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American Society for Quality
Ottawa Valley Section

Unlocking Value: A Practical Guide to Value Stream Mapping

June 27, 2024, Ottawa, ON Canada



Objectives

- Review of Lean Principles
- Introduction to Value Streams
- Evaluating waste, bottlenecks, and constraints
- Identifying the Future State
- Tools and Methods to Improve Flow
- Q&A and Discussion
- Resources for Additional Learning

Lean Thinking

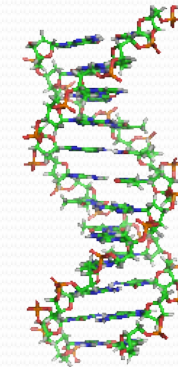
A continuous improvement discipline of analyzing the flow of product, materials, people, information and the systematic elimination of “waste”.

Each step/activity in a process **must add value for the customer**

Continuous improvement becomes a way of life.



- ✓ Exactly what they need
- ✓ When they need it
- ✓ In the quantity they need
- ✓ In the right order or sequence
- ✓ Without errors or mistakes, and
- ✓ At a price they consider good value for money



Value & Value-Added

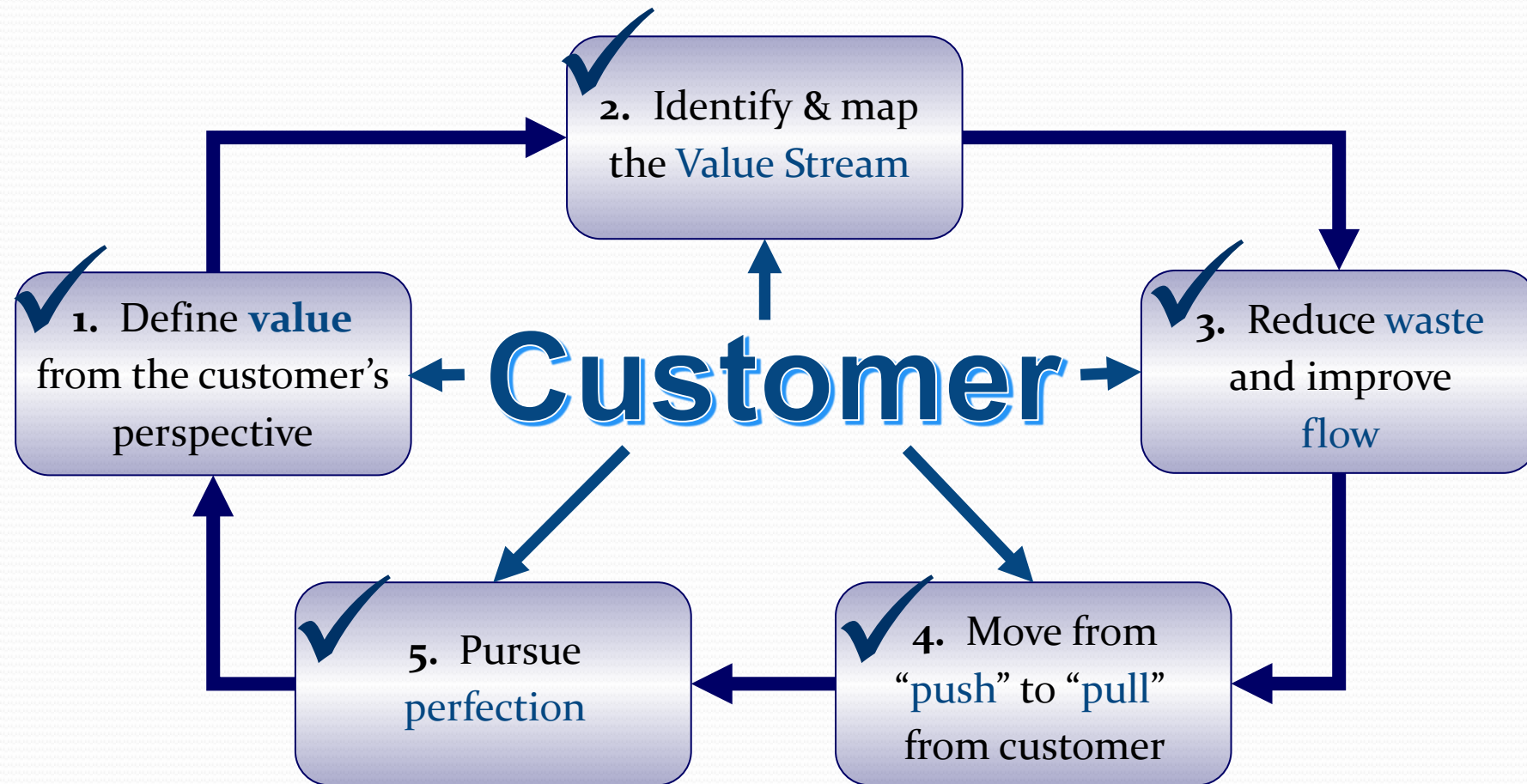
*“**Value is defined by the customer** (externally focused) and is only meaningfully expressed in terms of a specific product that meets the customer’s needs at a specific price and specific time... Lean Thinking must ignore existing assets and technologies and rethink the business... and re-evaluate where to create value for the customer.”*

Source: “Lean Thinking”, (ISBN 9780743249270)
James P. Womack and Daniel T. Jones

*“**Value-Added:** An activity is value-added if a **customer is willing to pay for**; it changes form, fit or function of a product or service; it converts input to output; **it is not waste.**”*

Source: Quality America Inc.

