



ERP; implementation & maintenance in a lean environment

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UK Lean Aerospace Initiative

Agenda

- UKLAI
- ERP and Lean
- The UK LAI Approach & Results
- Conclusions

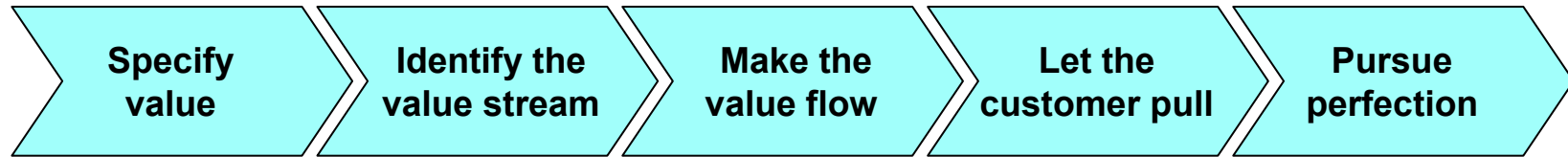
UK Lean Aerospace Initiative (UK LAI)

- **The UK LAI exists to research and promote the leading practice of lean principles and encourage their implementation in UK aerospace companies to promote growth**
- **The UK LAI consists of a group of leading Universities consisting of Warwick, Nottingham, Cranfield and Bath**
- **All the leading UK Aerospace companies contribute towards the UK LAI research programme**
- **They are supported in their efforts by the Society of British Aerospace Companies (SBAC), and the Engineering and Physical Sciences Research Council (EPSRC)**



Whilst the findings are from Aerospace, they translate directly to all markets

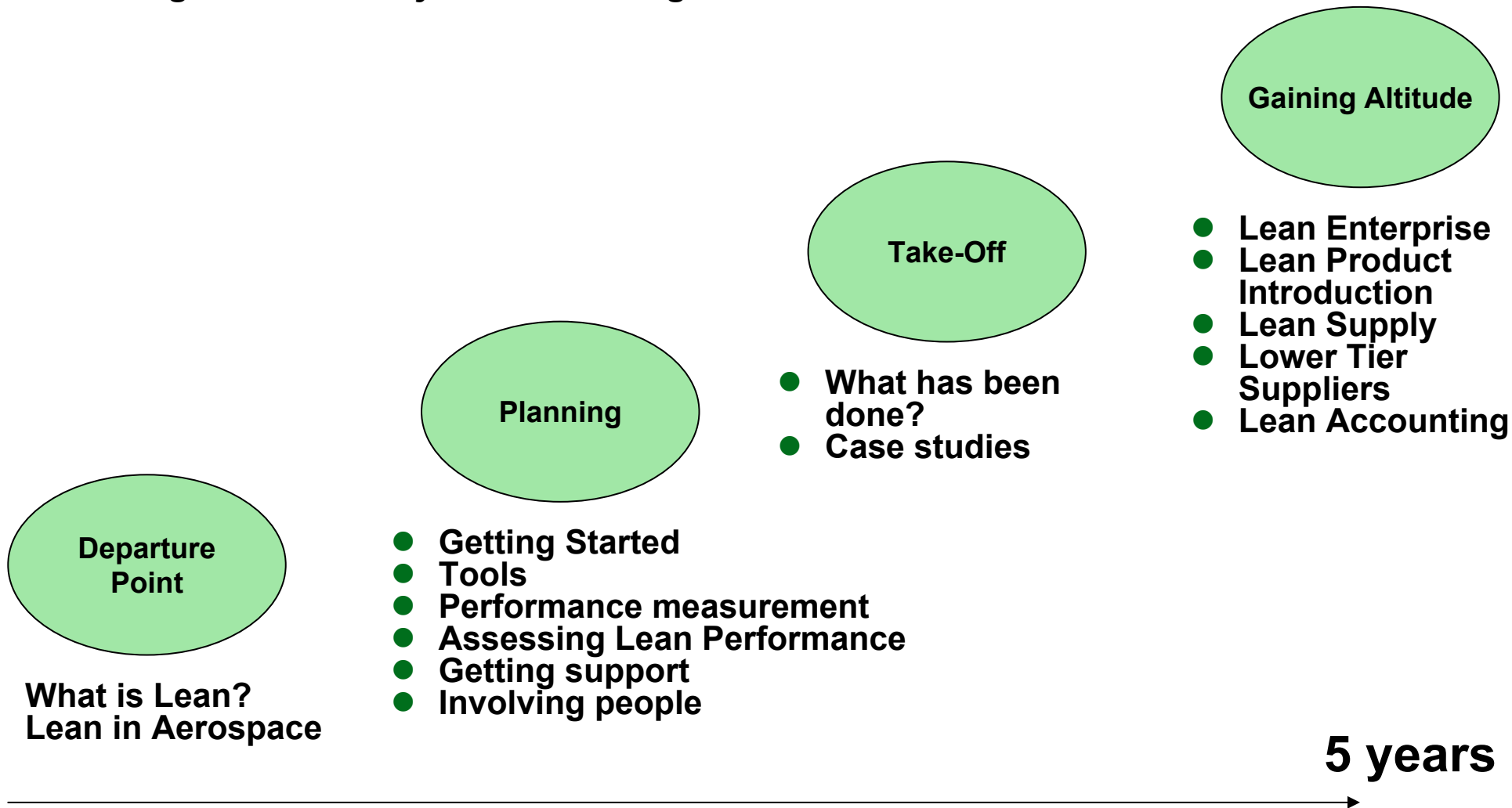
The 5 Lean Principles



- 1. Value; this element can only be defined by the customer**
- 2. The Value Stream; the core set of actions required to produce a product**
- 3. Flow; the method of aligning the processes to facilitate the critical path**
- 4. Pull; the customer should begin to “pull” product on an as needed basis**
- 5. Perfection; develop and amend the processes continuously in pursuit of perfection**

