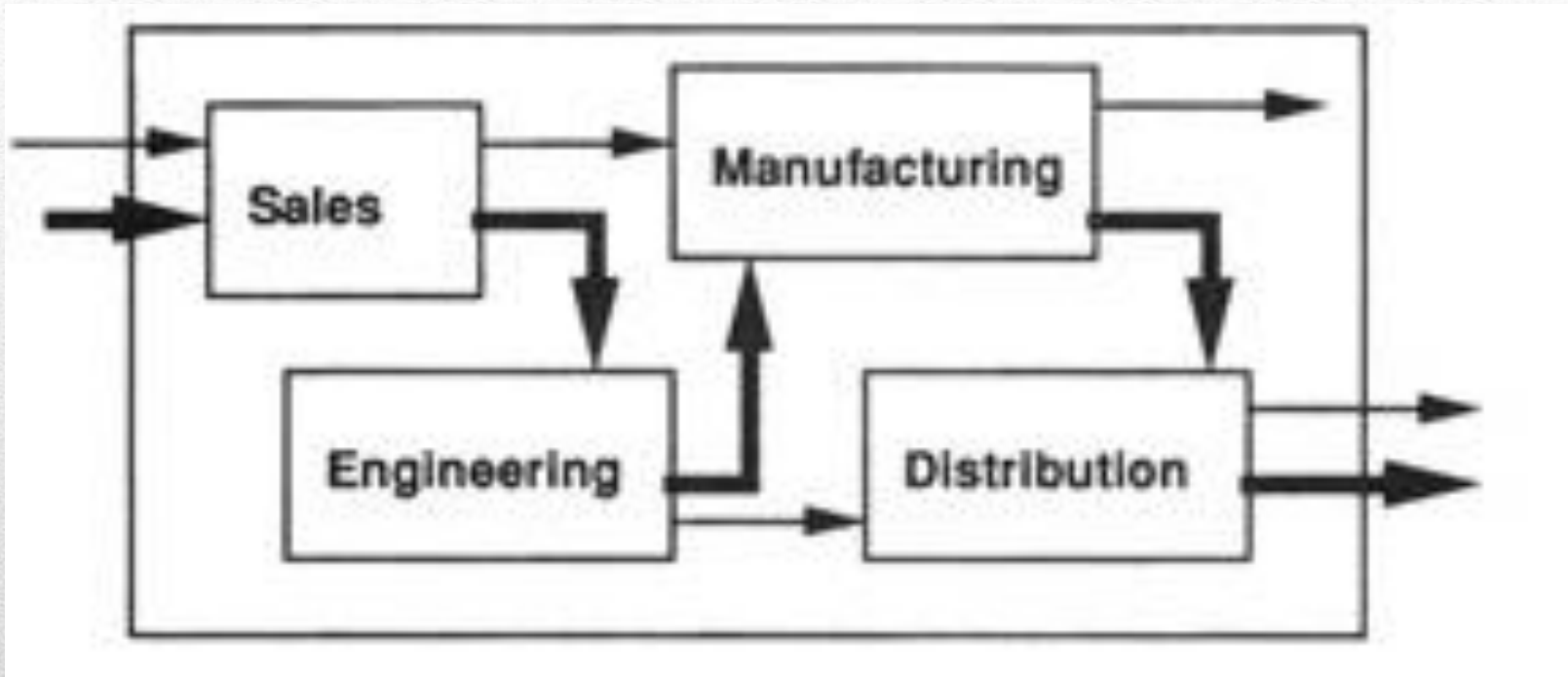