Five Key Lean Principles



Value versus Non-Value Added

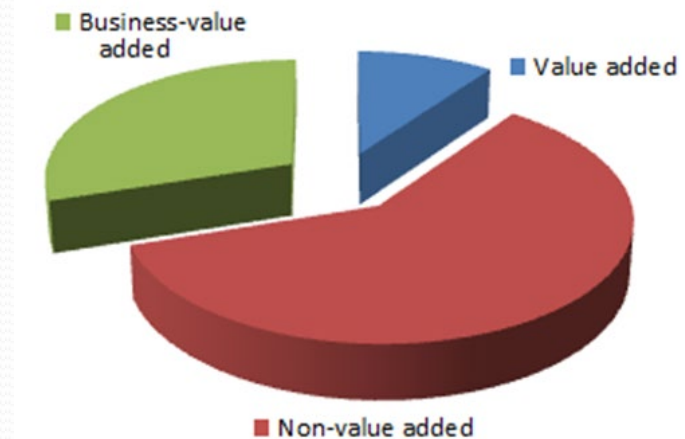
Value Added: Any activity or task that transforms the deliverables of a process in such a way that the customer is both aware of it and willing to pay for it; if left out, this activity would impact product/service performance and/or customer satisfaction

Business Value Added (Incidental Work): Necessary to support Value Added steps in the current process; includes activities that may not add value but are required by law, regulation, safety, business administration.

Non-Value Added (PURE WASTE): Any activity that, when left out, does not directly impact customer or business

Lean: Eliminate waste, Increase value!

Muda (“moo-dah”): a Japanese word meaning "futility; uselessness; wastefulness"



Value Streams - Manufacturing

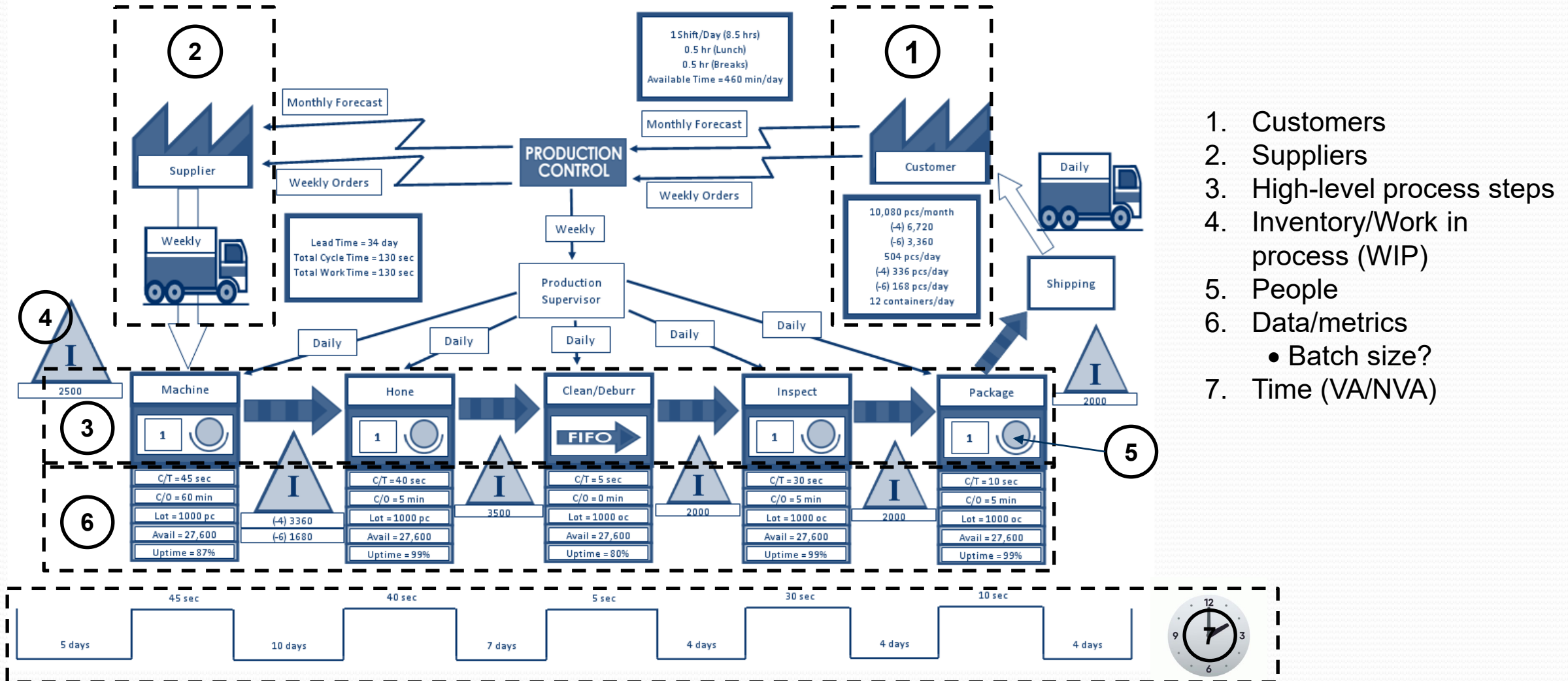
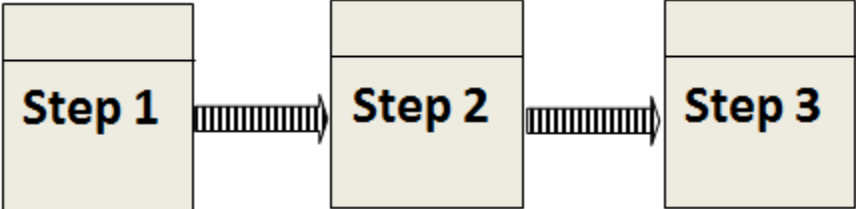