Source: Lean Thinking, Womack & Jones (1996); WMG Analysis

UK LAI Programme Life Cycle Positioning



Each university has specialised in a different research area

- **Lean Product Development (Warwick)**
- **Lean Accounting (Bath)**
- **Lean Logistics and eBusiness (Cranfield)**
- **Lean Manufacturing (Nottingham)**



Since inception the UK LAI has delivered sustainable value to industry through its research and many methods of education and dissemination



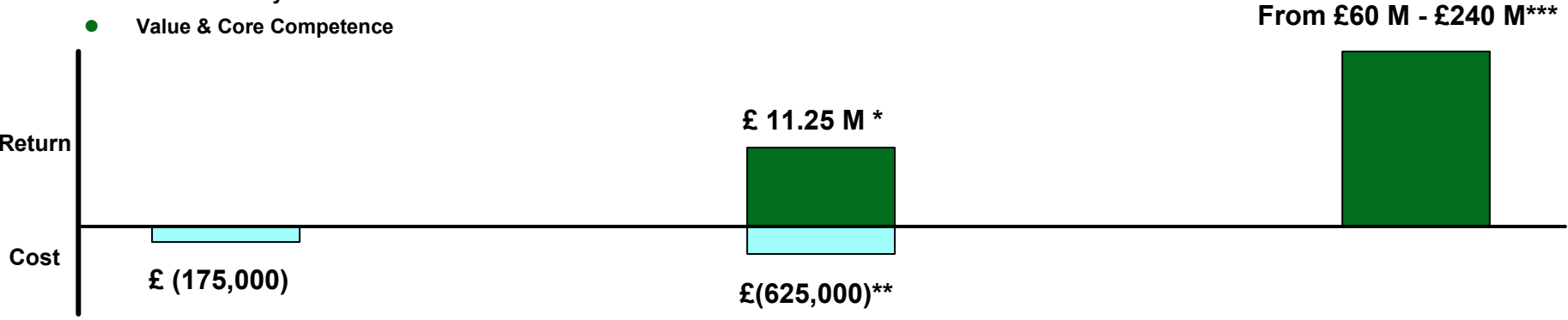
- Lean Accounting
- Effect of Lean on Suppliers
- UK Benchmarking Survey
- Lean Supply Chains
- eBusiness
- Manufacturing disturbance
- Aerospace Metrics
- Lean metrics for Engineers
- Lean Bid & Proposal
- Lean & ERP Systems
- Value & Core Competence



- Workshops
- Working Parties
- Lean Aerospace CD ROM
- LESAT
- Lean NPI Game
- Company Visits / Case Studies
- Masterclass Engineers



- Application of Lean Manufacturing
- Development of Lean Teams
- Value stream mapping
- Use of metrics
- Drive to create flow & pull
- Supplier development & restructuring
- New ways of thinking



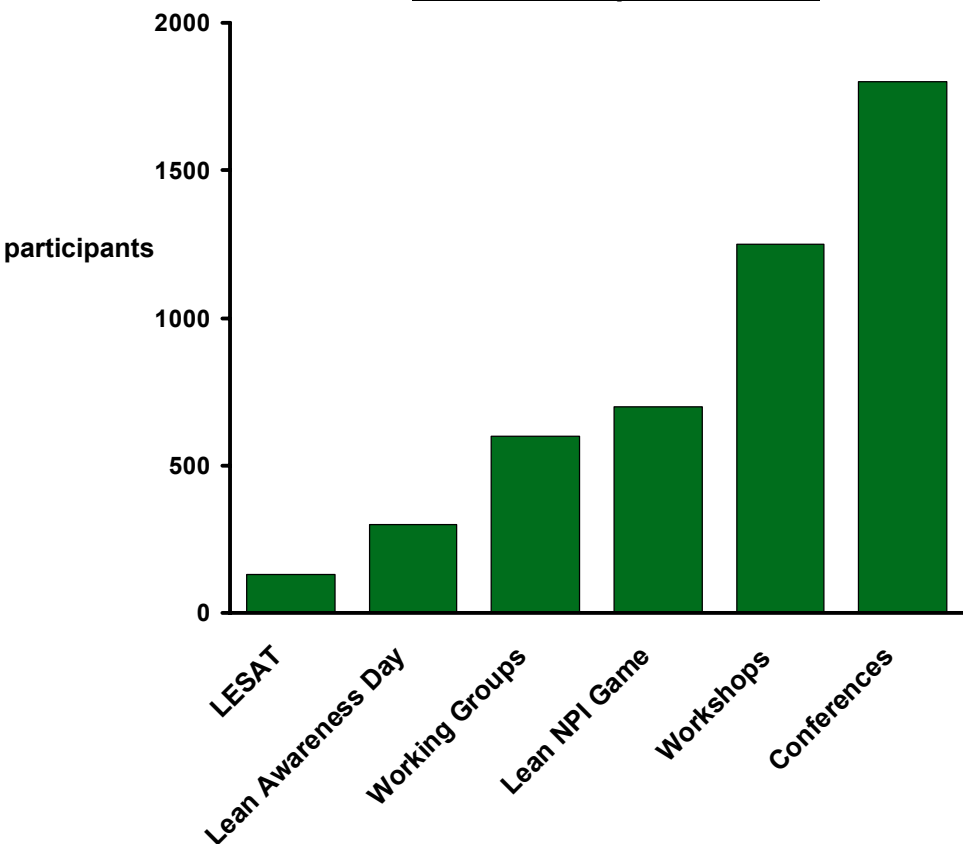
Note: Cost are all per annum. *Based on figures for realised benefit from equivalent SMMT interventions across the automotive supply chain. ** Cash cost
 *** Based on 5% of performance improvement claimed by UK aerospace SBAC data

