LEAN METHODOLOGY

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The Lean Manufacturing Methodology

- Lean Supply
- Core Production System
- Measurement/Visual Management
- Mindset Change
- Tools for Lean Focus

A Lean Process

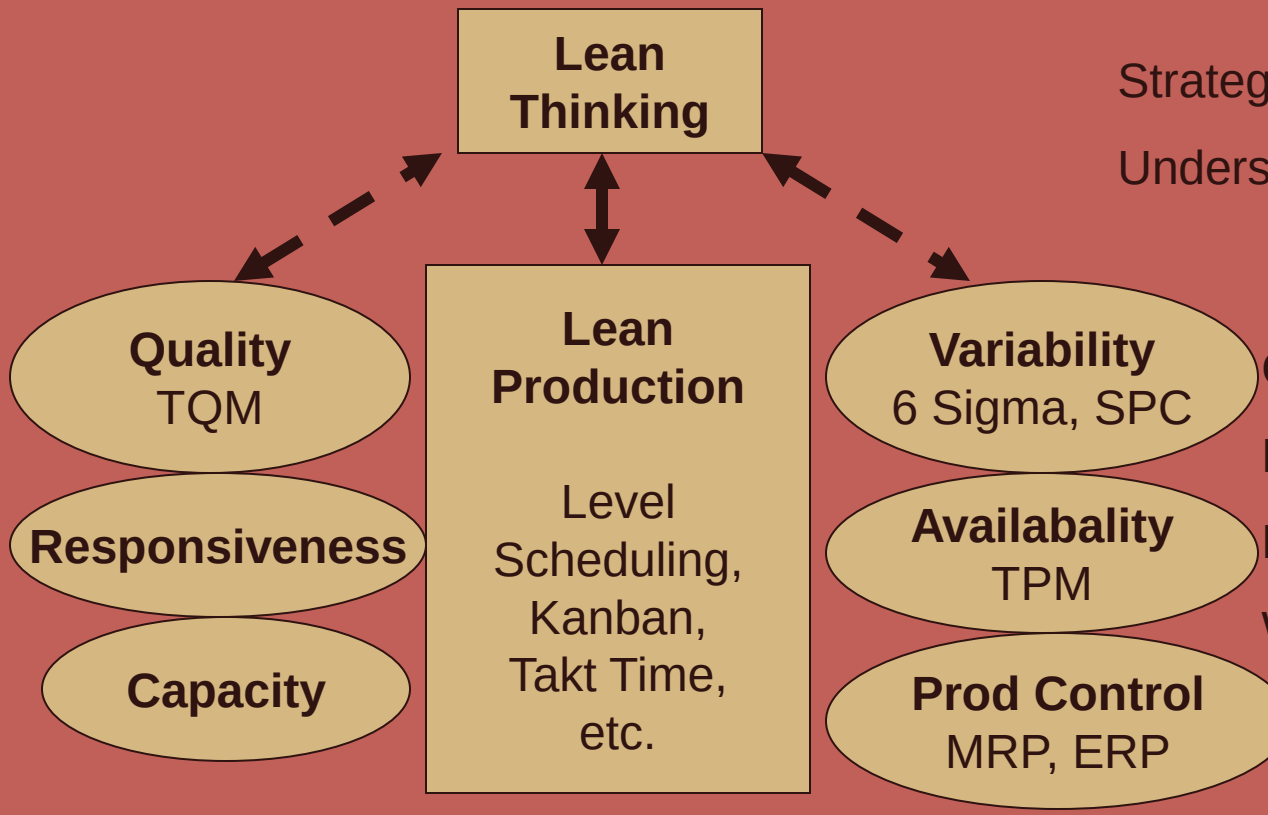
- Understand customer requirements
- Define internal value stream
- Eliminate waste, make info/products flow and be pulled through system
- Continually improve

Key Issues for Success

SAE Research Report

- Research identified 6 elements that create the foundation for best practice in lean operation among manufacturers
  1. Management
  2. People
  3. Information
  4. Supplier/Organization/Customer Chain
  5. Product
  6. Process/Flow