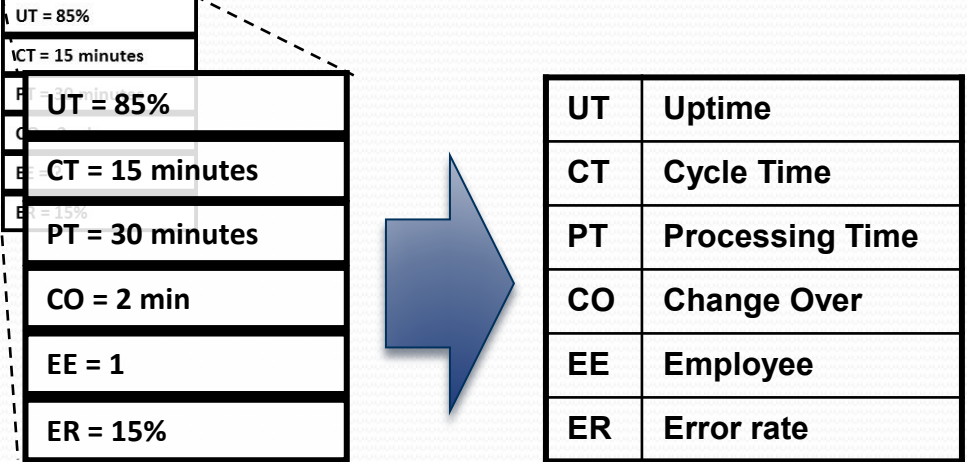
Image source: https://www.sigmaxl.com/images/production_con.png

Data Box Elements

- Process/Activity Steps






- Information Boxes

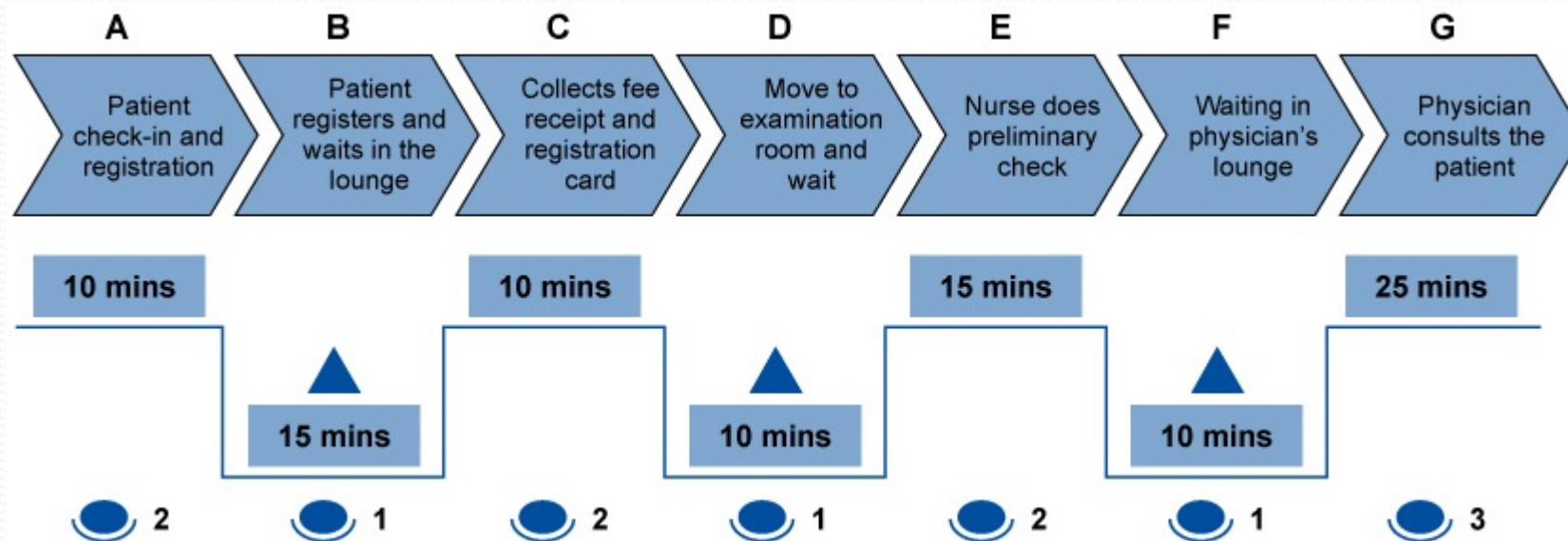


- VA & NVA Time



Value Streams - Healthcare

-  The time the patient spends waiting in between the processes
-  Number of people involved in that particular process step:
 - 1: Patient
 - 2: Hospital staff (clerk, nurse, etc.) and the patient
 - 3: Hospital staff, patient and the doctor
-  Process time



