



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



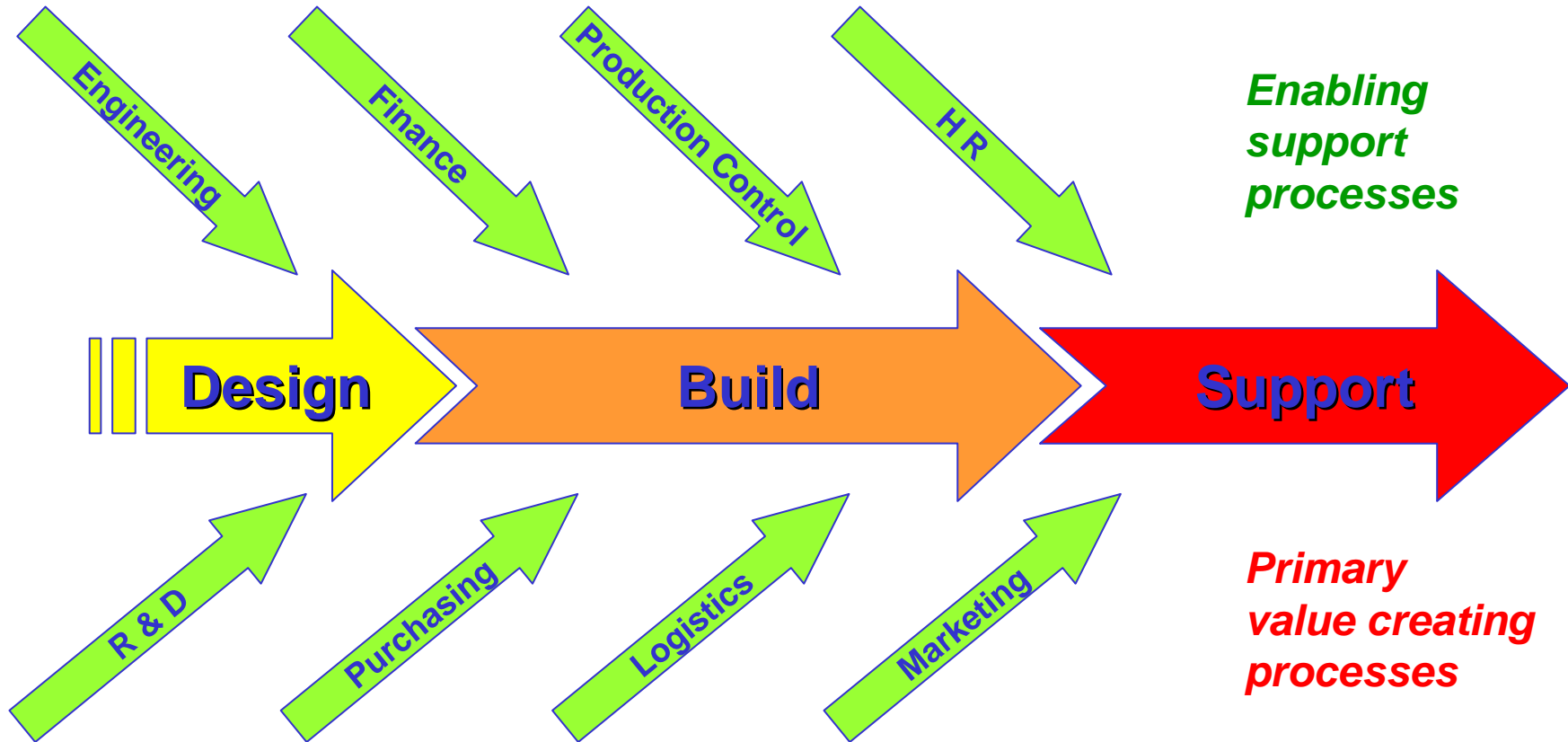
- Initially thought of as empowered teams and continuous improvement – Kaizen and TQ
- Then as a box of tools – 5S, SMED, TPM etc.- sometimes combined into a Production System
- Then as a more radical reconfiguration of individual operations – Kaikaku – all still **Point Kaizen**
- Value stream mapping 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

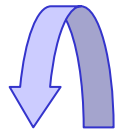
No created demand amplification

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

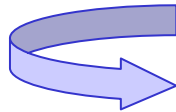
Combine steps where you can to flow

Levelled and released in small quantities

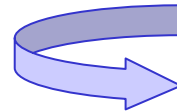
Demand signals direct from the customer's point of use



