



Lean Transformation in high-tech product range

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WORLD CLASS – through people, technology and dedication



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Topics

- A short story of Lean development
- The evolution of the car
- What is Lean?
- The Principles of “Lean Thinking”
- The 7 wastes
- 5 S
- The Value Stream
- SE and Lean Principles
- Status in Kongsberg Group



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THE HISTORY FROM STONE AGE TO 1990 IN FIVE MINUTES



*In the real old
days we did and made
mostly by our self.*



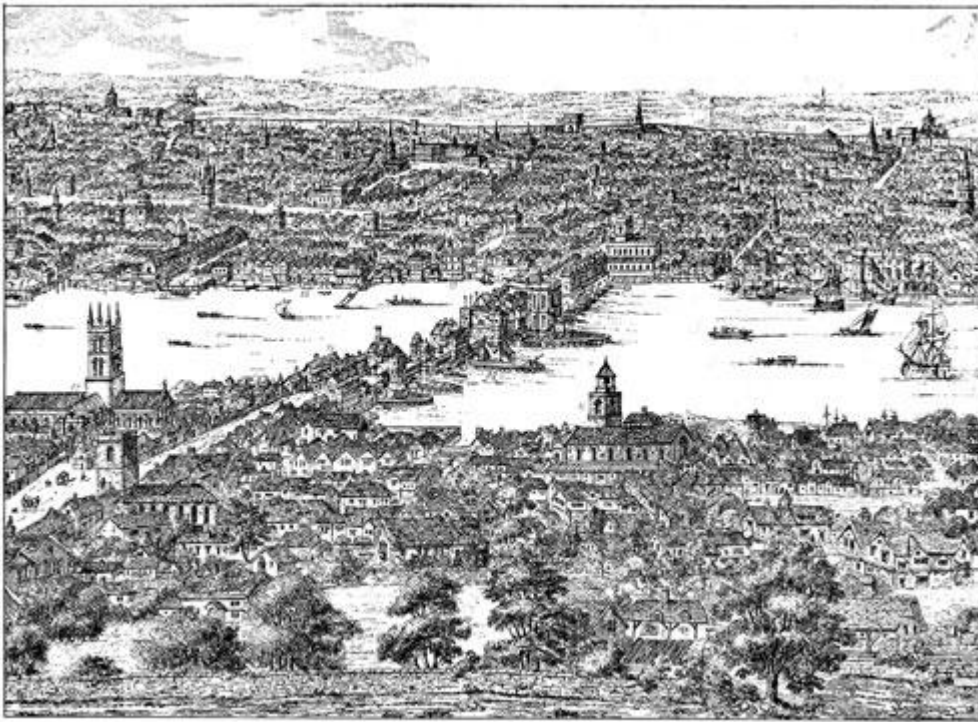
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*Then we became
specialists*





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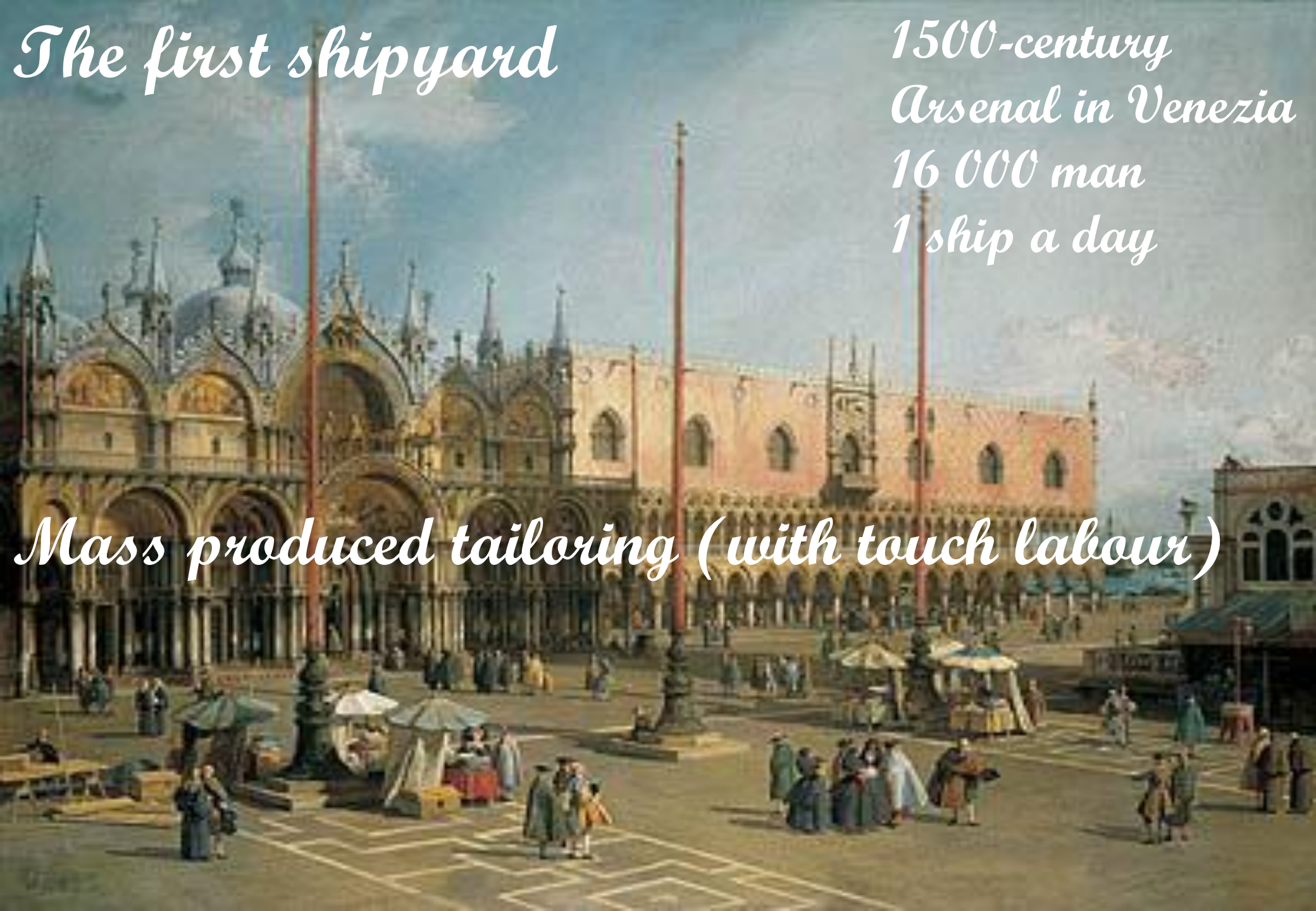
*Transportation
became more and
more important*