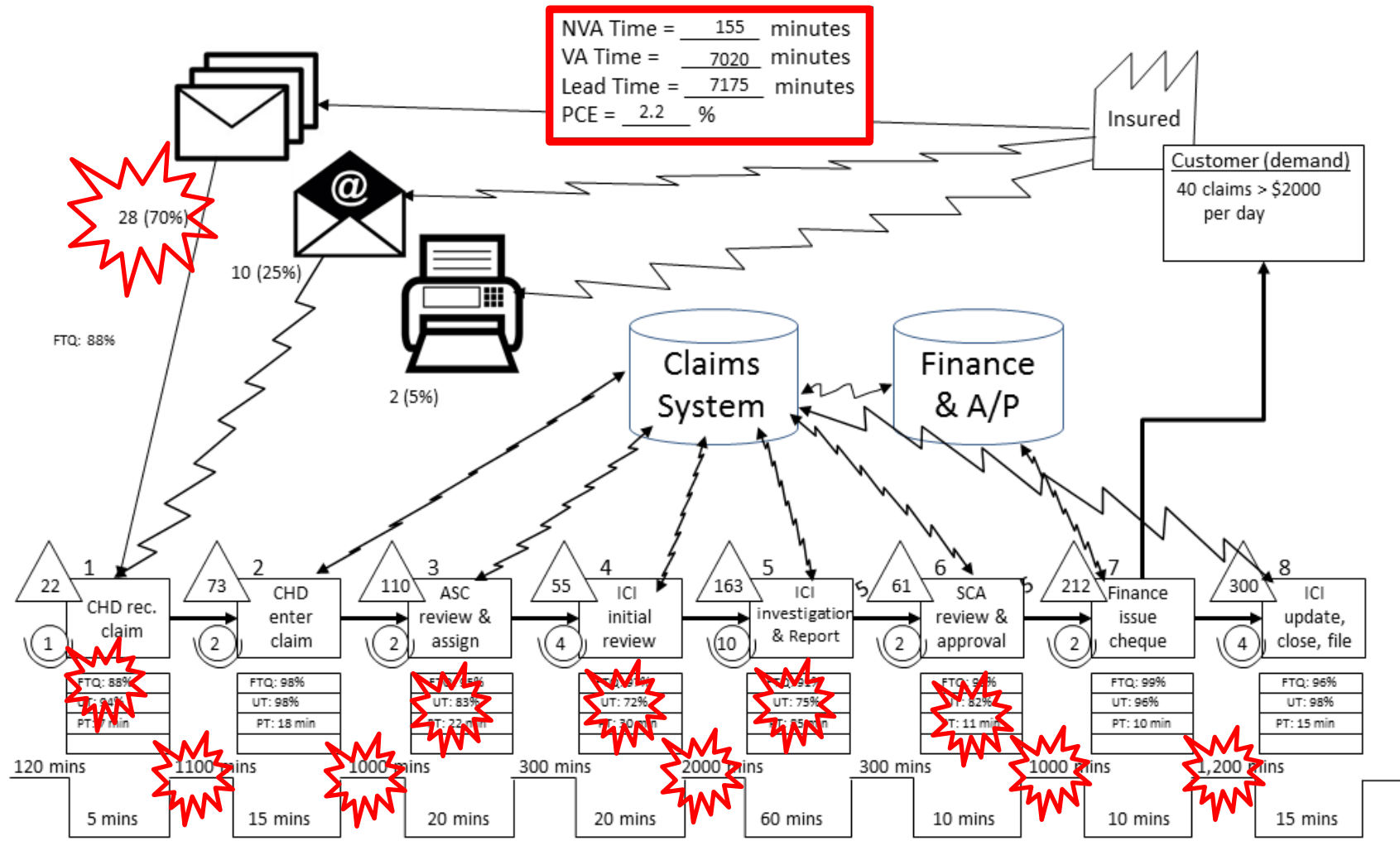
Data??

- Demand to fulfillment?
- The customer experience?
- Waste and constraints to flow?

- Time & Resources?...
- Value added?
 - Non-value added?



Value Streams – Services/Admin



- Constraints to flow?
- Bottlenecks?
- Quality issues?
- Delays?

- Defects
- Overproduction
- Waiting
- Non-Utilized Talent
- Transportation
- Inventory
- Motion
- Extra-Processing

PCE = Process Cycle Efficiency (VA time / Total Lead Time)

Value Stream Mapping Project

PHASE	TASK OR ACTIVITY	DESCRIPTION
PROJECT PREPARATION	Define the problem (5W2H)	Use 5W2H method to write effective problem statement.
	Conduct Gemba Walk	Verify & validate problem through observation.
	If verified, update & finalize problem statement	Use 5W2H method to write effective problem statement.
	Construct SIPOC Map	Frame problem within a process using SIPOC format.
	CT Flow-Down (CT Tree)	Identify the "Critical To" elements of the target process.
	Voice of Customer (VOC): Kano Analysis, etc.	Use Kano analysis to confirm/prioritize customer needs.
	Prepare initial Project Charter	Complete draft project charter (owned by Project Sponsor)
	Conduct a Change Readiness Risk Assessment	Confirm that the conditions for a successful project exist.
	Complete a stakeholder analysis	Identify your key project influencers and opposers.
	Prepare a project plan and schedule	Identify tasks, tools and appropriate timeline for your project.
Review and approval by project sponsor/champion	Meet with sponsor, review and final approval to launch project.	
LAUNCH MEETING	Prepare for project launch meeting	Scheduling, supplies, agenda, communication, etc.
	Sponsor welcomes project team (recommended)	Importance of project, support, etc. Leaves when completed.
	Team Introduction & Icebreaker	Introductions and team building exercises.
	Team roles, rules & responsibilities	Agree on how team will function and agree on code of conduct.
	Review problem statement, charter, plan, etc. (Goals)	Achieve clarity and consensus.
	Lean training for team (if and as required)	Value, eight wastes, concept of flow, hidden factory, etc.

