Traditional Lean

1. Customer Value:
   - Quality known per product or customer
   - Lead-time – standard (problems covered over with FG, Raw or WIP inventory)
   - Price –economies of scale for both raw materials & operations to gain price improvements

2. **Identify/map the Value Stream:**
   - Management of problem solving (A3, 6-sigma, etc.)
   - TAKT – std. for customer of type of product
   - Value Streams can be fixed long term
   - Process Mapping less importance (less lead-time & cost in info. flow)
   - Information flow: standard & repeatable
   - Lead time: mostly influenced by supply chain & operations

3. Flow – how to create flow across all processes: Value Stream Management
   - Pacemaker – heavier operations focus (i.e. level **every** process to takt)
   - Lead-time (can be overcome with inventory)
   - SMED
   - OEE
   - 5S
   - Quality

   } use to balance each process to Takt

4. Pull – work towards pull & no need forecast (is only a solution when can not arrive at 1 piece flow)
   - Planning – plan pacemaker (long CT), manage inventory (Raw, WIP, FG)
   - Leveling – small batch, JIT
   - Kanban – where you can not reduce change-over, consider Supermarkets for Raw & WIP

5. Perfection – kaizen (continuous improvement)
   - Applies to specific products & standardizing before next kaizen step

High Mix – Low Volume Lean

1. Customer Value:
   - Quality (per part/project spec.)
   - Lead-time (OTD) – entire value stream (Quote, schedule, purchase, logistics, order fulfill, ship, install/debug, invoice (cash flow))
   - Price - maintain & manage against quote
     Profit better understood per project & customer

2. **Identify/map the Value Stream:**
   - Determine which problems deserve the effort to root cause problem solve (ABC)
   - TAKT = planning/managing with quoted time
   - Value Stream: more flexible as projects/customers change, only by type of part/product (i.e. cross training matrix)
   - Process Mapping: more important to improve lead-time (OTD) & cost for entire value stream
   - Information flow: varies depending on project type, customer, market
   - Lead time (value adding): influenced by workload at every step of information & material flow (less influence w/ supply chain)

3. Flow – how to create flow: push order in & maint. flow
   - Bottlenecks:
     Flow of information: real time manage
     Flow of material: manage in real time (day by hour, FIFO boards, etc.)
   - Lead-time competitive advantage
   - SMED
   - OEE
   - 5S
   - Quality

   } focus on bottlenecks, continuously realign capacity with demand

4. Pull – only a consideration based on ABC (runners, repeaters, strangers analysis)
   - Planning – launch based on agreed lead-time, bottlenecks (capacity vs. demand) identified by 'day by hour' & FIFO boards
   - Leveling – you are already JIT (only applies if you have runners)
   - Kanban – only applicable if ABC analysis identifies 'runners', can use conWIP?, then apply to raw & WIP (never FG for runners)

5. Perfection -
   - Applies to general 'processes'
   - Focus is bottleneck processes
   - Heavier focus on lead-time (no FG to hide issues)
   - Bottlenecks in both flow of information & flow of material (both have demand vs. capacity issues)
   - Lean accounting (Activity Based Costing)

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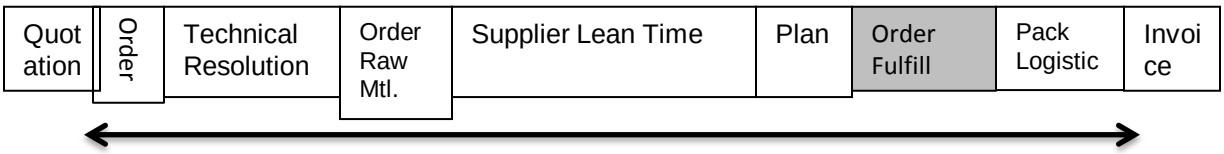
In High Mix / Low Volume
Lead-time is Dramatically Influenced Outside of Operations

High Mix – Low Volume Lean

1. **Customer Value:**
   - Quality (per part/project spec.), might need to evolve understanding
   - **Lead-time (OTD)** – entire value stream (Quote, schedule, purchase, logistics, order fulfill**,** ship, install/debug, invoice (cash flow))
   - Price – maintain & manage against quote, profit varies more by product & customer, therefore require a better understanding per project & customer

Lead-time has less to do with operations



Operations is only a small portion of total lead-time, Therefore Low Volume Lean specialized methodologies focus both on the entire value stream

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Takt time & the Pace-maker Principals are addressed with Quoted Times & Real-Time Bottleneck management

High Mix – Low Volume Lean

2. Identify/map the Value Stream:

- Determine which problems deserve the effort to root cause problem solve (Intuitive, ABC, etc.)
- TAKT = planning/managing with quoted time
- Value Stream: more flexible as projects/customers change, only by type of part/product (i.e. cross training matrix)
- Process Mapping: more important to improve lead-time (OTD) & cost for entire value stream
- Information flow: varies depending on project type, customer, market
- Lead time (value adding): influenced by workload at every step of information & material flow (less influence w/ supply chain)

$$\text{Takt Time} = \frac{\text{Time Available (per period)}}{\text{Customer Demand (per period)}}$$

Difficult to determine, especially if you 'Build to Order'

Use your quoted times (your link to the customer) & visually monitor planned to actual time with 'day by hour'

~~**Pacemaker** = Traditionally the process with the longest cycle time, it's typically based on standard products or product families.~~

Instead

Identify and minimize the impact of the Bottle-neck in real time

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These are a few simple examples of how Lean being applied to

High Mix – Low Volume

differs from lean's traditional applications to

Low Mix – High Volume

Scenarios

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