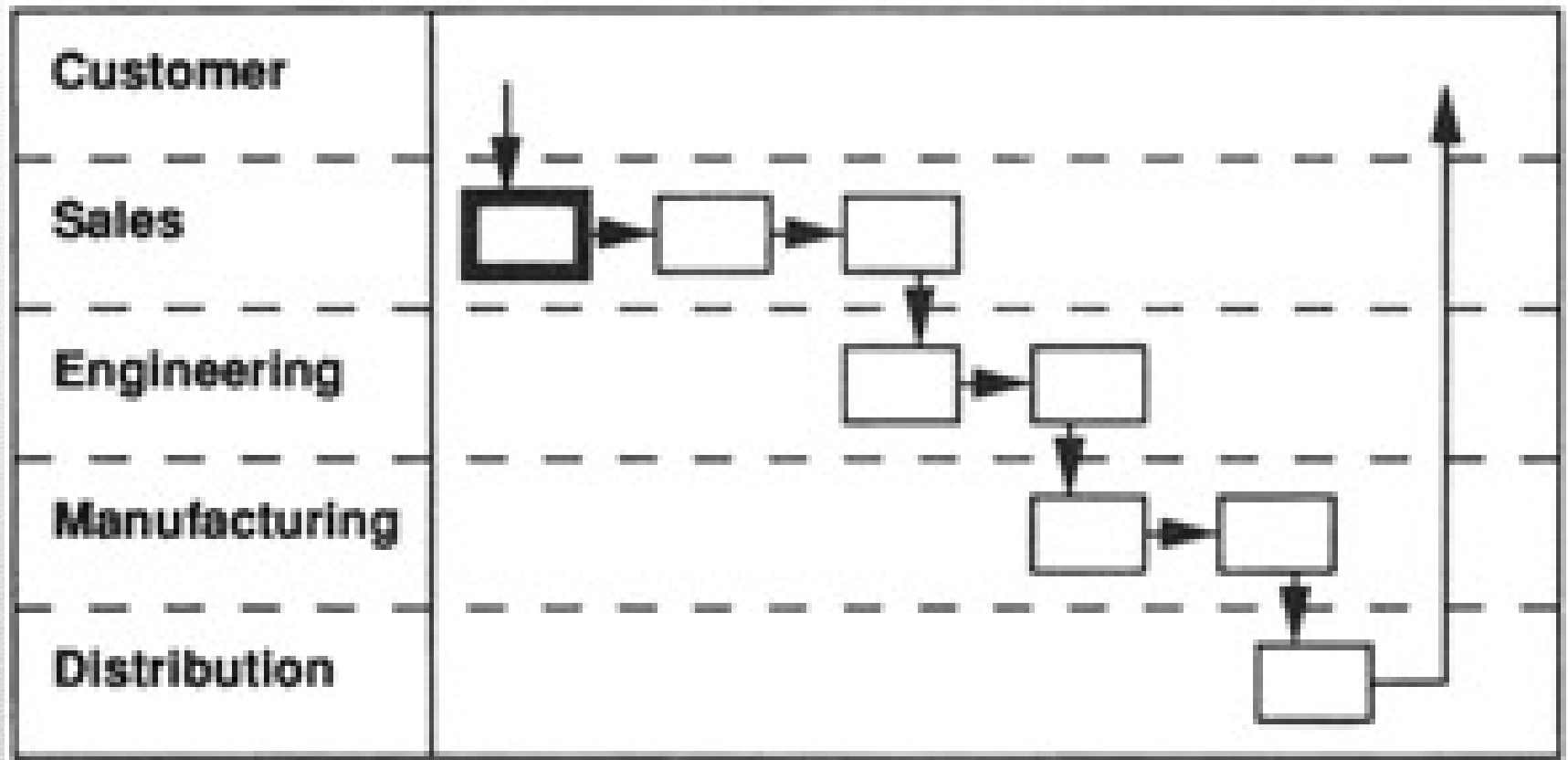# Lean Six Sigma