1. Establish winning conditions for your projects (any change for that matter)
2. Projects don't plan to fail... projects fail to plan!

Identifying the Current State

MAP THE CURRENT STATE	Construct a product/service routing matrix	Narrow your focus to a product or service "family"
	Construct current state value stream map	Build draft value stream map with your team
	Process (flow) Mapping (as/if required)	Use process maps to get more insight into each step of the VSM
	Prepare a Spaghetti diagram (as/if required)	Capture motion and usage occurring in one or more target areas
	Failure mode and effects analysis (as/if required)	Current state risks/failures only - do not identify solutions yet.
	Conduct Gemba Walks & gather data/information	Validate current state VSM and related observations
	Brainstorm to identify potential factors causing problem	Use appropriate brainstorming technique
	Use of the "Five Whys" method	Explore ideas and seek better understanding
	Prepare cause & effect (C&E) diagram	aka "Fishbone", "Ishikawa" to organize factors identified
	Group Voting Technique	To identify "vital few" factors of interest
	Generate Pareto Chart	Identify if vital few (preceding step) fit 80/20 rule
	Collect/acquire relevant data to validate assumptions	Data and observation to test/validate current state assumptions
	Update and finalize current state assessment/VSM	Consolidate findings and assessment of current state incl. VSM
	Review and approval by project sponsor/champion	Update sponsor. Obtain their feedback and approval.

1. Employ whatever tools you think will help to “paint” the current state “picture”
2. Each tool adds an additional layer of information and builds on the narrative
3. Goal: Inspire respectful discussion in the team and respectful challenging of paradigms governing the current state.

Identify Future State

CONSTRUCT FUTURE STATE MAP	Confirm customer demand and establish takt time	Ensure that team understands key concepts of flow, etc.
	Construct future state value stream map;	Establish performance goals including Takt time
	- Remove bottlenecks - Theory of Constraints	Delays, waiting, WIP, etc.
	- Eliminate/reduce batching	Batching is poison when it comes to flow... treat it as such
	- Level work/Load Balancing	Understanding takt time, cycle time and work leveling required
	- Rapid/Quick change-over (SMED)	Lost productivity and bottlenecks due to set-up/changeovers?
	- Work cell design/cellular manufacturing	Waste and lost productivity due to poor work cell design
	- Kanban/material management systems	Kanban, supermarket and related improvement opportunities
	- Error-proofing/Poka Yoke	Improved scheduling to support future state flow
	- 5S/6S opportunities	Verify future state and improvement opportunities identified
Review and approval by project sponsor/champion	Update sponsor. Initial findings. Feedback and approval.	

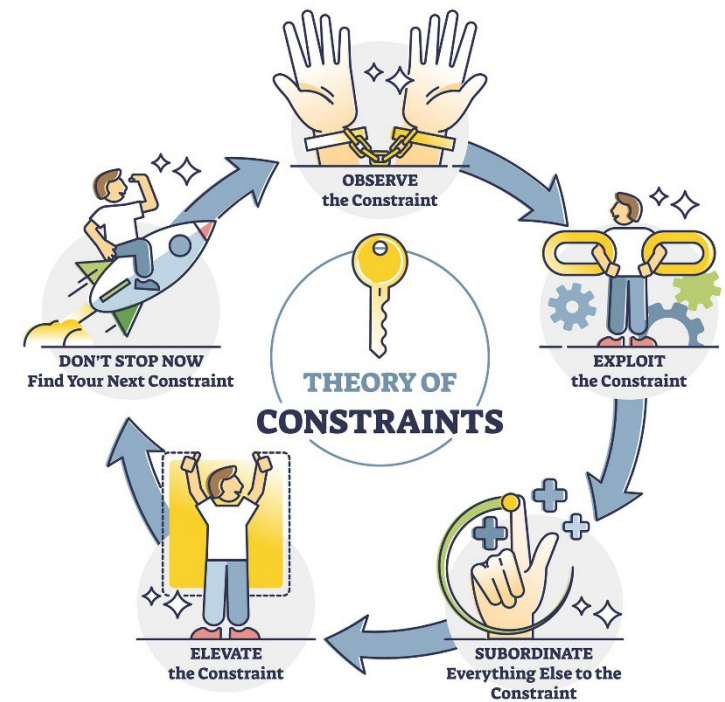
1. Employ Lean techniques and continuous improvement methods and tools
2. Strive for continuous (single piece flow)
3. Design in flexibility to adjust to changes in demand
4. Respect for people – a “human” approach to Lean

Theory of Constraints (TOC)

A management philosophy **focusing on identifying and addressing the primary bottleneck (constraint)** that limits the overall performance of a system. Goal: Improve throughput by optimizing the constraint to enhance the entire system's efficiency.

Five Focusing Steps:

1. **Identify the Constraint:** Determine the process step that limits the overall system's output.
2. **Exploit the Constraint:** Make the most of the constraint's capacity without major changes.
3. **Subordinate Everything Else:** Align all other processes to support the constraint.
4. **Elevate the Constraint:** Increase the constraint's capacity through investments or changes.
5. **Repeat the Process:** Once a constraint is resolved, identify and address the next one.