The first shipyard

*1500-century
Arsenal in Venezia
16 000 man
1 ship a day*

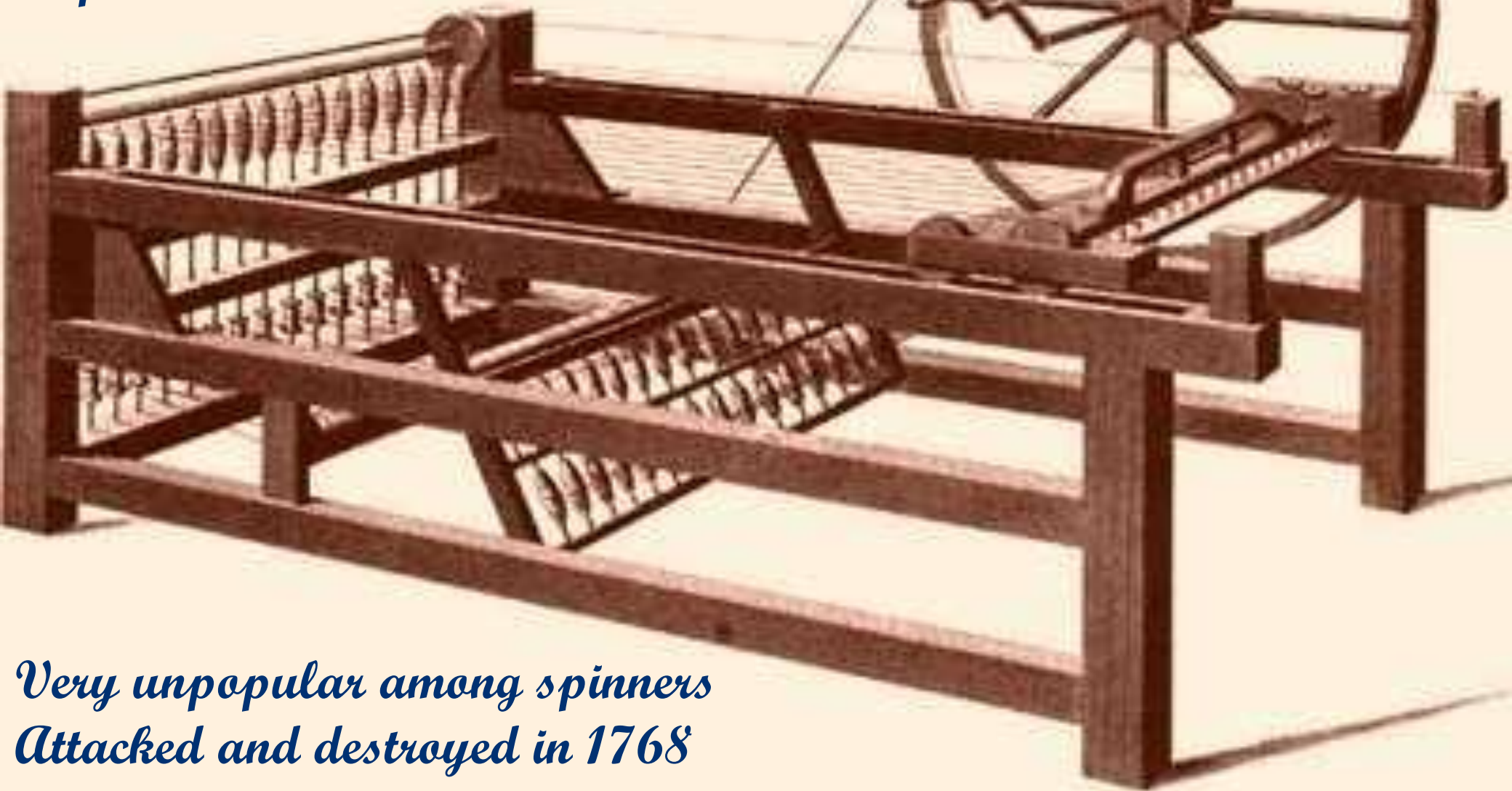
Mass produced tailoring (with touch labour)