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

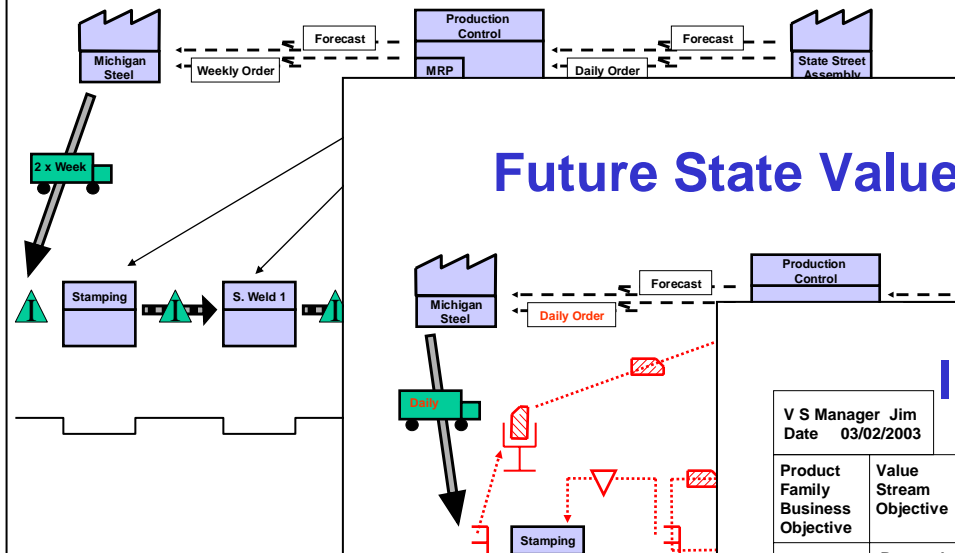
Managing Flow Kaizen



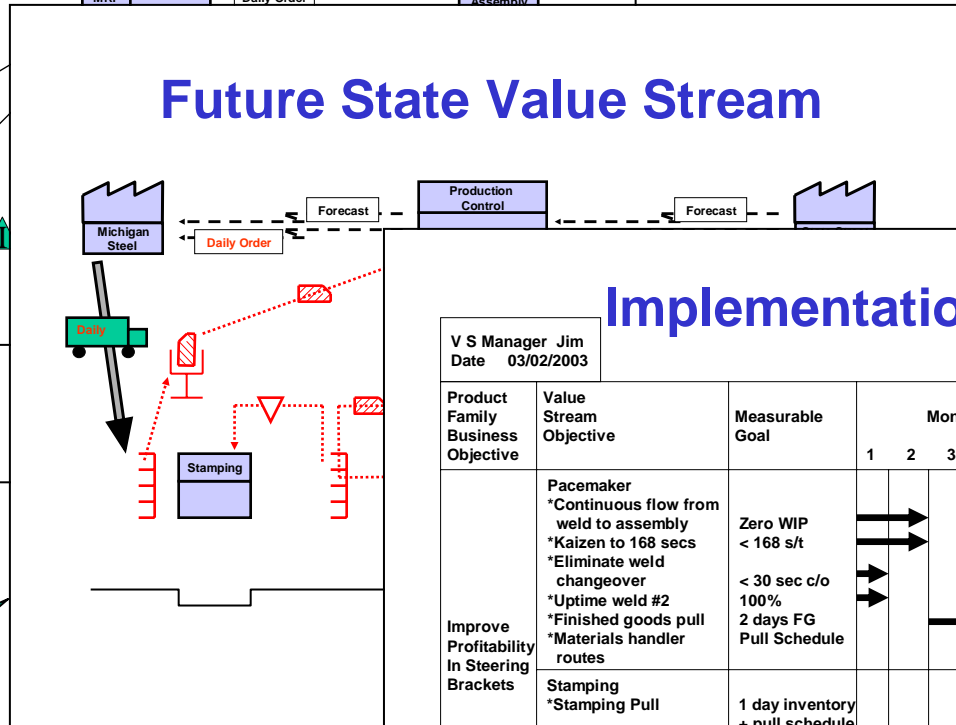
- Appoint a Value Stream manager to lead – with end to end responsibility for a product
- Develop a clear understanding of customer value and the business case
- Map the current value stream and ask the key questions to envisage a future state
- Develop a plan, implement it, measure progress, standardise, 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