Source : WMG Analysis



The research done by the UK LAI has already influenced the thoughts and actions of many thousands of UK Aerospace professionals

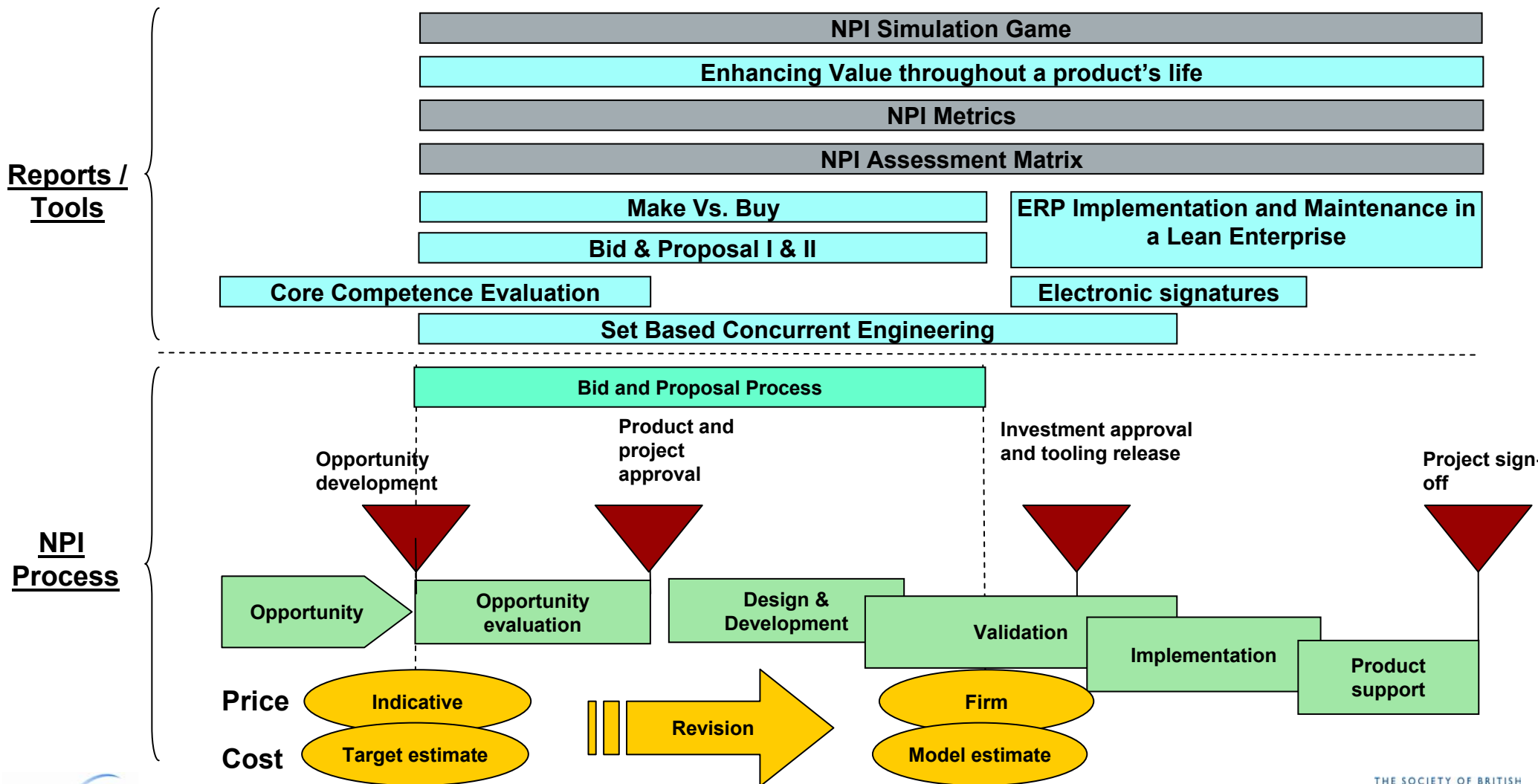
Active Participation Levels



- The UK LAI conferences and workshops have consistently been popular with industrial members
- A growing number of professionals have been attending working parties
 - these members both learn from and shape the research
 - their contribution keeps research focused on areas directly relevant to industry
- Lean awareness days migrated from the UK LAI to the Masterclass Engineers product portfolio
- Launched in February 2003, the Lean NPI game has already been adopted by industry and academia
- The LESAT, jointly developed by MIT and WMG is becoming an industry standard in the USA, but is slow to catch on in the UK