Clase # 3

- Relationship
- Cross-functional
- Flow chart
- Mostly for information processing
- Top Bottom approach
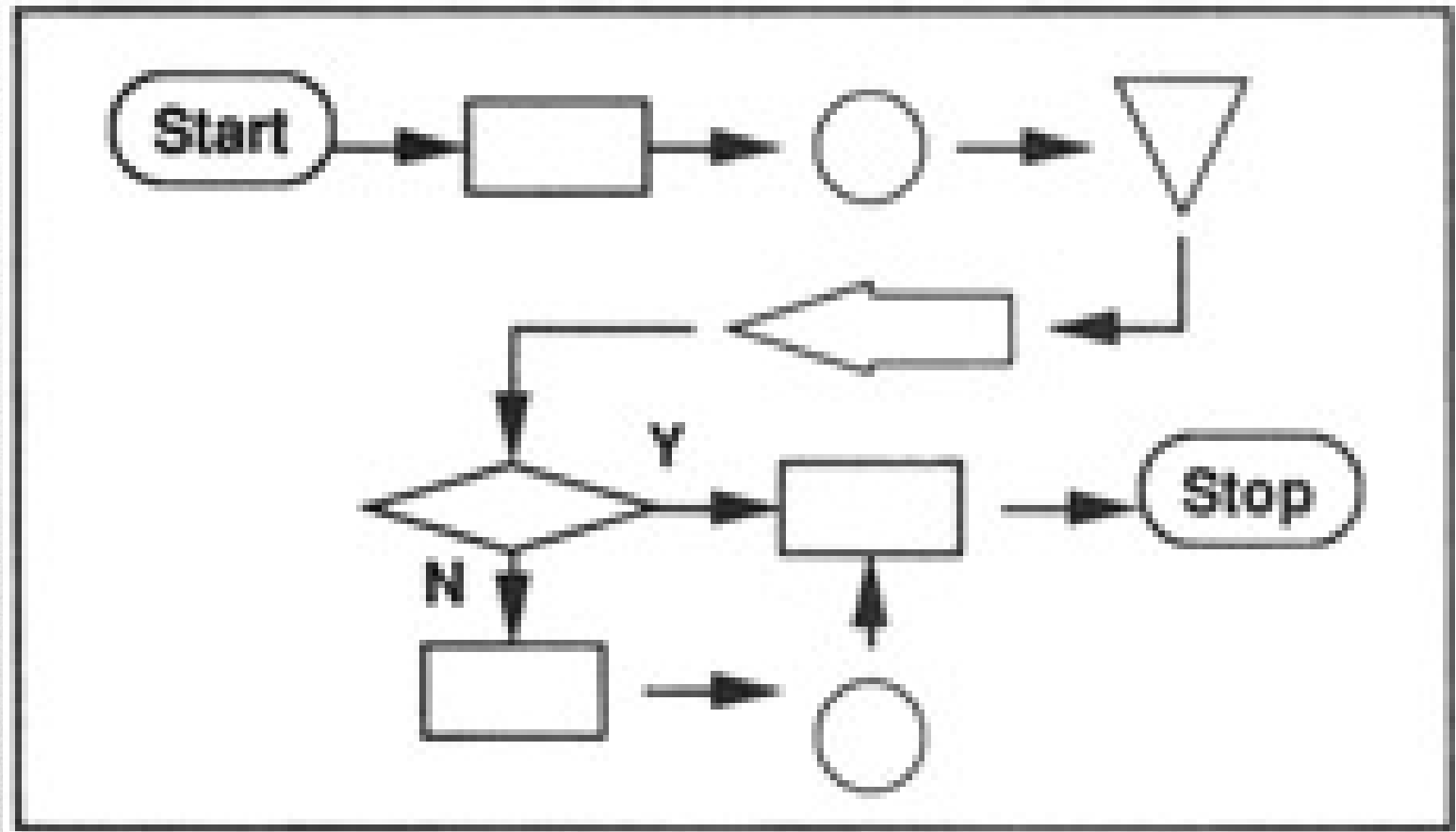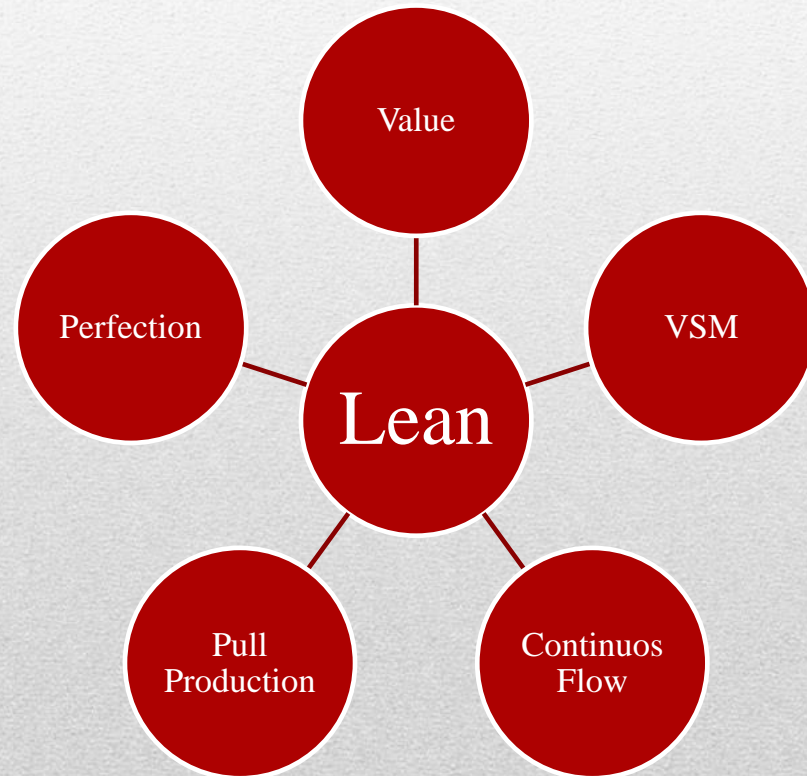
Mapeo general