Lean Framework



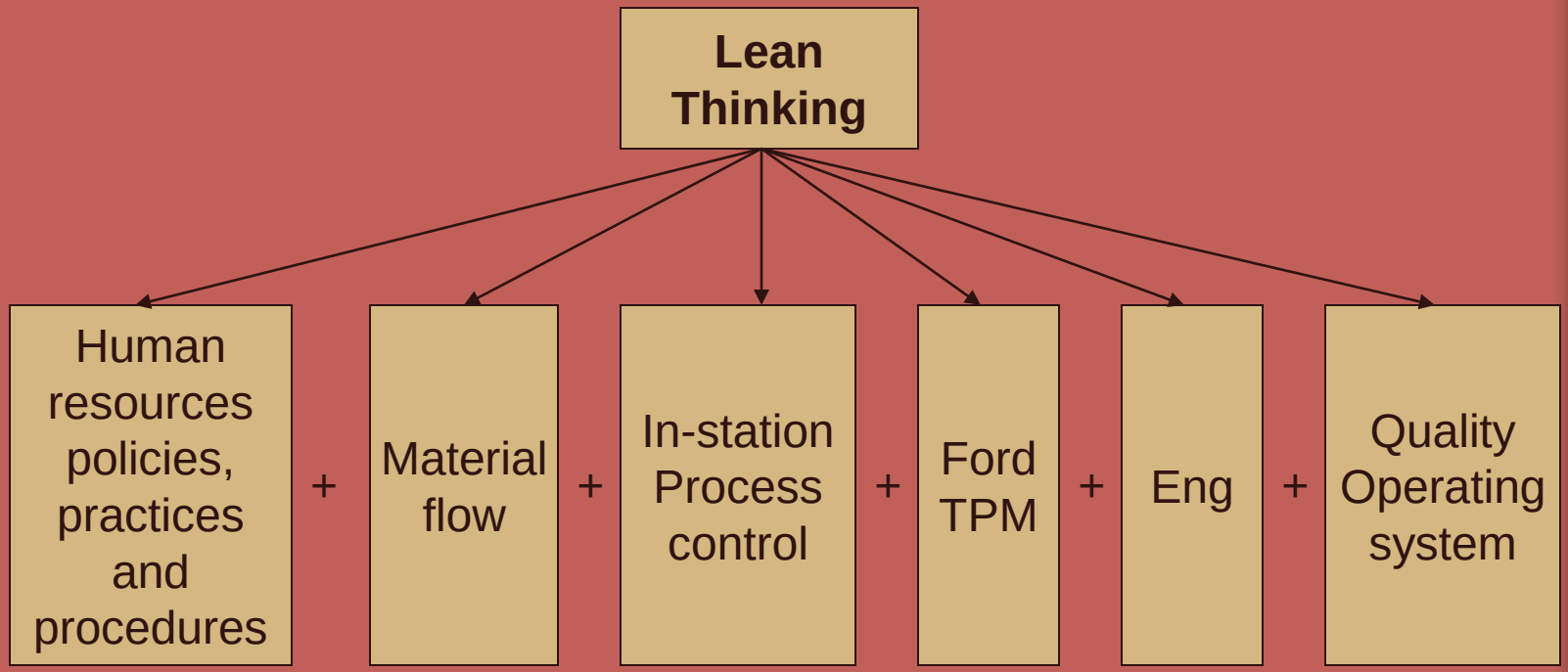
Strategic Level:

Understand Value

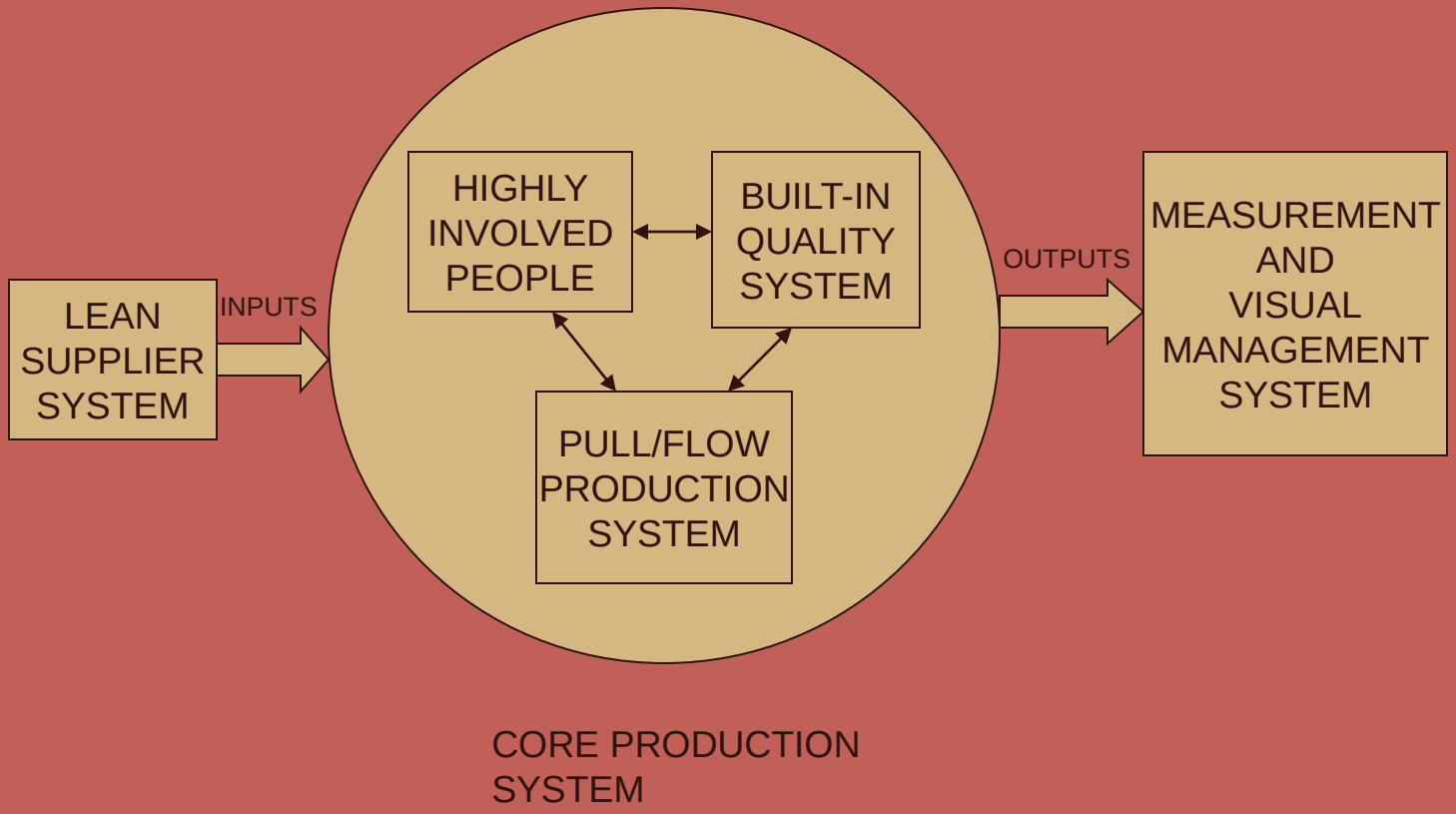
Operational Level (Tools):

Eliminate Waste

Ford Production System



A Lean Manufacturing Framework



Lean Supplier System

- To improve skills in JIT, TQM, SPC, CAD/CAM, Cost
- To increase trust
- To keep suppliers in touch with market developments
- To enhance the reputation of the supplier as a good partner
- To help smaller suppliers lacking specialist trainers and facilities
- To share development benefits
- To provide an example to subcontractors as to how they should develop their own suppliers

Core Production System

- Highly Involved People
  - Pay incentive
  - Multi-skill
  - Training
  - Autonomy
  - Suggestion