Source: Karl Smith (SBAC) Analysis; WMG Analysis

The current work at Warwick examines the application of lean methodologies to many aspects of the NPI process, and a number of reports and tools produced



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Enterprise Resource Planning (ERP) systems

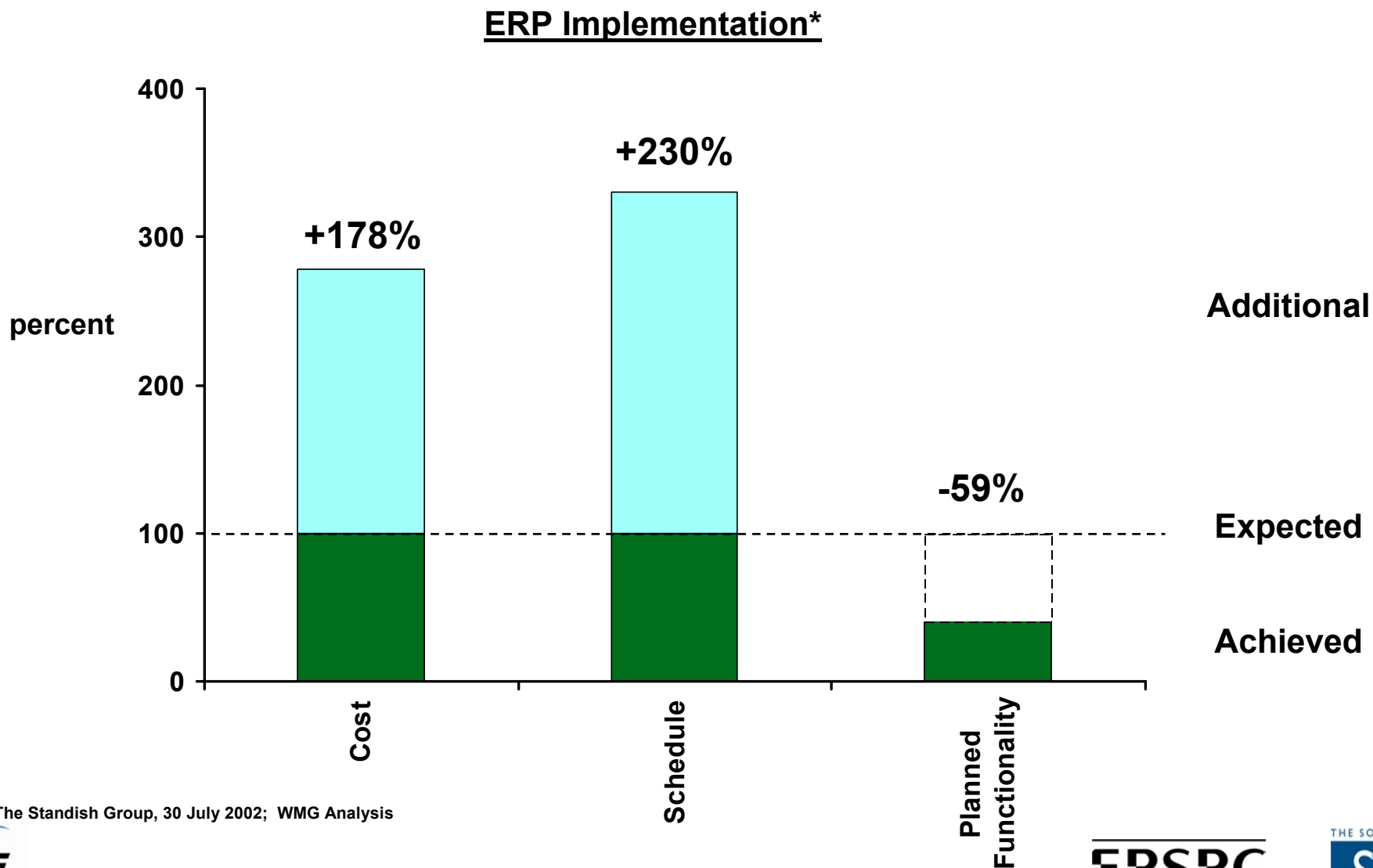
- **ERP systems are software packages which aim to integrate information from different areas of a business & across supply chains**
 - **the systems offer a real-time, organisation wide view of a companies products/services, orders and financial position**

“... Computer-based systems designed to process an organization’s transactions and facilitate integrated and real-time planning, production, and customer response...”
Prof. D. O’learly, University of North Carolina, 2000

- **UK aerospace companies are currently implementing these systems**

.....however they have found this to be far from straightforward!

The consequences of failure have been significant



Source: *The Standish Group, 30 July 2002; WMG Analysis

Key issues for the business

- **Systems are way over expected cost**
- **The are delivered very late**
- **They don't do half of what was promised**

Jobs are lost over this!