Relationship

Crossfunctional

Flow chart

- "Lean is a systematic approach to identifying and eliminating waste through continuous improvement, flowing the product at the pull of the customer in pursuit of perfection."
- Porque Lean:
  - Operacional
  - Administrativo
  - Estrategica

Lean

- JIT
- Build to Order
- Schlimmbesserung
- Que es Value Stream Mapping?
- Value added (VA)
- Non Value added (NVA)
- Think as the customer

Value Steam Mapping

- 95% NVA
- TIM WOODS
- Value Stream Management

Waste
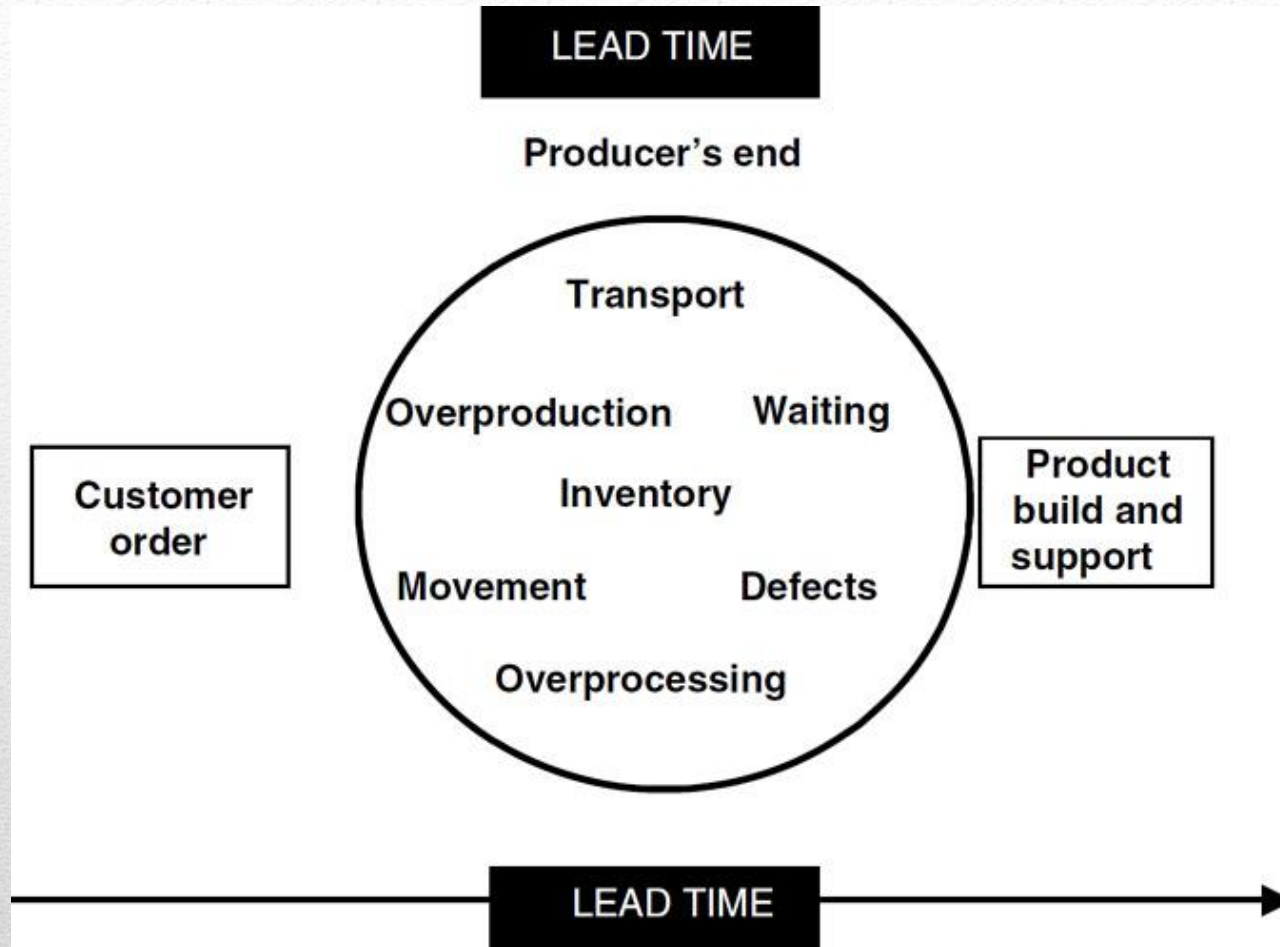
Lead time

- Cycle time
- Changeover time
- Uptime
- Production Batch Size
- Talk time
- Queueing time
- Lead time
- Overproduction BIG WASTE

Elementos de VSM

- La voz del cliente
- Diseño del proceso correcto
- NVA activities eliminated

Actividades VA y NVA

- What is pull?
- 7 deadly wastes
- What is Flow?
- Tools for flow
  - Takt time
  - Standardize work
  - 5S (Sort, Straighten, Shine, Standardize, Sustain)
  - Work Balancing
  - Leveled production

Pull and Flow

$$\text{Takt time} = \frac{\textit{Production Time Availabel}^*}{\textit{Customer Demand}}$$

* Minus lunch breaks; time briefing; other

Production Time Available/day = 8 hours = 480 minutes

Prodcution Time Available/day = 480 − (lunch + breaks) Lunch = 45 minutes/day

Breaks = 2 breaks of 15 minutes each/day = 30 minutes

$$\text{Production time availabel/day} = \frac{(480)-(75)}{\textit{Customer Demand}}$$

Assume that daily customer demand is = 100 parts per day

$$\text{Takt Time} = \frac{405 \text{ minutes}}{100 \textit{ parts/day}} = 4.05 \text{ parts per minute}$$