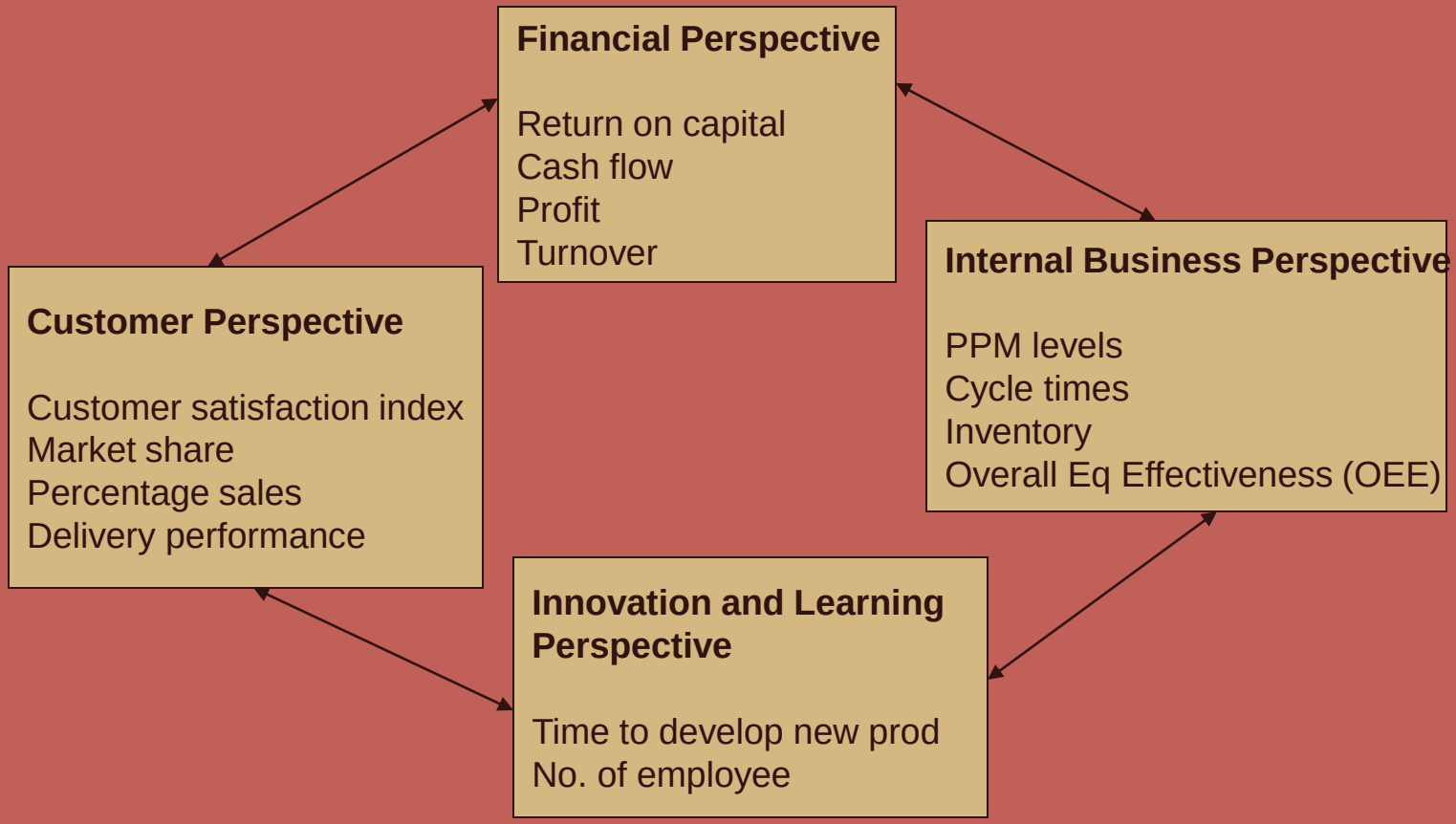
Core Production System

- Built-in Quality System
  - SPC
  - SOP
  - Error proofing (Poke Yoke)
  - Capability
  - Jidoka

Core Production System

- Pull/Flow Production System
  - Small lot
  - Leveling (Heijunka)
  - Takt time
  - One piece flow
  - TPM
  - Facility layout
  - Kanban
  - SMED

Measurement/Visual Management System



Measurement/Visual Management System

A few more key measures!

- Cost
  - Process (activities)
  - Products
  - Change-over time
- Quality
  - % operation to conformity
  - % machine with Cpk more than 1.5
  - TPM (% of area covered/operator trained)

- **Takt time** can be defined as the maximum time per unit allowed to produce a product in order to meet demand. It is derived from the German word **Taktzeit** which translates to *cycle time*.

Takt Time

- Takt time can be first determined with the formula:
- T = (Ta/Td)
- Where
  T = Takt time, e.g. [minutes of work / unit produced]
  T_a = Net time available to work, e.g. [minutes of work / day]
  T_d = Time demand (customer demand), e.g. [units required / day]

Benefits

- The product moves along a line, so bottlenecks are easily identified when the product does not move on in time.
- Stations that don't operate reliably are easily identified.

- The takt leaves only a certain amount of time to perform the actual value added work. Strong motivation to get rid of all non value-adding tasks
- Workers and machines perform sets of similar tasks, so they increase their productivity.
- As all products are "stuck" in the line and cannot be "lost“ on the shop floor

Measurement/Visual Management System

A few more key measures!

- Delivery
  - Lead time
- People
  - Value added per person
  - Training days per employee per year
  - Kaizen participation rate

Lean Assessment

- Please ask yourself the following questions with relation to your job (your answer is either YES or NO)

1. Put customer first and keep them in mind?
2. Have respect for the people who you work with/for and who work for you?
3. Have maximum opportunity to contribute your ideas?
4. Feel you can learn from each other and grow?
5. Feel that management acknowledge your aspirations?
6. Think that all employees see themselves serving each other and the customer?

Lean Assessment

7. Feel management listens to you too?
8. Think that members in all occupational classifications are urged to try or suggest new ideas?
9. Not feeling afraid of making mistakes?
10. Feel the management builds relationships, which are based on collaboration rather than fear or indifference?
11. Think that everyone in the company is encouraged to search for and suggest better methods for performing their jobs?