UK LAI research objectives

- **Understand why so many ERP implementations result in schedule and cost overruns**
- **Confirm or disprove any existing theories**
- **ERP vs. Lean analysis**

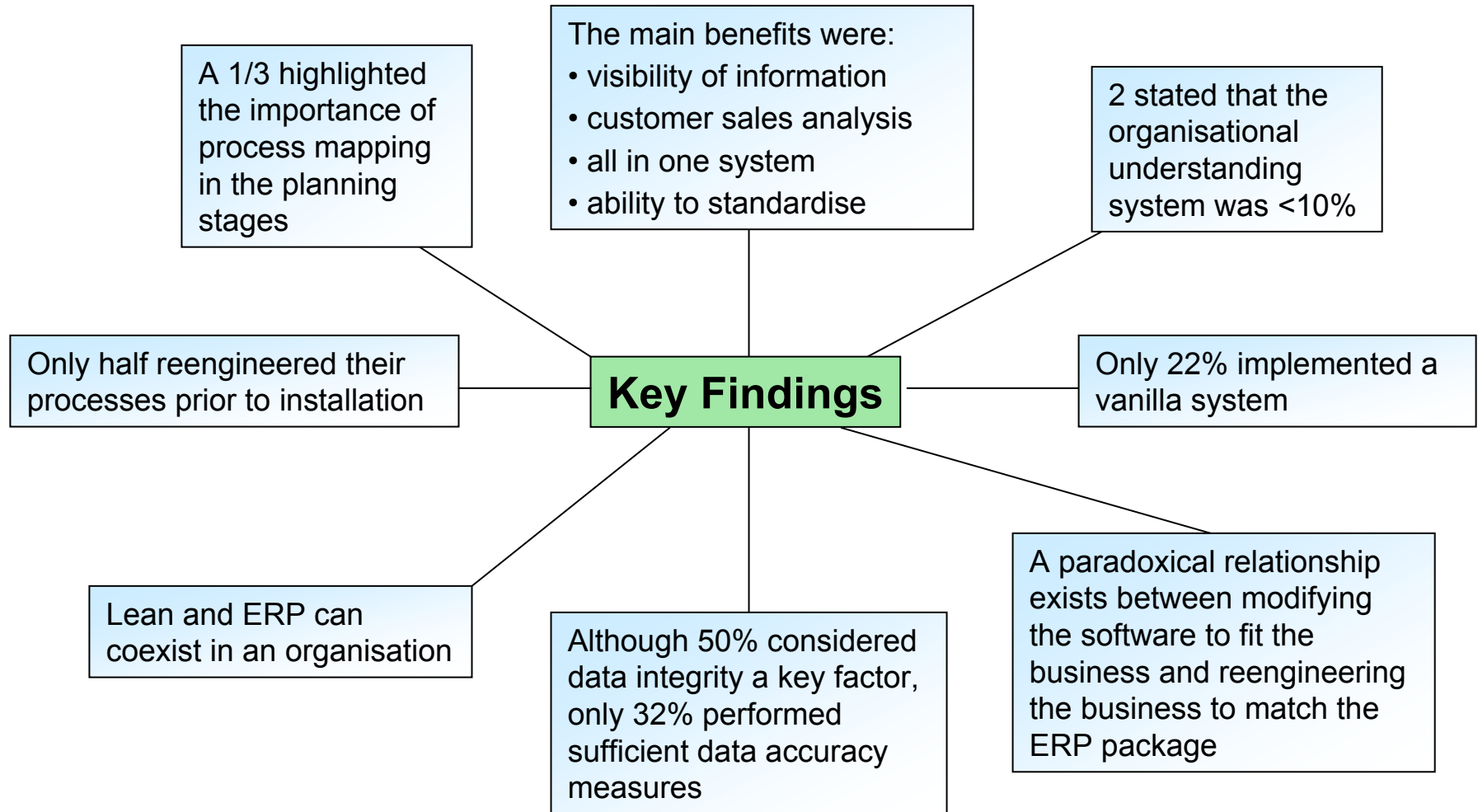
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Research Methodology

- **Secondary data from literature review**
 - 23 journal articles
 - database constructed to capture knowledge from articles
 - spreadsheets for quantitative data
 - mind maps for qualitative data
- **Primary data collected by interviewing users and implementers**
 - 13 interviews completed
 - included all primes, some 1st and some 2nd tier suppliers