Takt time

- Metafora del rio
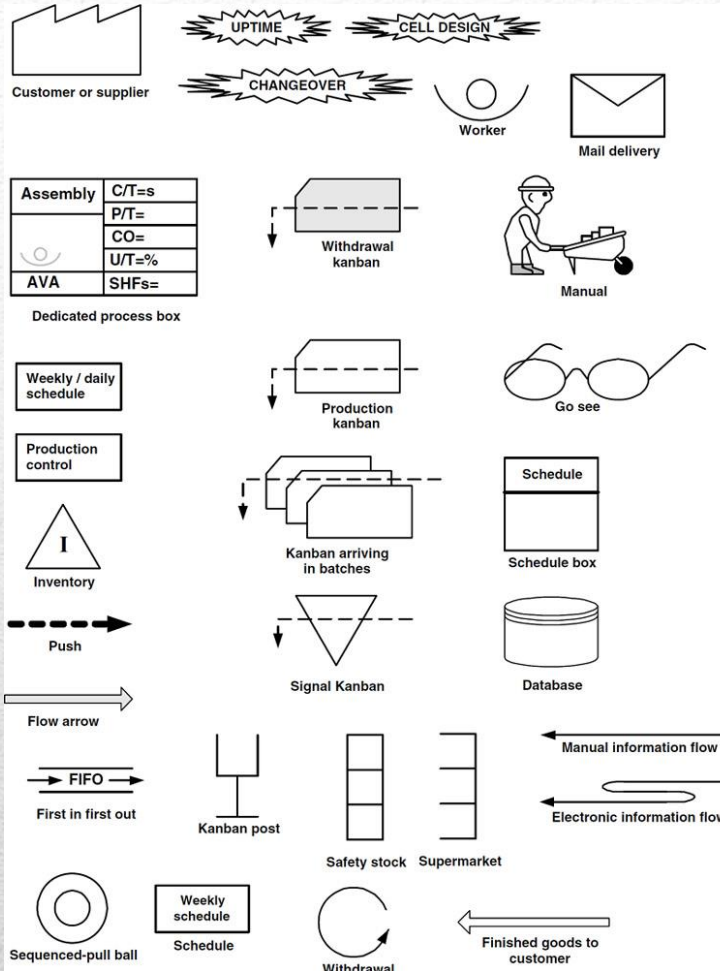- Donde aplica
  - Clientes
  - Manufactura
  - Servicios

Representacion Grafica

1. Seleccionar una familia de productos
2. Lider
3. Caminar todo el proceso
4. Incluir materiasl y flujo de informacion
5. Cronometro
6. Usted haga el mapeo completo

Pasos a seguir

Algunos simbolos

- Definicion de valor
- Value Stream mapping
- Flujo continuo
- Pull
- Perfeccion

5 principios Lean

- Value stream mapping provides a visual approach to improve lead time, as well as planning and identifying kaizen events for effectiveness, and allows different areas of an organization to gain understanding of the overall material flow of the business. Value stream mapping is therefore a powerful tool for analyzing information and material flow throughout the organization and between organizations to identify and plan a Lean process.

Observacion

- Tiempo efectivo de trabajo
- Demanda del cliente
- Takt time
- Pitch time
- Queue Time
- Cycle Time
- Total Cycle time

Algunas metricas

Tiempo disponible menos todas aquellas actividades del trabajo que no generan valor: Almuerzo, reuniones y descansos.

Dia de trabajo = 8h = 480 min

Almuerzo = 30 min
reuniones = 45 min

Tiempo efectivo = 8 h−almuerzo−reuniones (1 h = 60 min; 8 h = 480 min)
 = 480 min—30 min—45 min = 405 min

Tiempo efectivo

- Numero de transacciones, servicios o partes por semana

$$\text{Customer demand} = \frac{\text{number of units}}{\text{week business week}} = \frac{300}{5}$$

$$= 60 \text{ deposits per day}$$

$$\text{Takt time} = \frac{\text{effective working time}}{\text{customer demand}}$$