Spinning Jenny, the first machine 1764

Start of the industrial revolution

Replaced 20-30 workers



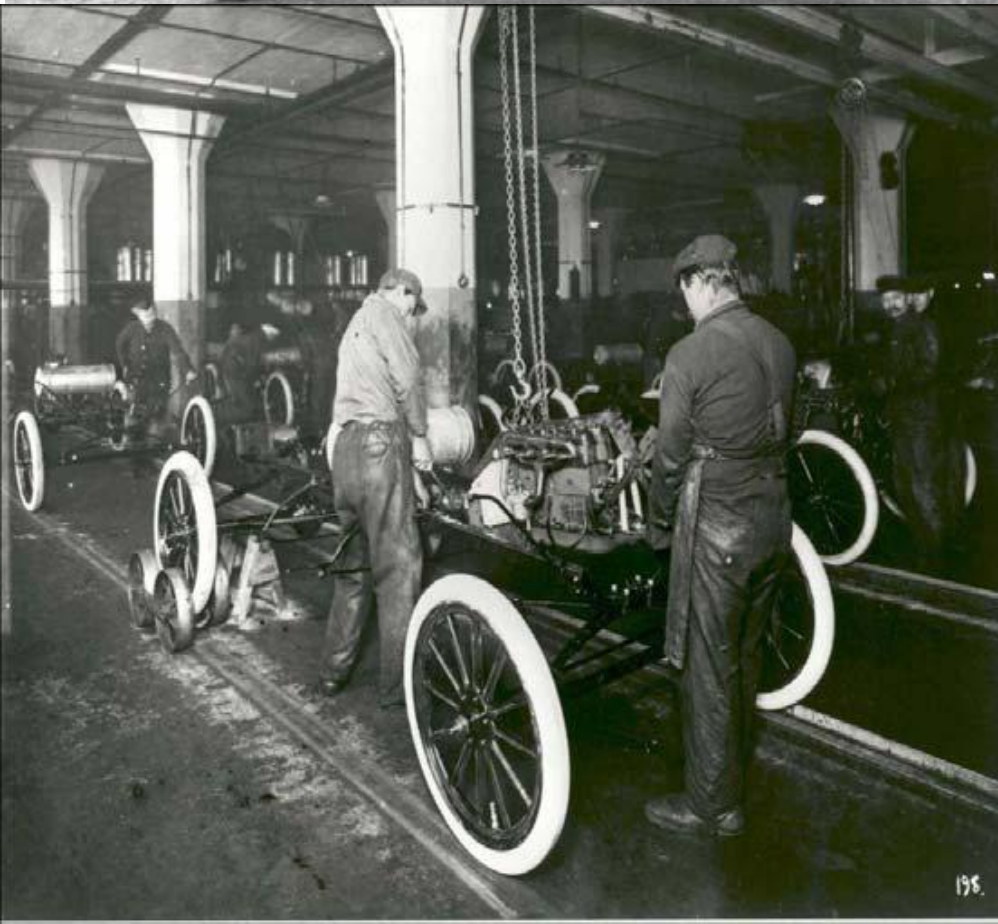
Very unpopular among spinners

Attacked and destroyed in 1768



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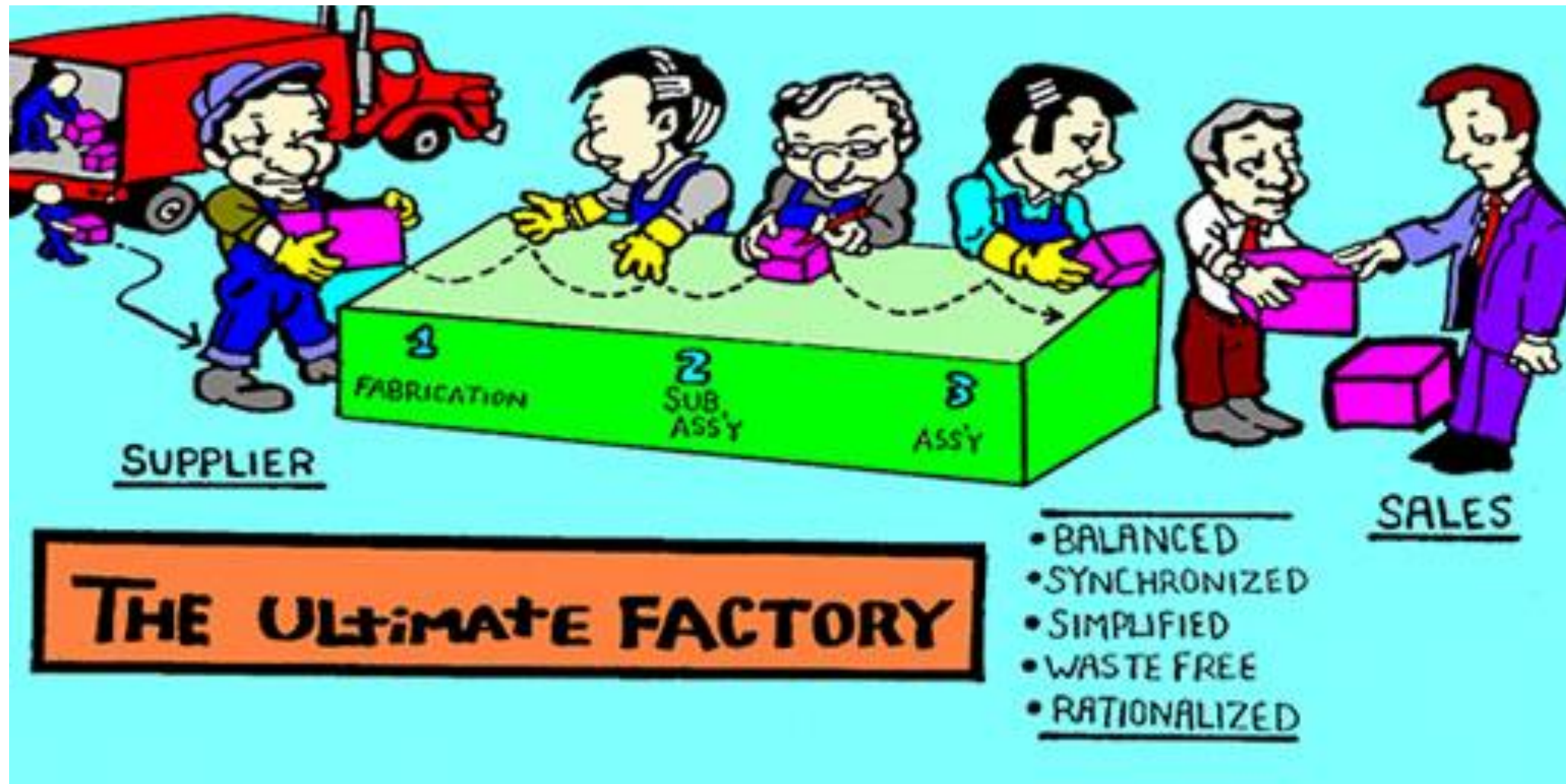
Mass production



Toyota and Lean (50-60-70-80-90 century)



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Evolution of the car

- Craft Production
- Mass Produksjon
- Lean Production

Craftsmanship



Craft Production

The workers:

Skilled in mechanical design and principles of good parts to adapt so they eventually fit

The tools:

Flexible and variable in large numbers

The products:

Unique, hard to maintain, variable quality and high price

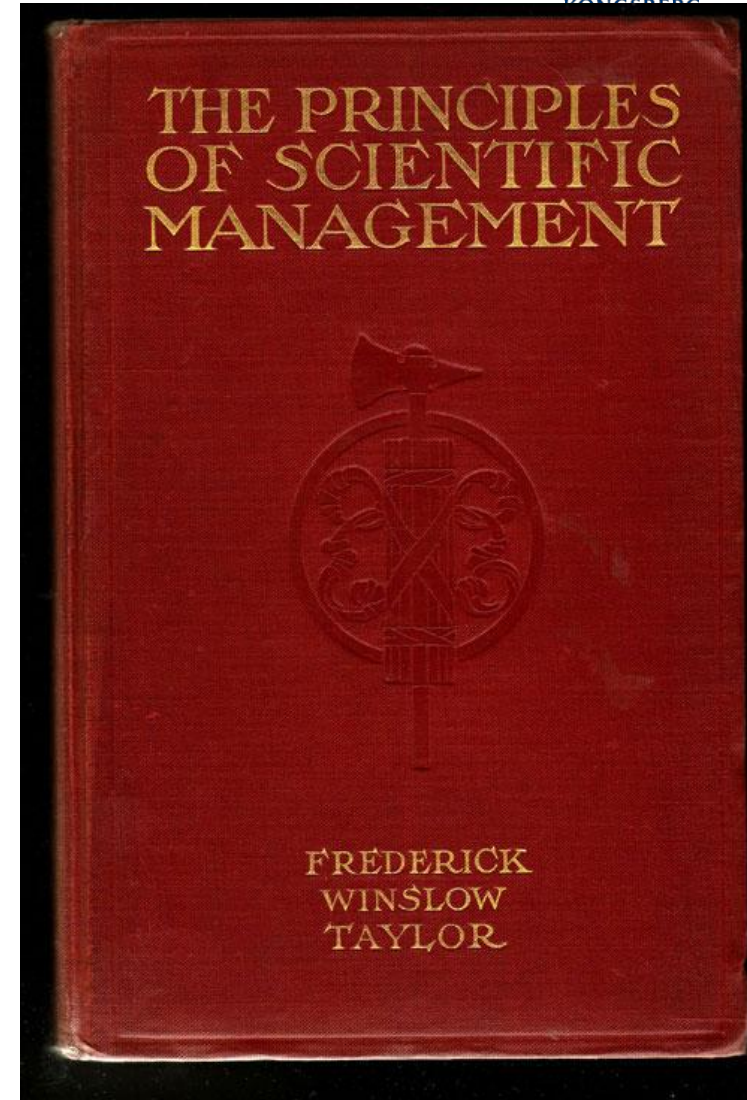
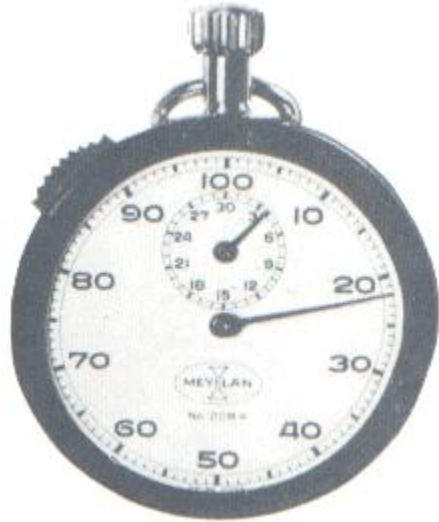
Target:

Tailored to each customer's needs

Systematics and planning, Taylorism



Scientific Management



«There are only two reasons why a worker works –
fear of losing his job, and money»

Henry Ford

Henry Ford – The master of mass production



“The average worker wants a job
in which he does not have to think”

Henry Ford

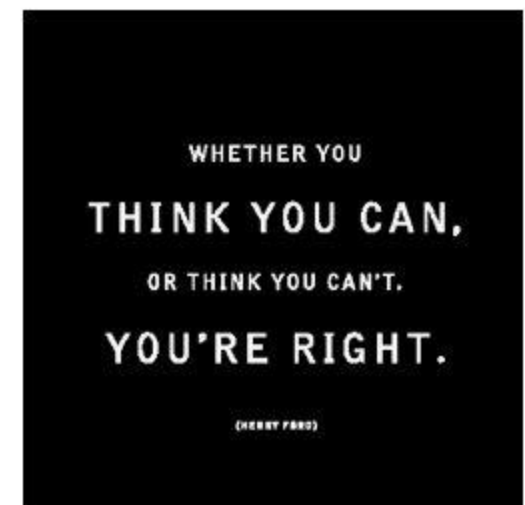


“Had I asked what the customers
wanted, they would have answered a
faster horse”
Henry Ford

Henry Ford – Standardization of parts and products



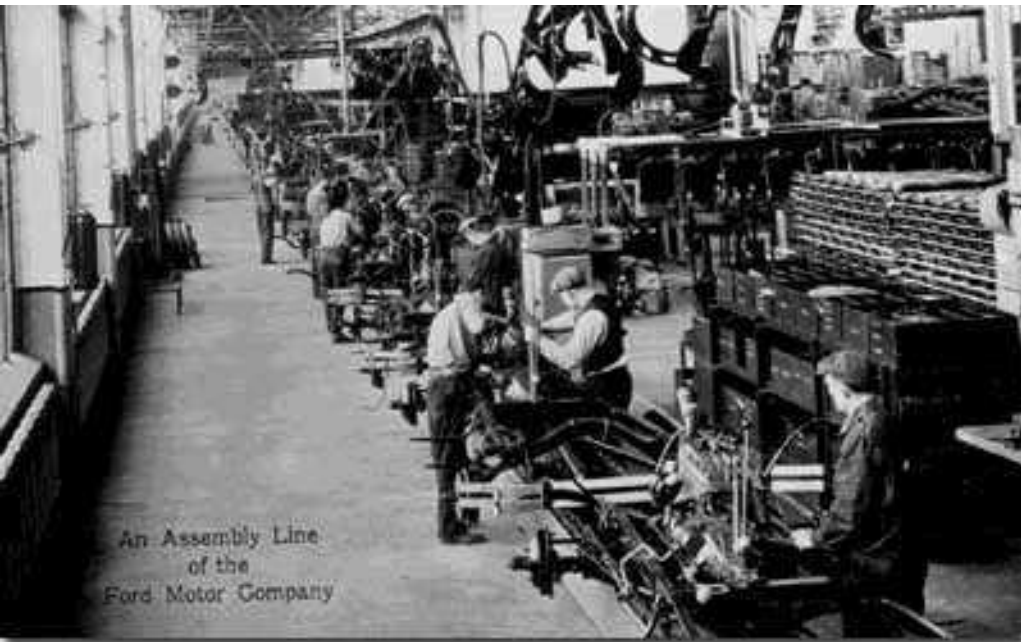
“A customer can get his car in the color he wants, as long as the color is black.....”
Henry Ford



Henry Ford – assembly line



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In 1913, with the introduction of the moving assembly line, Ford achieved the ultimate Taylorite idea - men's work pace is controlled by a mechanical conveyor, where the rate was determined by management



Mass Production

The workers:

Limited experience, interchangeable parts also developed interchangeable workers - dull and monotonous work

The tools:

Fixed and unchangeable, one purpose and expensive

The products:

Low cost, standardized products that were easy to use

The target:

Permitted errors, control store, limited amount of products, reduced number of parts

Lean Production

After the Second World War, Eiji Toyoda and Taiichi Ohno at Toyota Motor Company remanufactured Ford's continuous production concept, but further synchronized flow with demand from the end customer (s), and ...



... Lean production was born

Lean Production

The workers:

Teamwork, interdisciplinary problem solvers both in production and process

The tools:

Flexible but focused; increased use of automation

The products:

Standardized, high quality, high volume

The target:

Strive for perfection, zero defects (6 sigma); zero stock on the factory floor

Frederick Taylor
(Scientific
management)

Henry Ford
(assembly line,
mass production)

Toyota Production System



Dr. Taichii Ohno
1950: Assembly
Manager

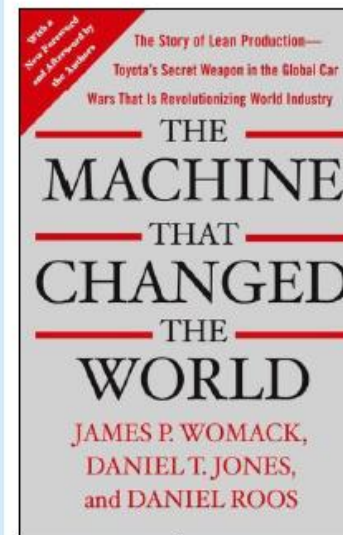


Eiji Toyoda
1950: Managing
Director

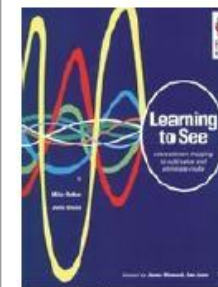


Dr. Shigeo Shingo
1959: Industrial Engineer

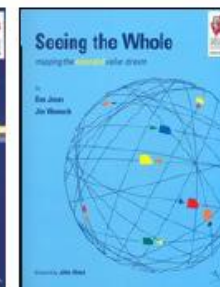
**Deming, Feigenbaum, Juran,
Ishikawa (TQM, SPC)**