Point-Effect of some key findings



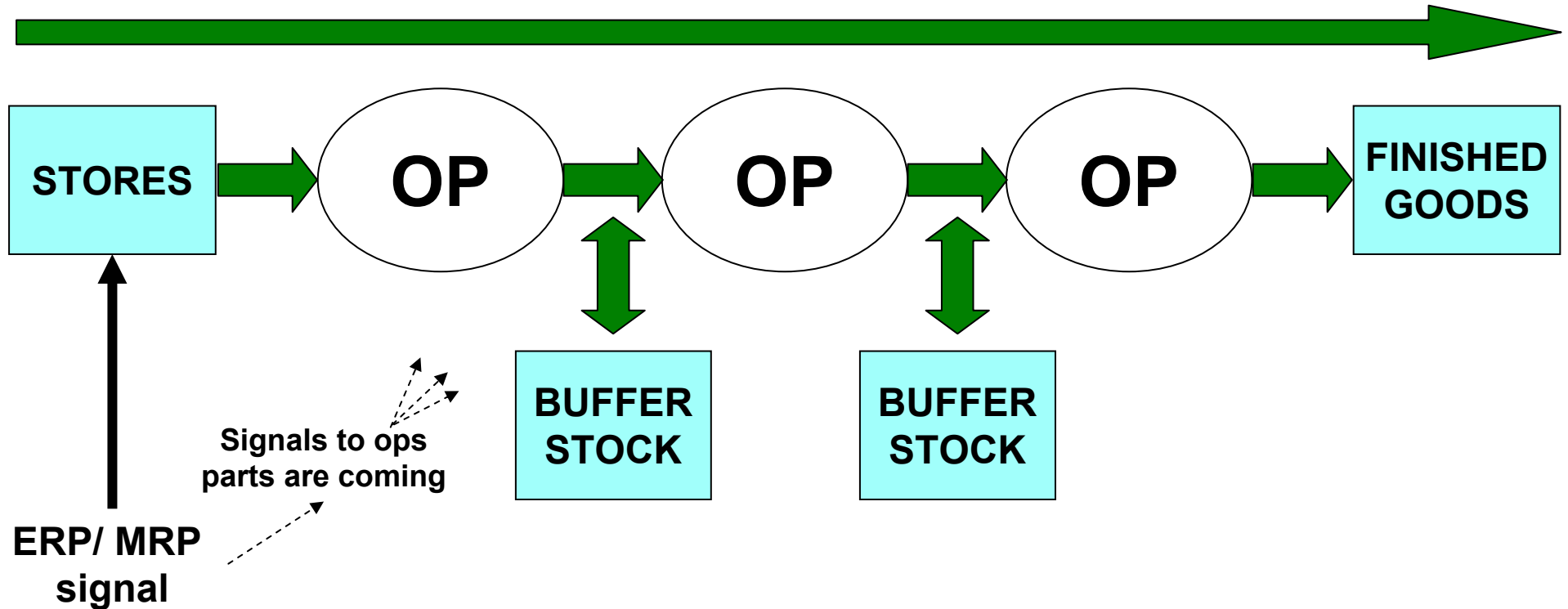
There is a conflict between Lean and ERP philosophies

- **Current ERP/MRP processes are “PUSH” systems**
- **Lean thinkers strive for customer “PULL”**

**The two can be made to meet
within manufacturing**

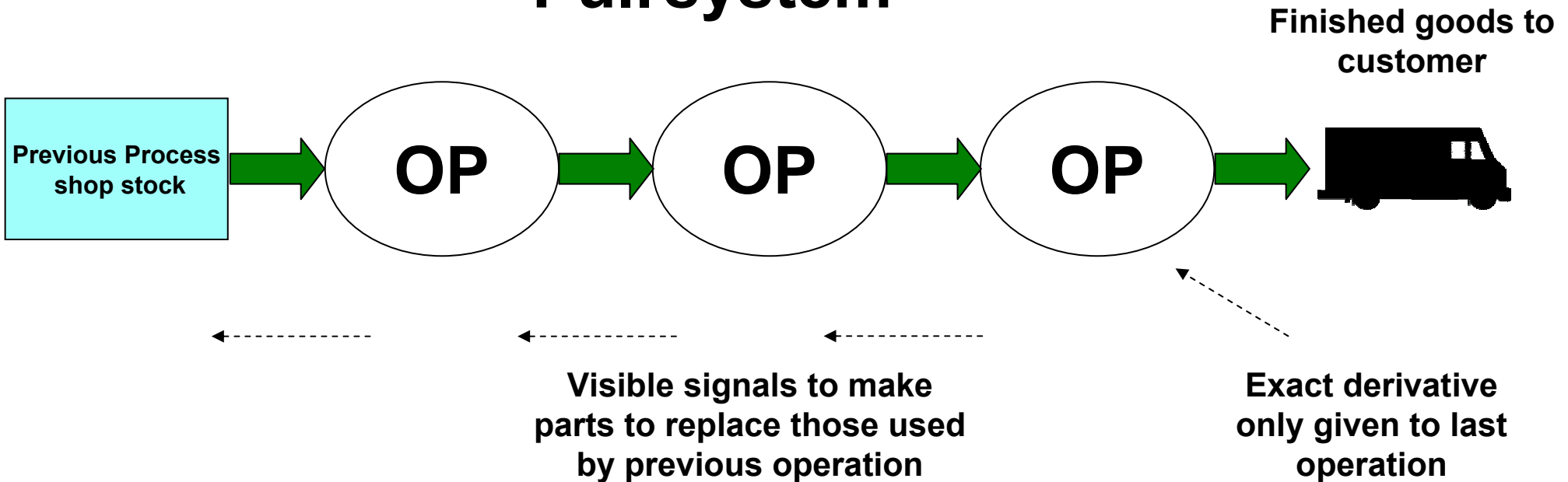
ERP and MRP systems schedule work, and are fundamentally 'Push' systems

Push system



The goal of Lean Manufacturers is to produce only when the customer asks for goods – creating a 'PULL' system