Demanda del cliente y Takt time

$$\text{Pitch} = (\text{Takt time}) \times (\text{number of workunits})$$

$$\text{Production time available} = 8 \text{ hs} \times 60 \text{ min/day}$$

$$= 480 \text{ min} - 30 \text{ min lunch} - 30 \text{ min meetings}$$

$$= 420 \text{ min}$$

$$\text{Customer demand} = 300 \text{ deposits per week (5 days peer week)}$$

$$= \frac{300}{5}$$

$$= 60 \text{ deposits/dayTakt time}$$

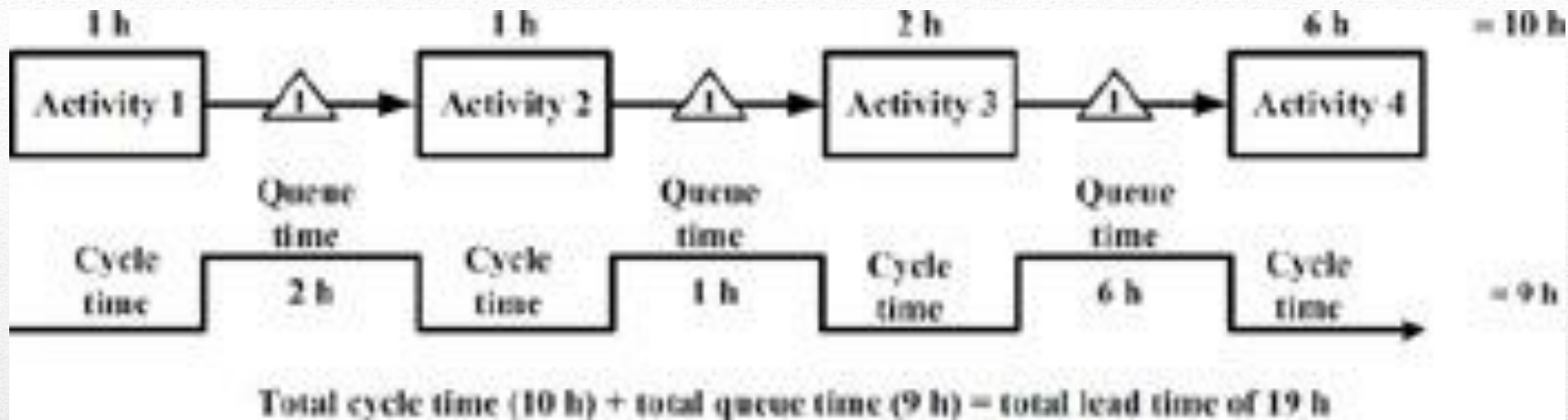$$= \frac{420}{60} = 7 \text{ min}$$

$$\text{Pitch} = \text{Takt time} \times \text{number of work units}$$

$$\text{Pitch} = 7 \text{ min} \times 60 \text{ deposits/day}$$

$$\text{One order} = 60 \text{ deposits/day}$$

$$\text{Pitch} = 420 \text{ min/deposit order}$$

Pitch time

Total cycle time (10 h) + total queue time (9 h) = total lead time of 19 h

- *Cycle time* is the elapsed time for an individual activity from start to completion
- *Total cycle time* is the sum of the cycle times for all of the individual activities in the process in the value stream.

Queue, cycle, total cycle and lead time

- Total lead time: 2970 min — 49 h 30 min

- Total cycle time (Process time): 1515 min. — 25 h 15 min — 4 days 1h 15 min

- Total queuing time: 915 min — 15 h — 1.9 days

- Available working time − 8h − lunch − meetings

- Units: 1 h = 60 min

- 8h = 480 min

- Available working time = 480 min − 30 min − 45 min = 405 min per day

- Therefore, available working time = 405 min per day = 6 h 45 min

- Takt time = (available working time)/(customer demand)