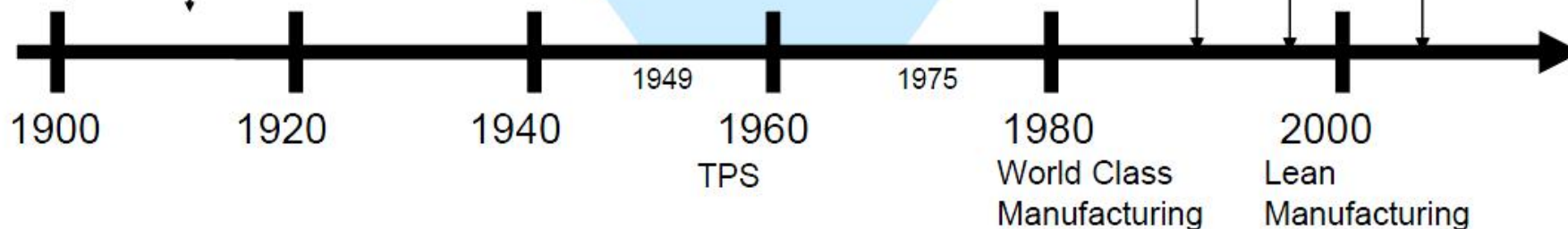
1990



1999



2003

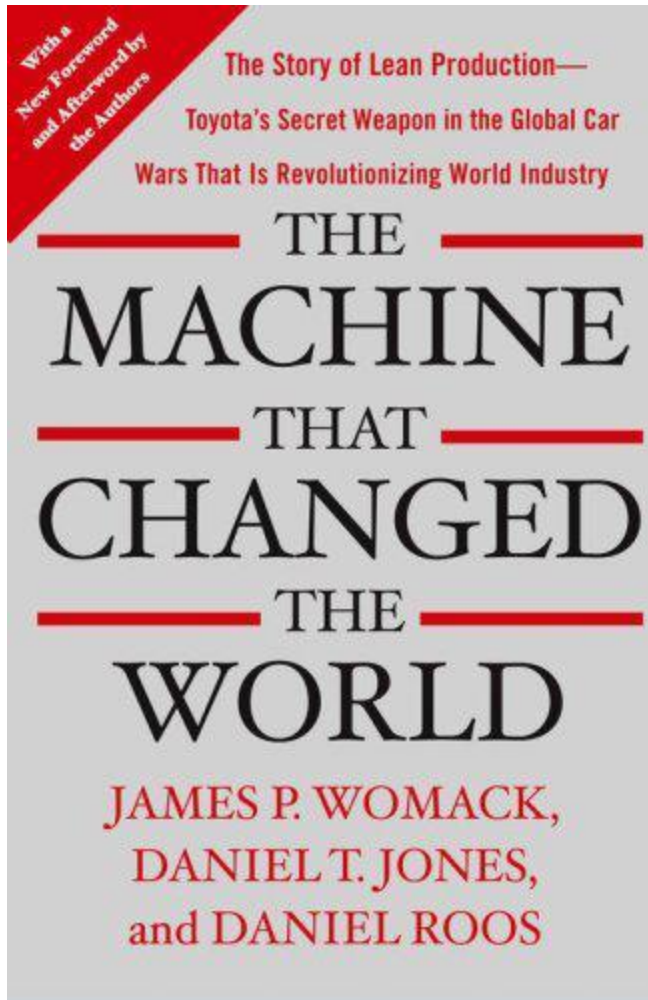


The Machine That Changed The World

(Womack, Jones & Roos, 1990)



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- Compares Lean processes of Toyota Production System (TPS) with mass production environments in the western world

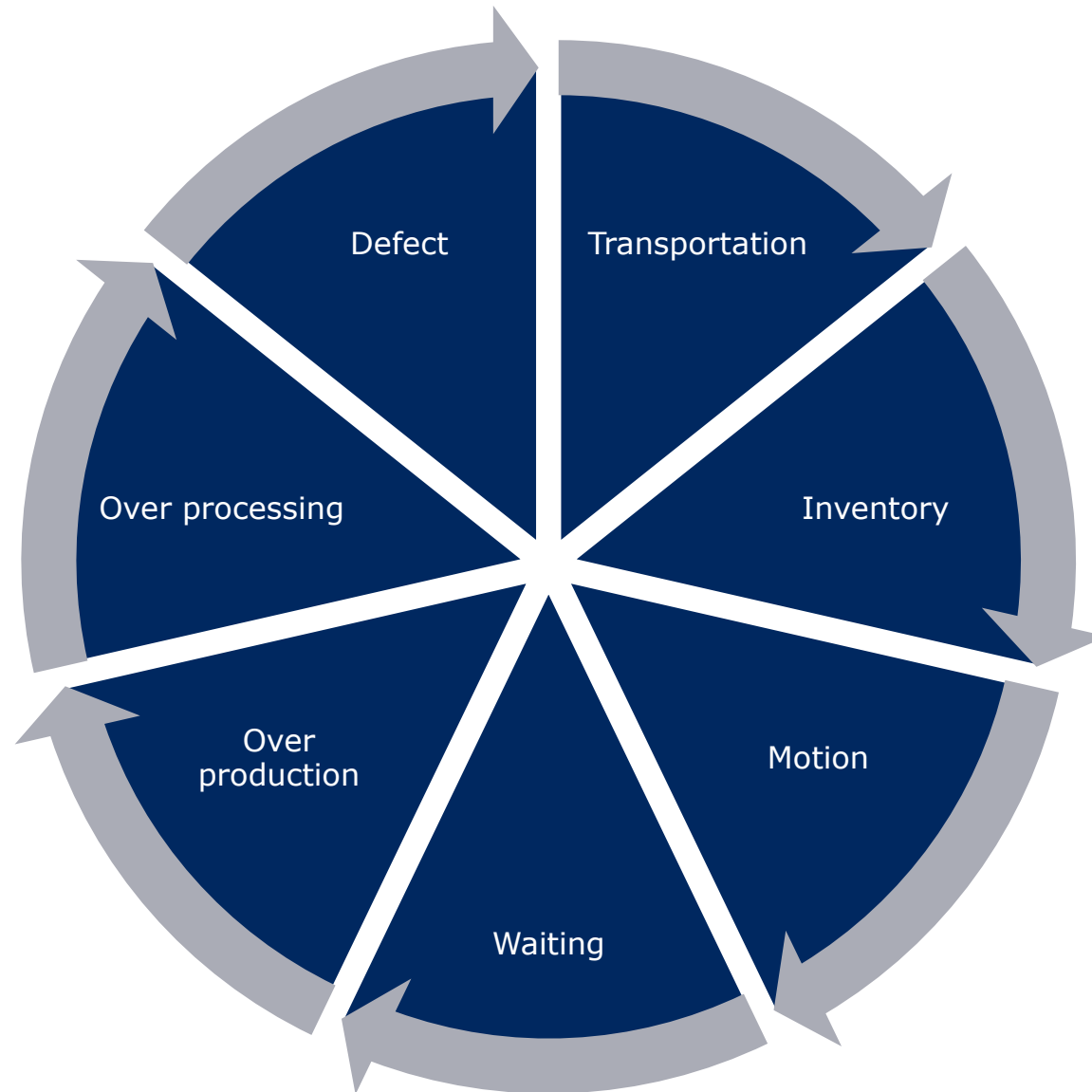
What is Lean?