Pull system



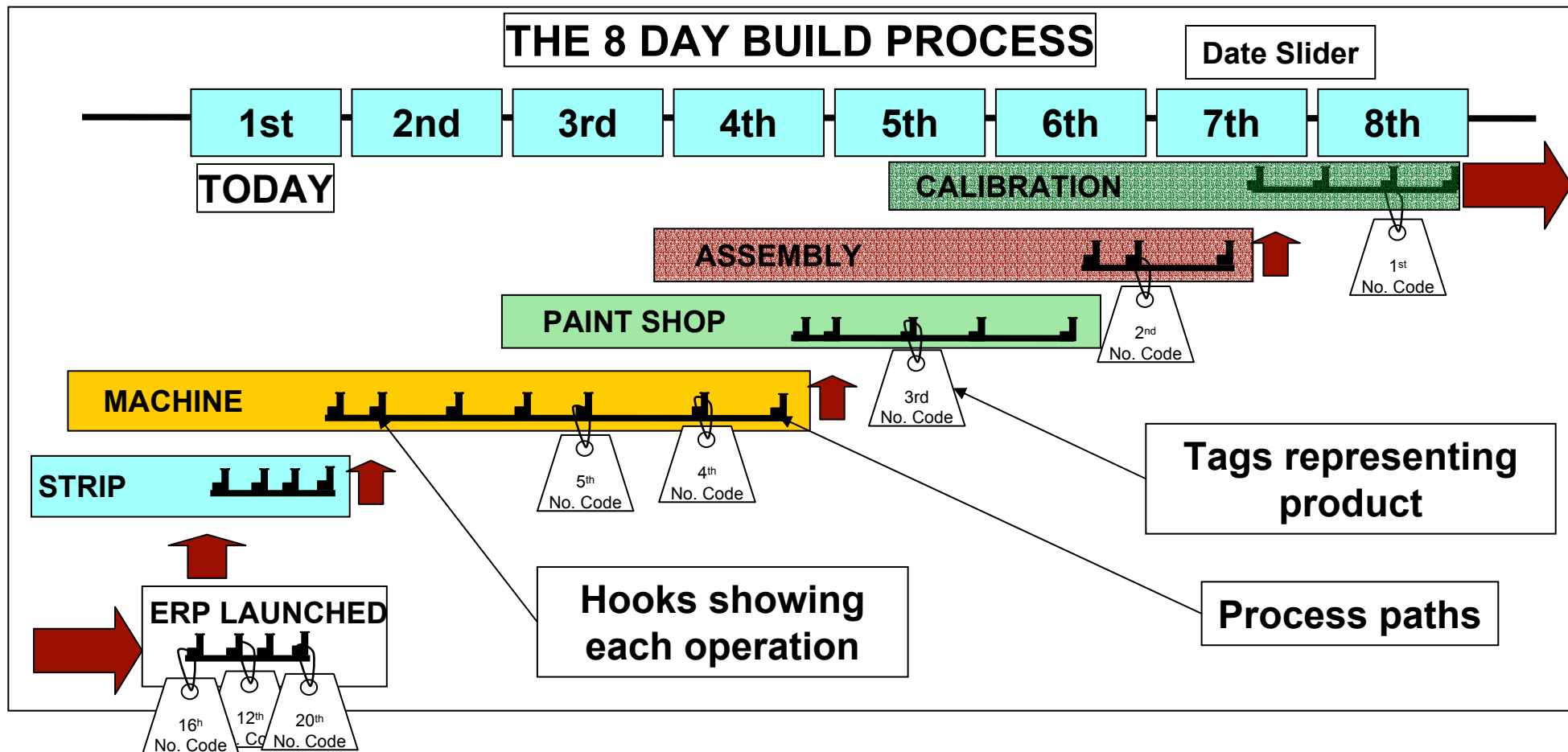
A comparison of ERP and Lean ideologies

	Lean	ERP
Principle	Pull	Push
Production	Based on customer demand	Based on sales forecasts
Manufacturing Process	<p>Get process right – then continually improve it</p> <p>One piece flow</p> <p>Balanced production lines with synchronised takt & cycle times</p> <p>Kanbans are used to trigger material and component replenishment</p>	<p>Emphasis on planning</p> <p>Products are produced in large batches</p> <p>Loaded machine work centres</p> <p>Procurement based on forecasted production schedules</p>
Goals	Eliminating all types of waste	Tracking all activities and materials
Format	Action orientated	Data dependent
Workers activities	Activities which add value to the product	Tracking operations (bar-coding)
Structure	Bottom-up	Top-down

Source: "Lean Vs ERP", (Bartholomew, D., 1999); "Lean and ERP: Friend or foe", (Nakashima, B., 2000); WMG Analysis

PUSH meets PULL using visual management boards which give process transparency

- A requirement launched on the 1st would have an anticipated completion on the 8th
- Bottlenecks are identified where tags accumulate



Visual management is only a patch to help maintain a poor process

- **The conflict will remain between ERP and Lean**
 - **ERP controllers resist change which requires costly system modification and destabilises their system**
 - **Lean practitioners desire constant change in pursuit of perfection**

The software code is not usually the key problem – it lies in the processes

- **Manufacturing and engineering processes cause problems**
 - ERP systems make an inefficient process happen more quickly
 - this will just cause problems more quickly

- **ERP implementation and maintenance causes problems**
 - communication between IT support and engineers is often poor
 - this results in misunderstanding of processes and resultant unsuitable ERP process reporting

- **Data integrity causes problems**
 - ERP systems are not smart, they are only as good as the data put in them
 - assumptions made are often not transparent to users
 - processes are required to check, update and audit data regularly