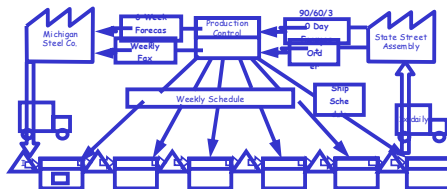
Background

- 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

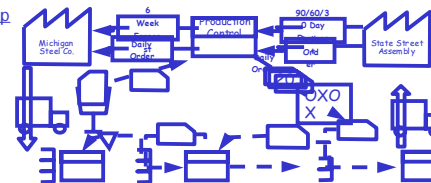
Goals

- 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		

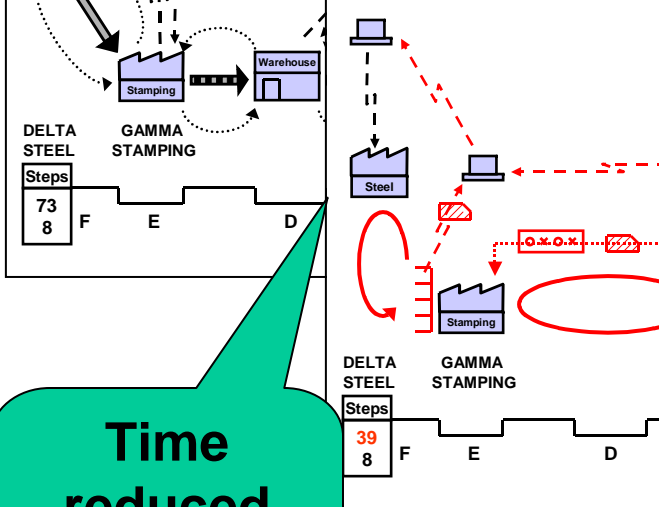
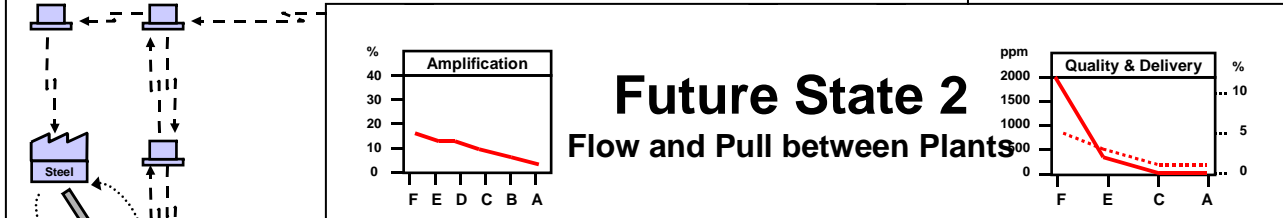
Follow Up

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

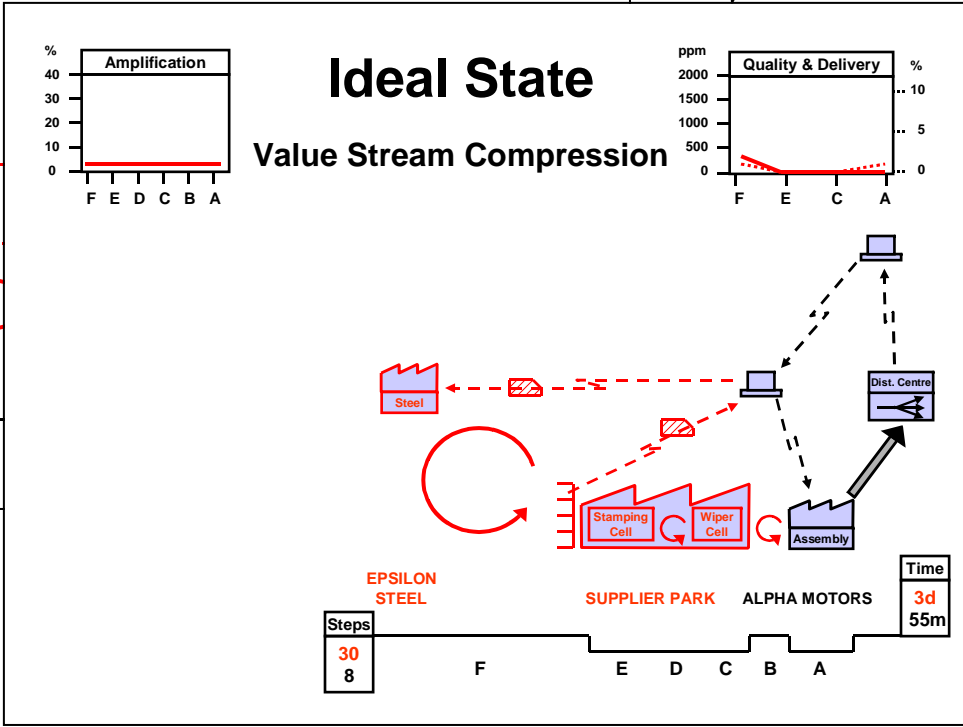
For Problem solving and managing projects



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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