- Takt time = 405 min/customer demand

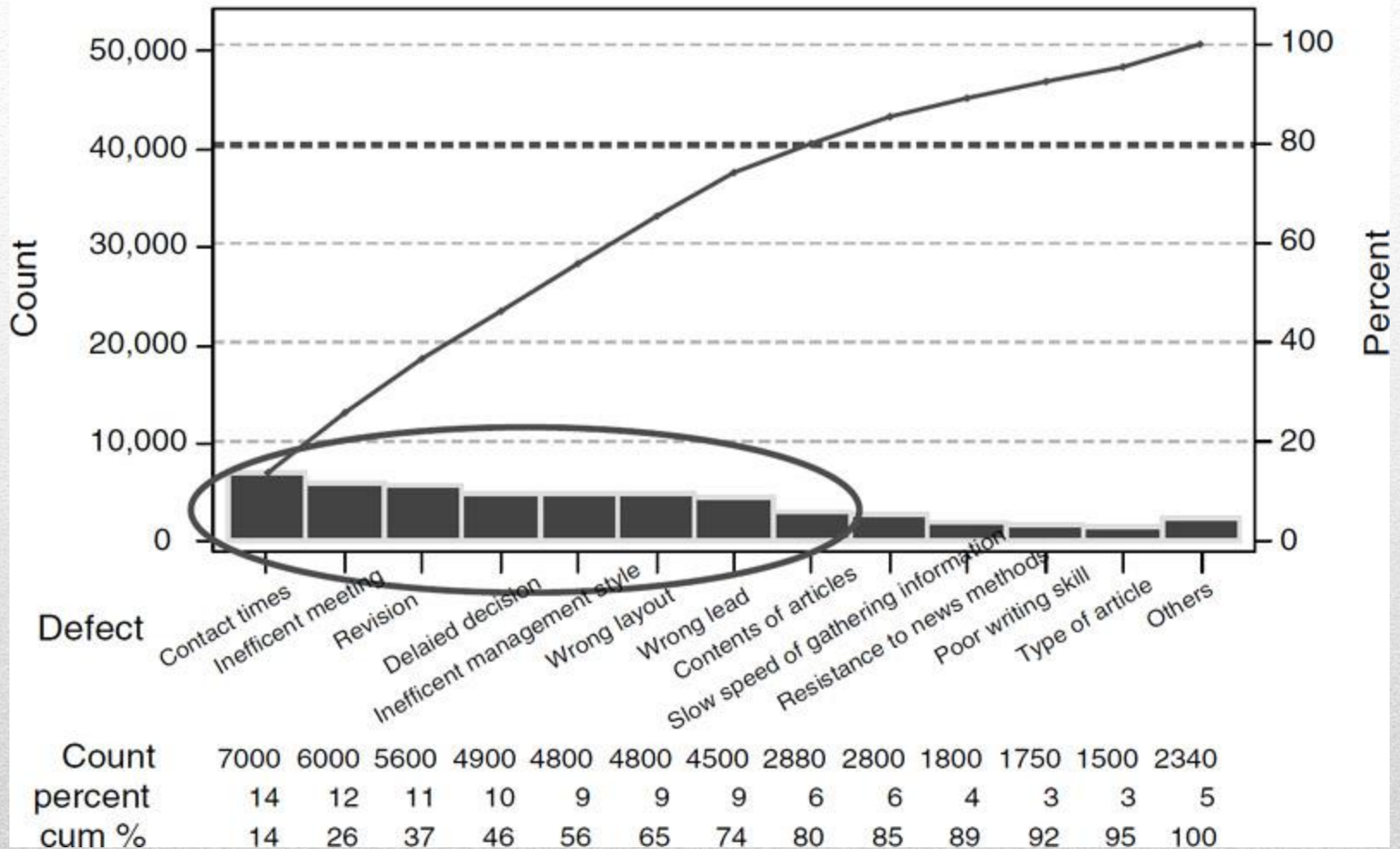- Value-added percentage = (total cycle time)/(total lead time)

- Value-added percentage = 2240 min/2970 min = 0.754 = 75.4%

Value added percentage & 6Sig Level

- Dibujo a mano
- Coleccion completa de informacion
- Verificar la integridad d ela data
- Comenzar al final del proceso para el principio
- Medicion con cronometro
- Hagalo usted mismo!

Current value stream

Pareto chart analysis (80/20)

Defect	Count	percent	cum %
Contact times	7000	14	14
Inefficent meeting	6000	12	26
Revision	5600	11	37
Delaied decision	4900	10	46
Inefficent management style	4800	9	56
Wrong layout	4800	9	65
Wrong lead	4500	9	74
Contents of articles	2880	6	80
Slow speed of gathering information	2800	6	85
Resistance to news methods	1800	4	89
Poor writing skill	1750	3	92
Type of article	1500	3	95
Others	2340	5	100

Analisis

- Kaizen y rediseño
- Revision de Waste
- TIM WOODS

Que hace un lean value stream

- Cual es el proposito?
- Como podemos mejorar lo que ya tenemos?
- Herramientas de calidad
  - Diagramas de Ishikawa
  - Pareto
  - Run charts
  - Bar charts
  - Scatter diagrams
  - Histogramas

Value stream futuro

Preguntas???