- A structured methodology for working with improvements
.....through involvement of ALL people!
- It's about eliminating "unnecessary work" (waste)
.... it's not about working faster!
- Take action of the individual things YOU can do something about
- Lean is an investment in processes and people

5 Lean prinsipper

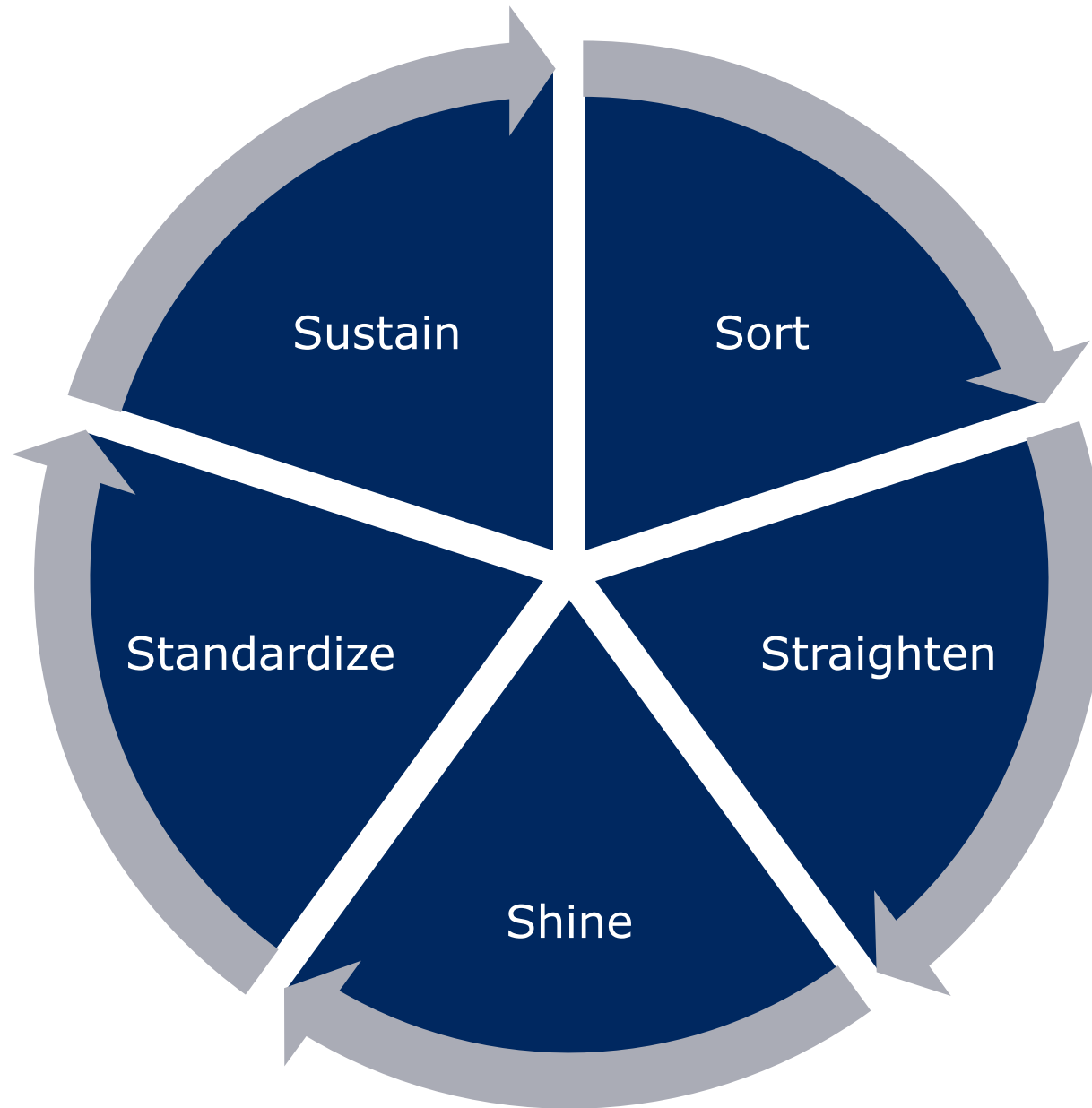
1. **Value** - specify what creates value from the customer's perspective
2. **Value Stream** - identify all the steps along the process chain.
3. **Flow** - make the value process flow.
4. **Pull** - make only what is needed by the customer
5. **Perfection** - strive for perfection by continually attempting to produce exactly what the customer wants.