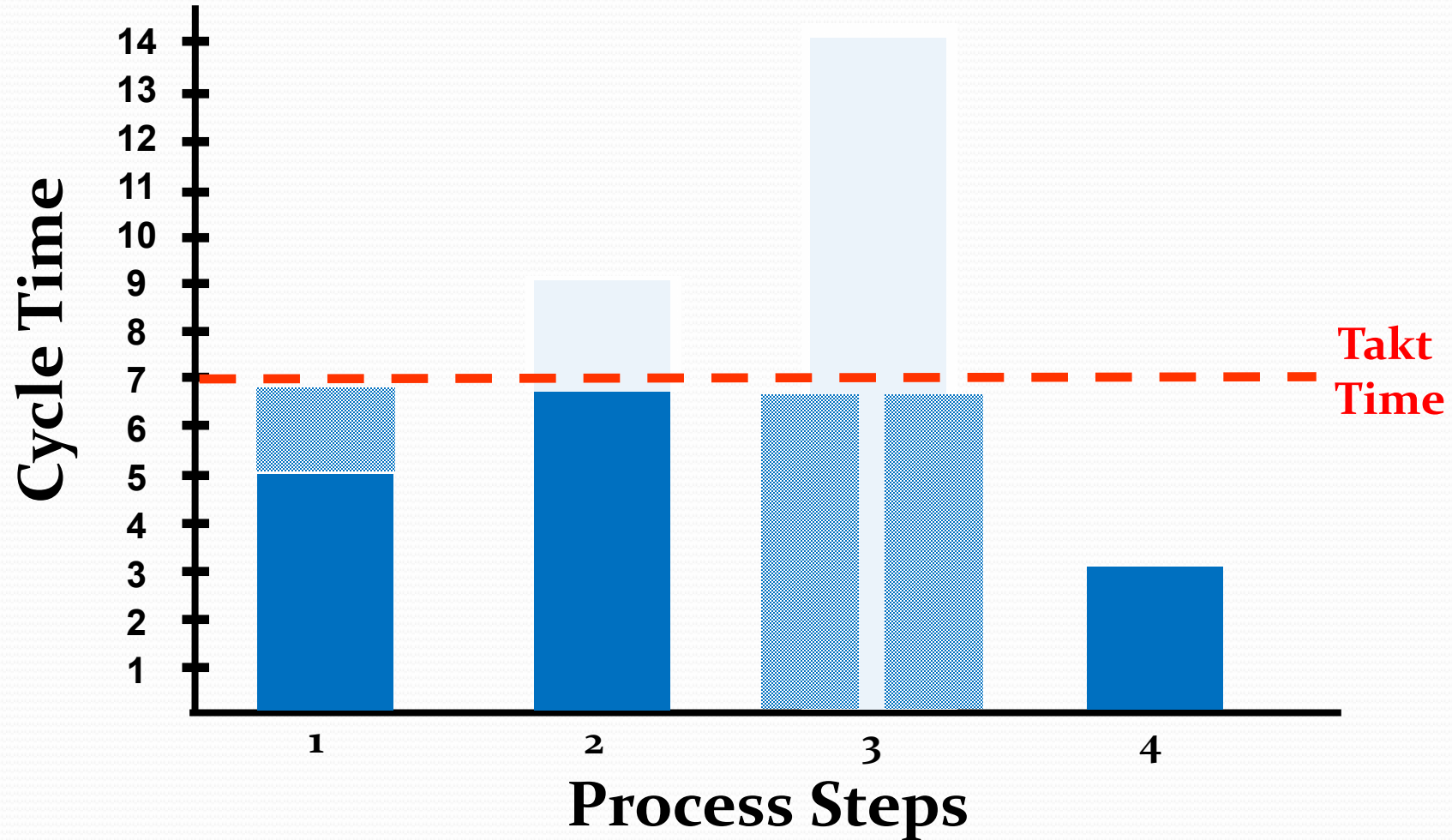
Pace? Enter Takt Time!

- “Takt”, a German word, refers to the tempo set by the conductor of an orchestra with their baton.
- Takt time in Lean is the required rate of production of goods or services to meet customer demand.
- Takt time is a required input for work-leveling and load balancing (see next slide).

$$\text{Takt Time} = \frac{\text{Available Production Time}}{\text{Customer Demand}}$$

