling, Purchasing, Maintenance, Human Resources, Finance.

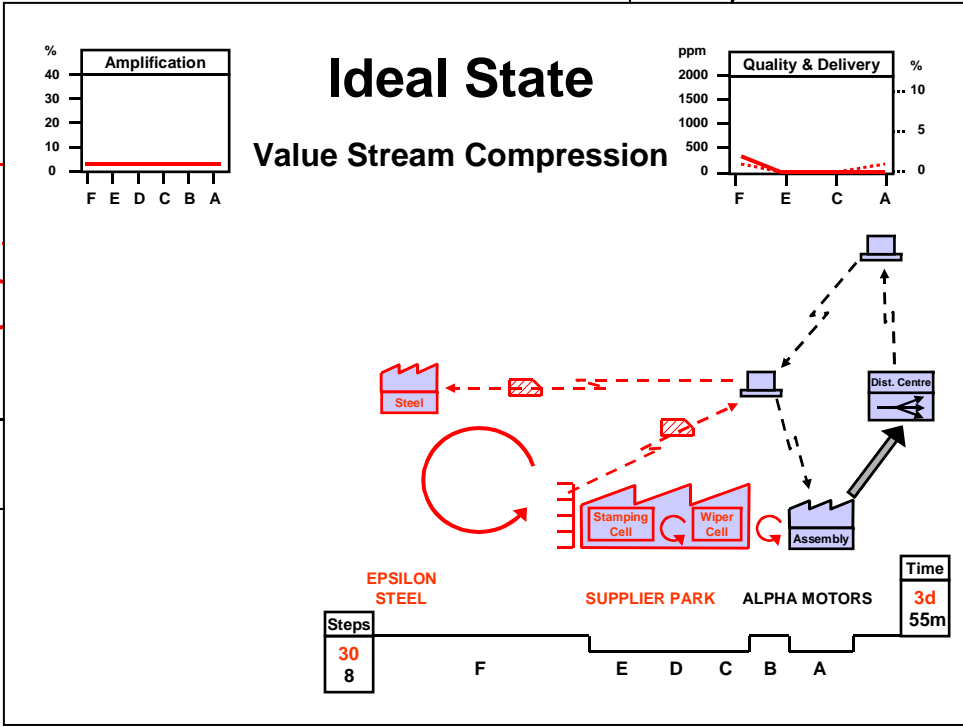
**For Problem solving and managing projects**



**Time reduced from 24 to 3 days**



**Time reduced from 44 to 24 days**



# Value Stream Compression



- If you calculate total costs you will discover it makes sense to make as high a fraction of total value for each product in one place as possible – but where?
- Design/make products with very stable demand and mature technologies at the global low-wage point
- Design/make products with unpredictable demand & less mature technologies at the lowest wage point in the region of sale (Mexico for NA, Rumania/Turkey for Europe, China/Vietnam for Asia.)
- Design/make products with immature technologies needing instant response to customers and R&D centers near the customer in high-wage markets

# The Next Generation



- How would you design the next generation product and the process, tooling, supply base and distribution with enhanced functionality and for 30% lower costs?
  - Designing out unnecessary steps
  - Designing right-sized tooling
  - Value stream compression with suppliers
  - Minimum costs in use through the life of the product

# Learning to See Value



- **Consumption is also a process** – of searching, obtaining, installing and using many products and services to solve consumer problems over time
- Managing consumption is increasingly frustrating, inefficient and time consuming
- Yet there are big win-win gains from working together with key customers to design, deliver and support exactly what they want, when and where they want it
- In return for feedback, foresight and levelled demand – which removes steps, time and cost for producers

# Lean Business System



- Has to be built on the **Value Stream Plans** for each product family – led by the Product Line Managers or Value Stream Managers – who have lots of responsibility but little formal authority
- But these plans can only be realised using the resources of the supporting functions – once the needs of all the value stream plans are known
- It is top management's job to lead a **policy deployment** process to prioritise and agree the resources for these actions and to align them with the overall needs of the business

# Your Check List



- Is top management willing to lead this?
- Is there a common way to manage a lean project – and to sustain the results?
- Is someone responsible for reconfiguring each product value stream through your facility and beyond?
- Is there an active policy deployment process based on value stream plans to prioritise and resource them?
- Is there a common language across the whole organisation for seeing processes and for root cause problem solving?

# Learning Lean



- It is not just an extension of continuous improvement or a tool box – but a system redesign for each product
- It is not just about design and production – but also about production control, maintenance, logistics etc.
- It is not about what works theoretically – but a robust system that tolerates day to day disturbances
- It will not happen unless someone is responsible for each product value stream – and unless they get the necessary support and resources from functional departments (which also means lean in every office!)

# Changing Thinking



- Is actually the hardest thing to do
- Much of lean is counter-intuitive and can only be learnt from experience
- So learning from examples is key - and sharing and deepening this experience is the way to build your best lean way together
- Lean is critical to your future – and involves a lot more than you thought – it is a new way of thinking
- The bonus is that you will discover that people like working in a lean process better than in the old way!



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