For success with Lean and ERP a clear approach was developed from the lessons learnt within the UK aerospace community

● **8 points were identified for success in ERP**

- 1. Shared vision throughout organisation**
- 2. Education of principles, concepts and technicalities for all project team members**
- 3. In depth training on behavioural and transactional issues for all end-users**
- 4. Process mapping of every affected operation**
- 5. Process redesign following lean principles**
- 6. Total data integrity, preferably before implementation**
- 7. Establish the correct balance between the structure of the ERP software and business processes, focusing on simplicity not complexity**
- 8. Do not force ERP systems onto areas where they are inappropriate**

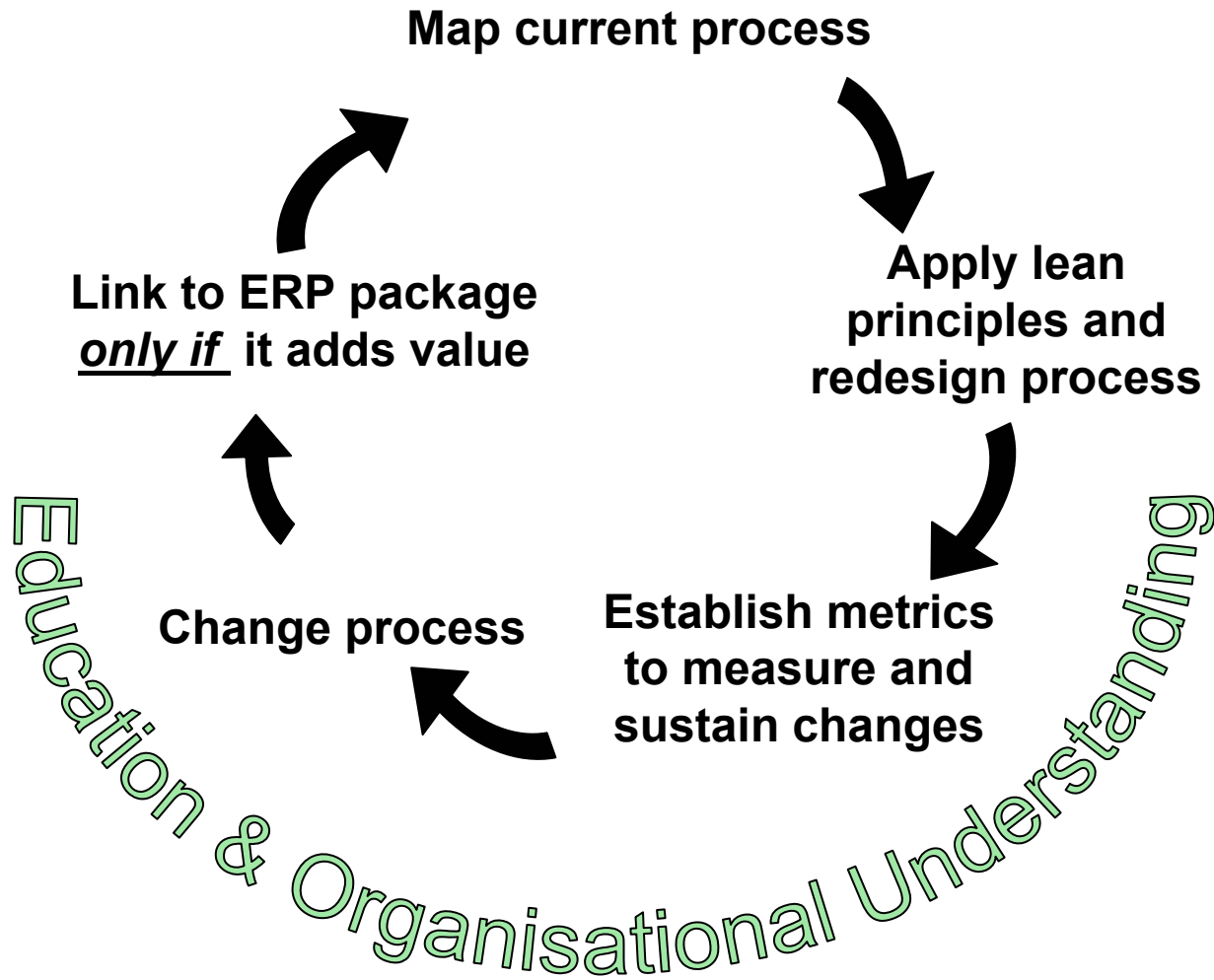
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Conclusions

- **Efficient business processes need to be established and mapped prior to ERP implementation**
- **A paradoxical relationship exists between the cost of modifying the software to fit the business and the potential recurring cost of reengineering the business to match the ERP package**
- **Performance measures need to be established which support ERP system integrity**
- **To gain maximum benefit there needs to be a shared vision and understanding of the systems capability**
- **Only by learning and understanding organisational processes can ERP be effectively employed**
- **Lean thinkers will constantly want to change processes to enhance value and remove cost, where ERP maintainers will resist changes which cause instability**

Summary Guide



- **The full report has been published by the SBAC funded by the DTI in the UK and I am currently seeking a US publisher**
 - **please leave us your card to stay informed and get your copy!**
- **Our best advice is...**

“... Keep it simple, keep it lean!...”

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