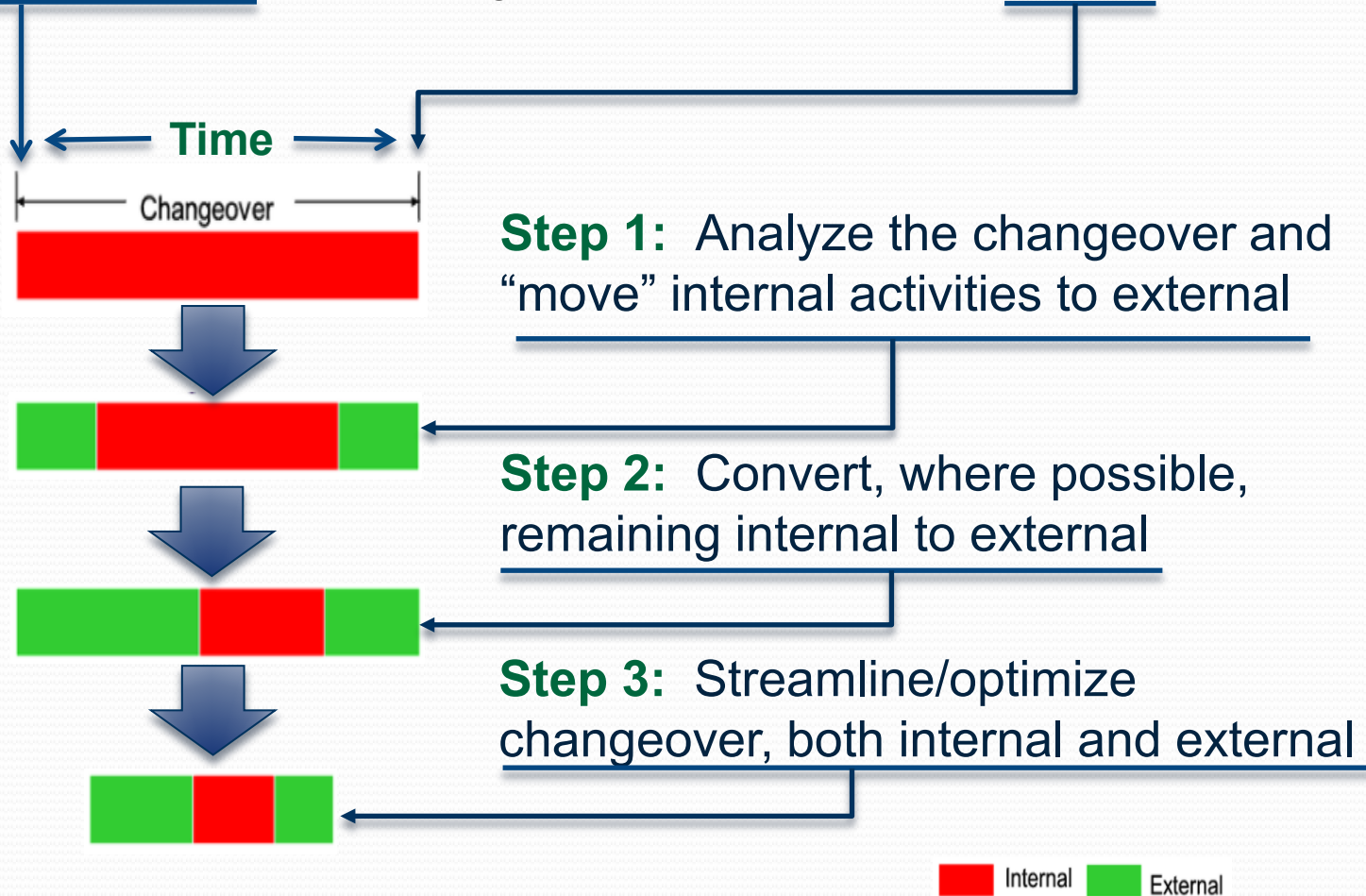
Daily Customer Demand:	units per day	500
Scheduled Work:	hours per shift	8
Shifts per Day:		1
Lunch:	minutes per shift	30
Breaks:	minutes per shift	20
Planned Downtime:	minutes per shift	20
Staff/Operator Cycle Time:	minutes per unit	0.82
Available Time:	minutes per day	410.0
Takt Time:	minutes per unit	0.82
Required Number of Staff/Operators:		1.0

Work Leveling/Load Balancing



Work Leveling/Load Balancing

Last "unit" completed... How long until work starts on the next unit?



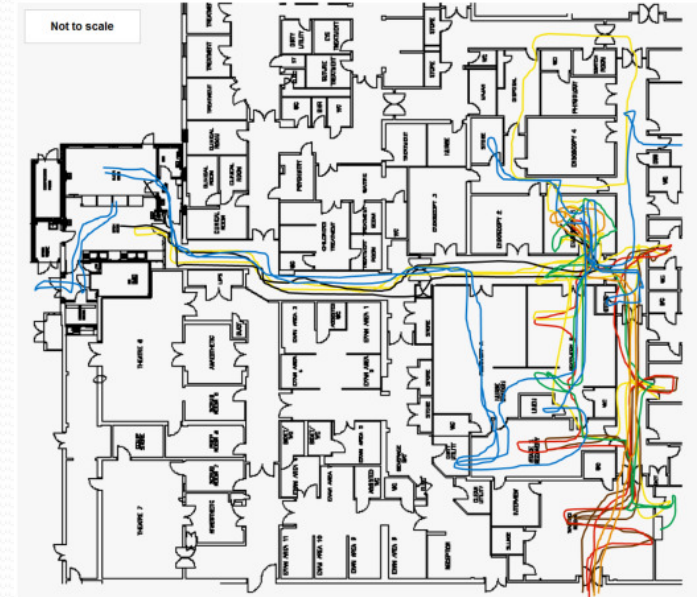
Work Cell Design

Work cell optimization, is a (Lean) practice that brings equipment, people and process into a single location, designed to improve efficiency, quality and throughput.

- Improves flow, reduces need for batching, and decreases inventory and “WIP”
- Reduced/minimized transportation of product and delays (between “departments” in traditional facility and office configurations)
- Increased communication and problem solving within the work cells (improved visibility for adjacent activities and the “whole”)

Optimization of the tasks within the work cell;

- Elimination of waste (ex. reduced motion within the cell)
- Safety and ergonomics is always a consideration in design
- Improved employee morale and reduced stress
- Increased team and employee ownership and pride
- Improved reaction time to issues (mistakes, errors, etc.)