The 7 wastes

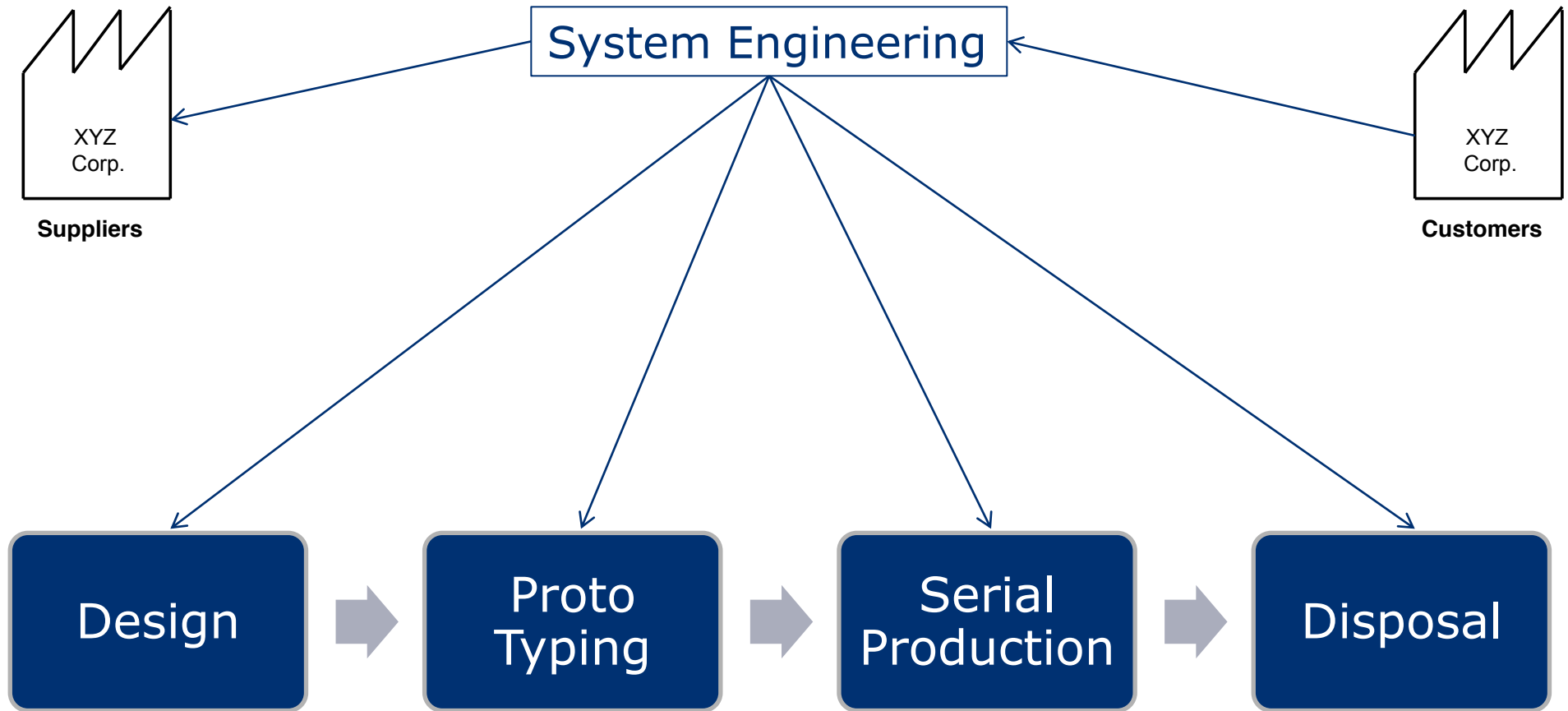


Tim Wood

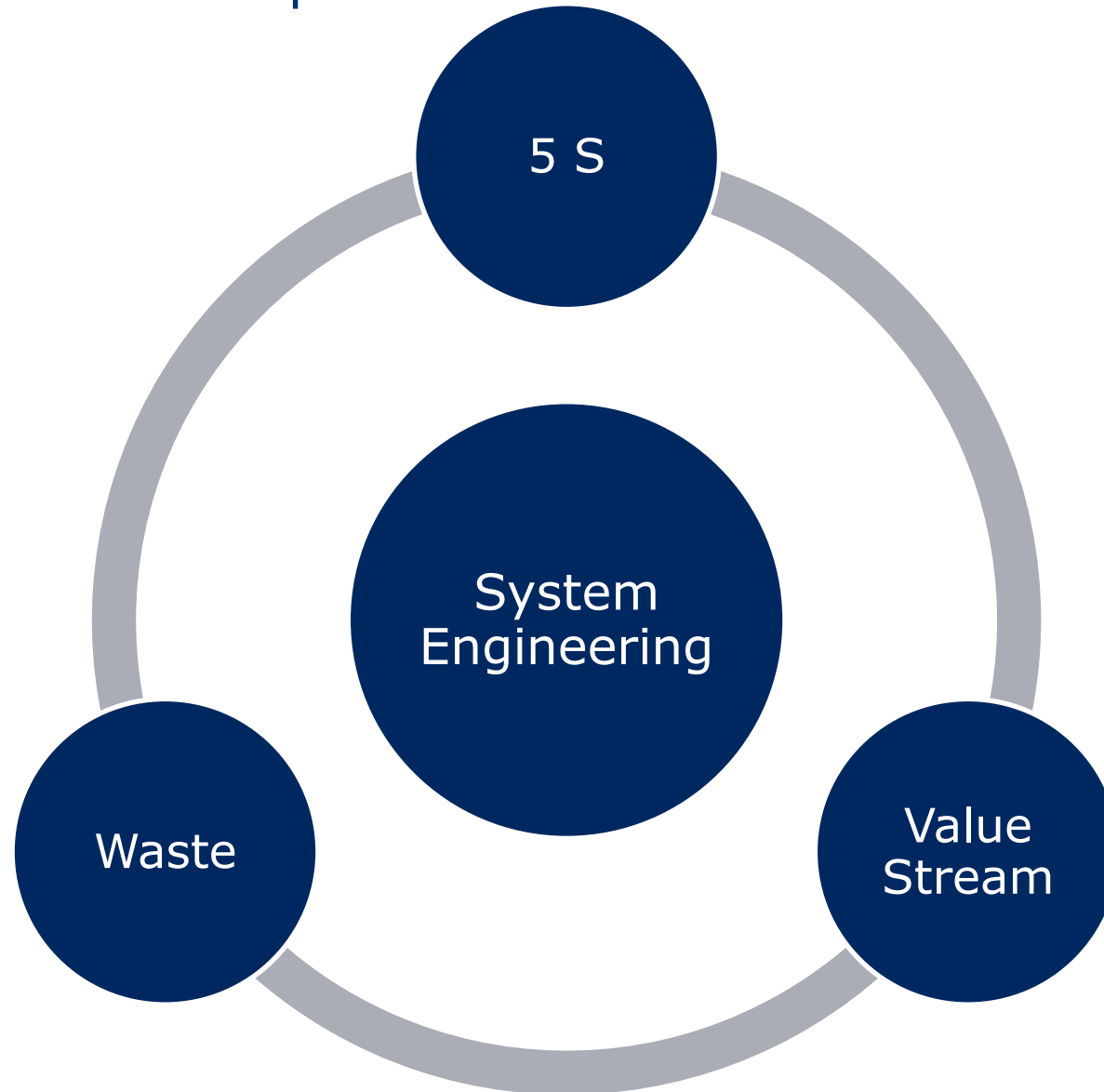
5 S

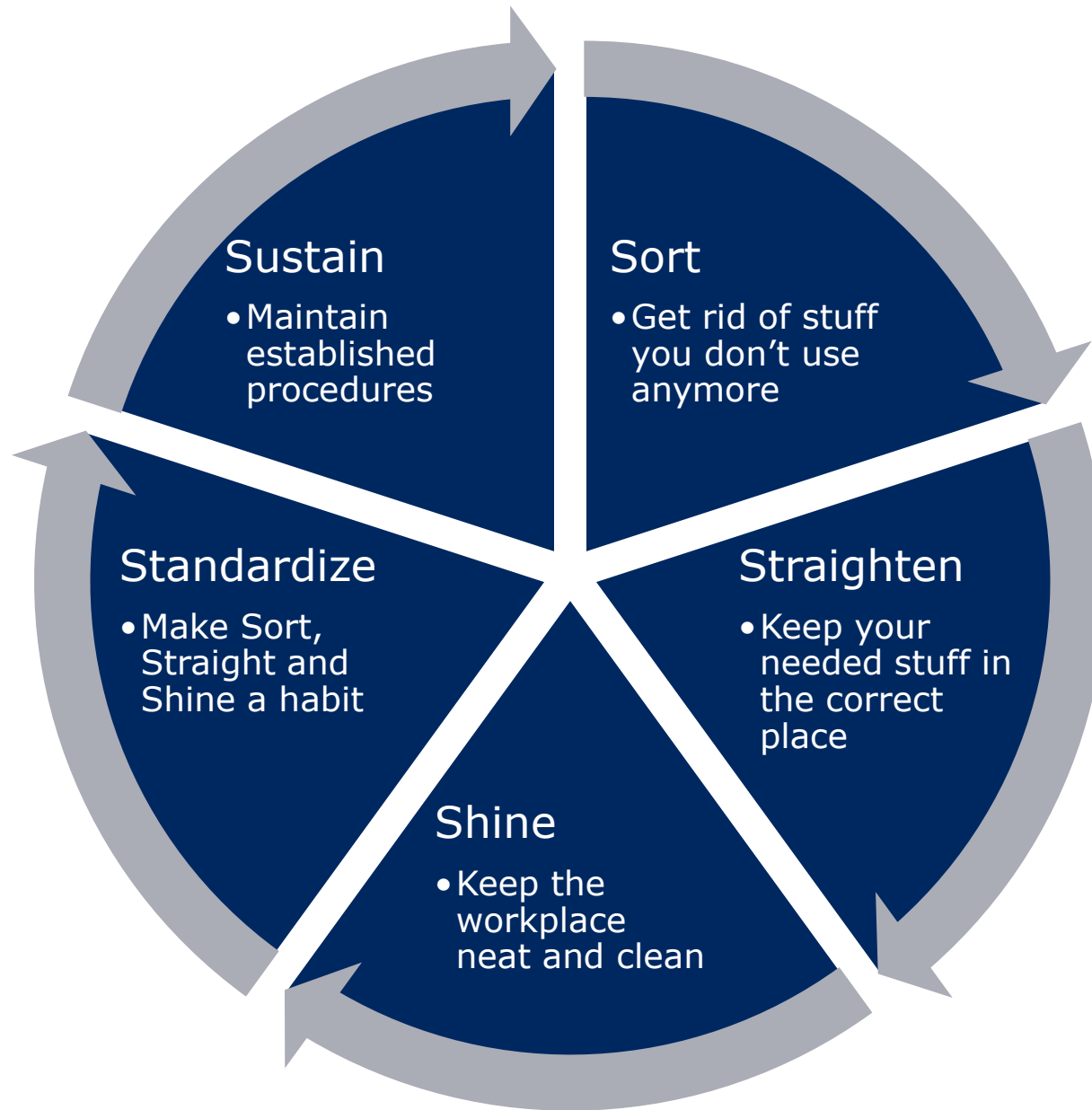


SE Value Stream



SE and Lean Principles





The 7 wastes (SE samples)

Transportation

- Sending documents for several reviews

Inventory

- Overload for some key personnel

Motion

- Long distance to colleagues, printers and meeting rooms

Waiting

- Clarifications before further progress

Over production

- Making too many documents

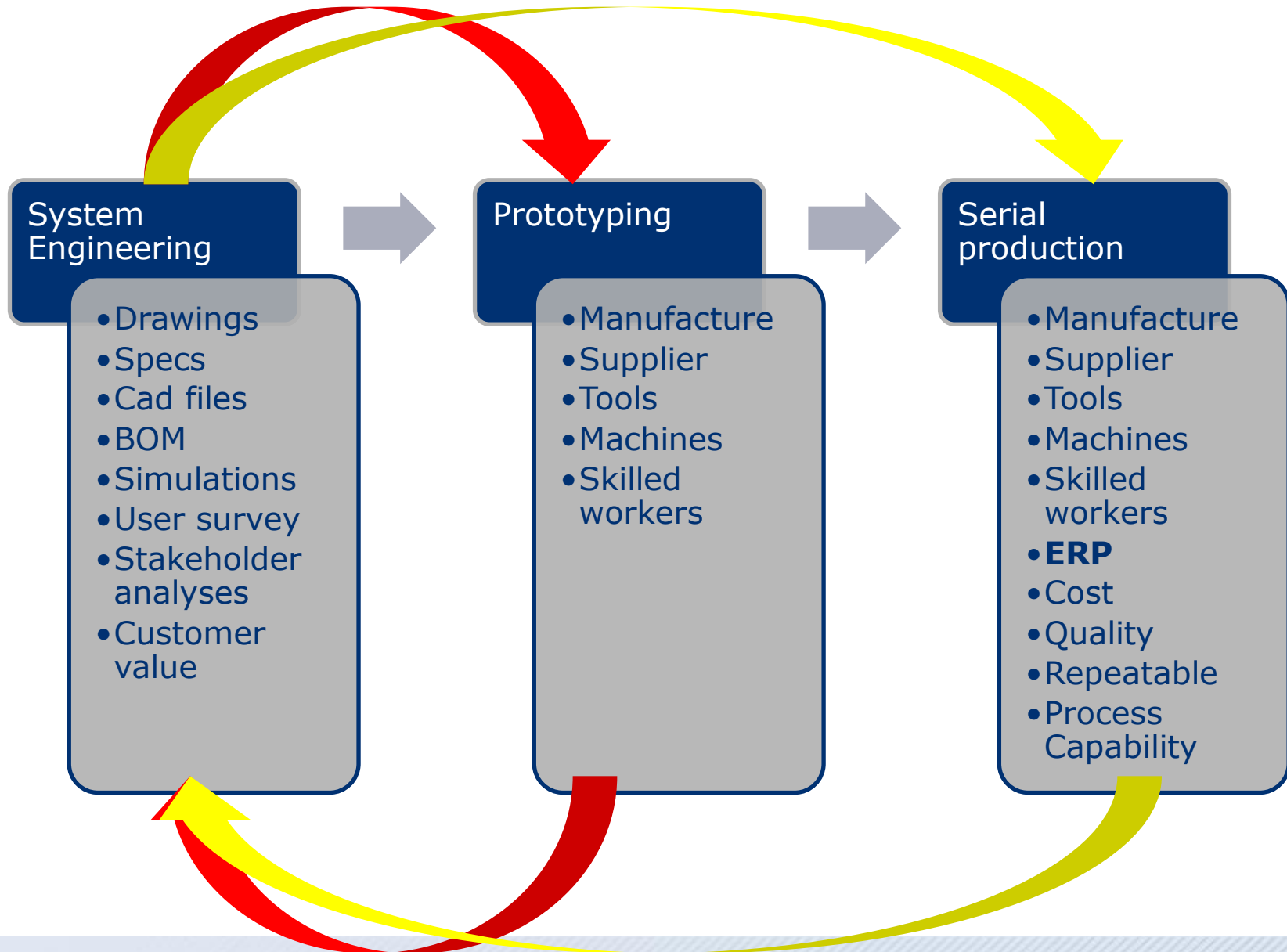
Over processing

- Expensive tolerances

Defect

- Handover of unclear spec

The Value Stream



Questions?



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