Kanban and Material Management

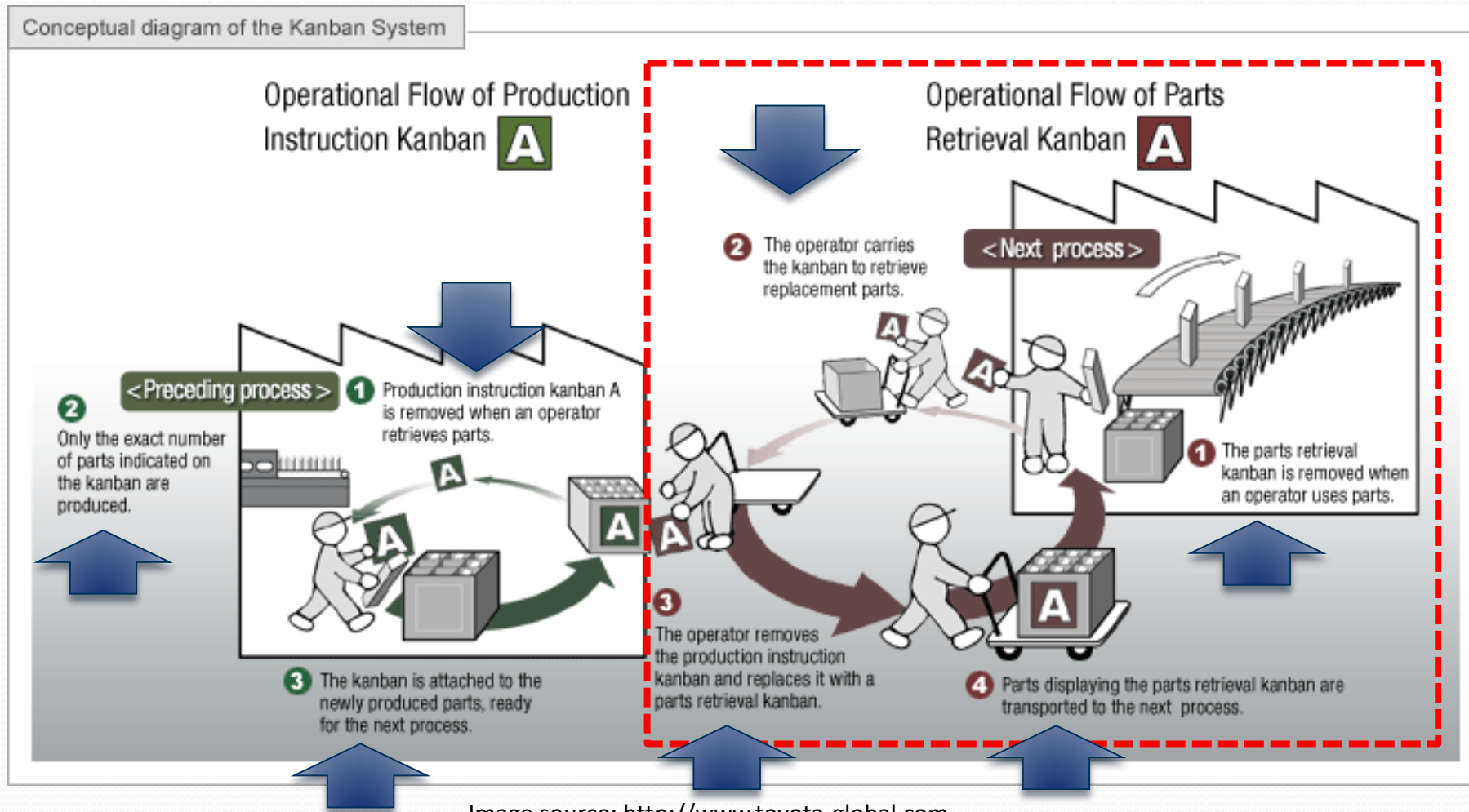


Image source: <http://www.toyota-global.com>

Error-Proofing (Poka Yoke)

Elimination

- At Source: Make it impossible for the error to occur
- In Station: Make it impossible for the error to progress to a defect. Contain the problem. (ex. a “Go/No-Go” gauge, inspection).
- Replacement: Automate manual operations

Facilitation

- Make it less likely that a mistake will be made.

Mitigation

- Minimize the adverse effects of the error when it occurs.

Detection (and Control)

- Detect errors earlier and react quickly.

Method	Prevention (Errors)	Detection (Defects)
Forced Control	Error can't be made	Defect can't escape to customer/next operation
Shutdown	Error detected and process shut down before defect is made	Process shut down immediately when defect is detected
Warning	Light/Alarm etc. indicates that error has been/is about to be made	Light/Alarm etc. indicates that a defect has been made
Sensory Alert	Visual/sensory cue that error has been/is about to be made	Visual/sensory cue that a defect has been made

5S/6S and Workplace Organization

- **5S:** The Lean concept of identifying and eliminating waste through improved workplace organization.
- A fundamental element of the Toyota Production System (TPS).
- Organizations may refer to their 5S programs as “**6S**” where safety is explicitly defined (although always a consideration in 5S).
- Safety is always a key consideration for both conducting a 5S event as well as creating a safer work environment!



Benefits of Value Stream Mapping

- **Visualize Workflow:** Provides a clear, customer-focused picture of the entire process, from start to finish (demand to demand fulfillment)
- **Identify Waste:** Highlights areas of inefficiency, waste in the current process and constraints to flow.
- **Enhance Communication:** Fosters better understanding and collaboration among team members – a holistic, integrated view.
- **Inspires Improvements:** Facilitates the identification and implementation of process improvements.


Mastering value stream mapping unlocks the potential to transform processes, achieve operational excellence, enhance your skills as a Lean practitioner, and make significant, positive changes in your workplace and industry.

Lean Six Sigma Certification x +

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Thank You

