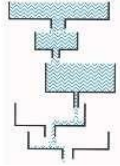


Kanban

Basic principles



Paris, le 1er juillet 2010
Version 1.0



Kanban is a 'fundamental' method for flow management.

- Kanban is applied to products with simple and low capital-intensive flows (amount of assets required for production: machinery, buildings, etc.):
 - low number of operations,
 - series size: large/medium,
 - low/medium capital intensity,
 - great flexibility in terms of the workforce (for example: transitioning from 2 to 3 shifts).
- Kanban is a production management tool that has four main objectives: :
 - to ensure Just-in-Time production at each stage of the process, it is necessary to align production with customer demand,
 - continuously monitor the level of work in progress to minimize the production cycle time.,
 - delegate the daily planning to the production line,
 - allocate time for management to engage in improvement actions such as Kaizen, SMED, and 5S, ...
- Kanban is generally applied within a workshop or a self-contained set of work cells. However, the Kanban system can be implemented between multiple sites, even physically distant ones.
- It is a visual and manual communication system for all individuals involved in the manufacturing process. It enables control over the production of products requested in the required quantities at the requested time between two stages of the flow.

Kanban contributes to streamlining the flow and highlighting weaknesses in a production line, thereby focusing efforts on critical points

Kanban is based on a culture shift.

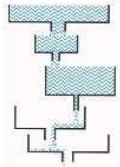
- Traditional behaviour:
 - “I produce parts whenever there is raw material available and/or when instructed to do so by my supervisor”.
- New paradigm:
 - “Even if I have the material, I do not produce until I receive a signal of consumption from my customer”.
- In Kanban, we refer to a pull-based flow as opposed to a push-based flow:
 - pull-based flow: The production of a workstation is dictated by the demand expressed by downstream workstations,
 - push-based flow:
 - the production of a workstation is determined by the batches arriving from the upstream workstation,
 - we can also say that push-based flows are scheduled flows: an attempt has been made to schedule the different operations by staggering them over time.
- Remarks :
 - due to a trend (Kanban), pull-based flows are considered better than push-based flows. However, this is true only in certain types of industries with repetitive (demand and flexible equipment),
 - there is no inherent limitation to having well-scheduled (push-based) flows).

**It is more expensive to produce when it is not supposed to be done
than to not produce at all.**

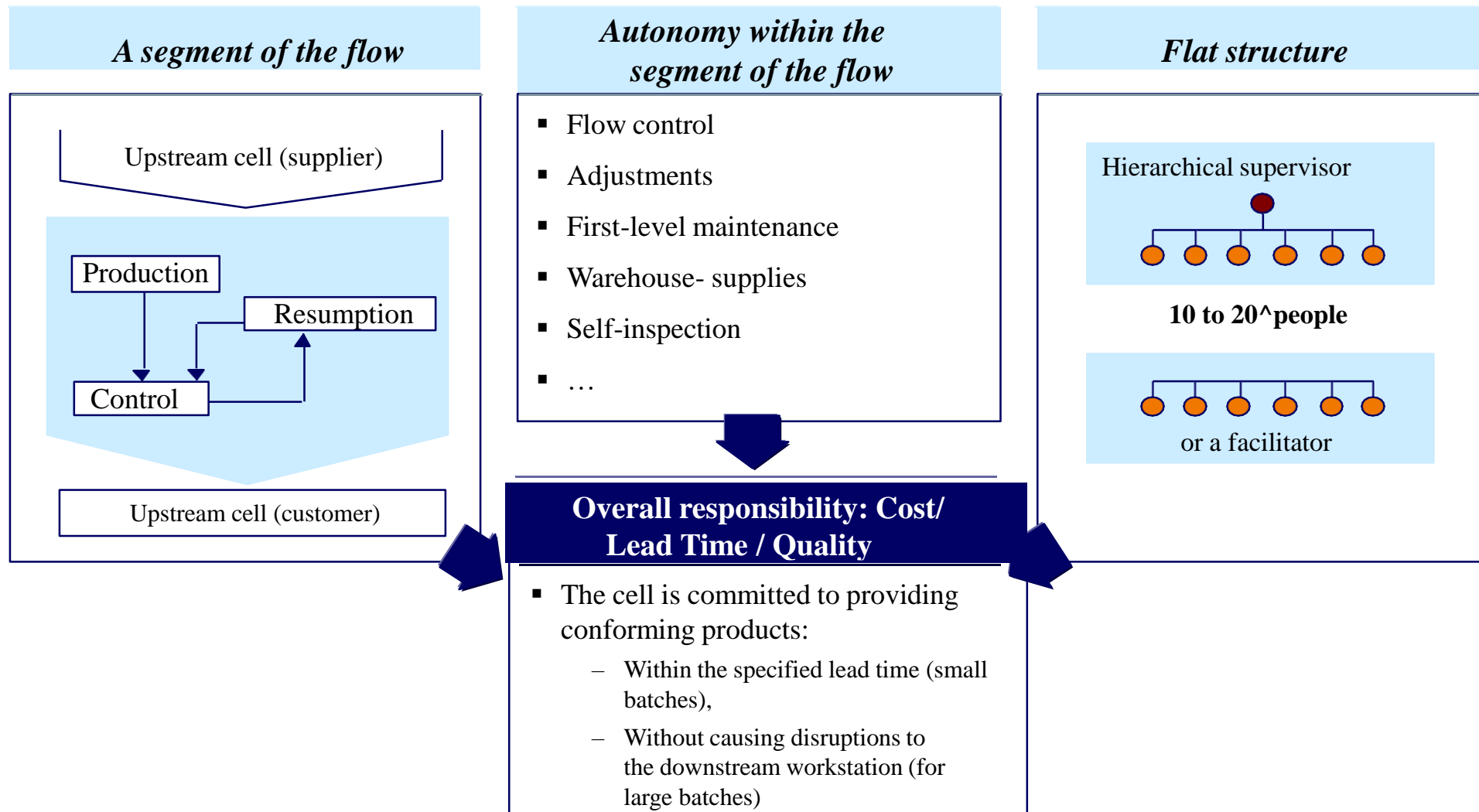
The classic symptoms that indicate the need to transition to Kanban include the presence of disruptions (in the factory or workshop) despite a good level of demand repeatability

- Degraded service level
- High and unevenly distributed stocks: stock after each operation in the process
- Unreliable inventory data
- Search for lost parts
- Decreased performance in downstream workshop
- Disorganization in workshops: machines not properly aligned or production lines not fully automated
- Emergency shipments
- Conflicting planning
- Planning disrupted by shortages
- Emergency series changes
- Poor utilization of resources

And all of this occurs with "simple" products that are produced regularly and in significant quantities!



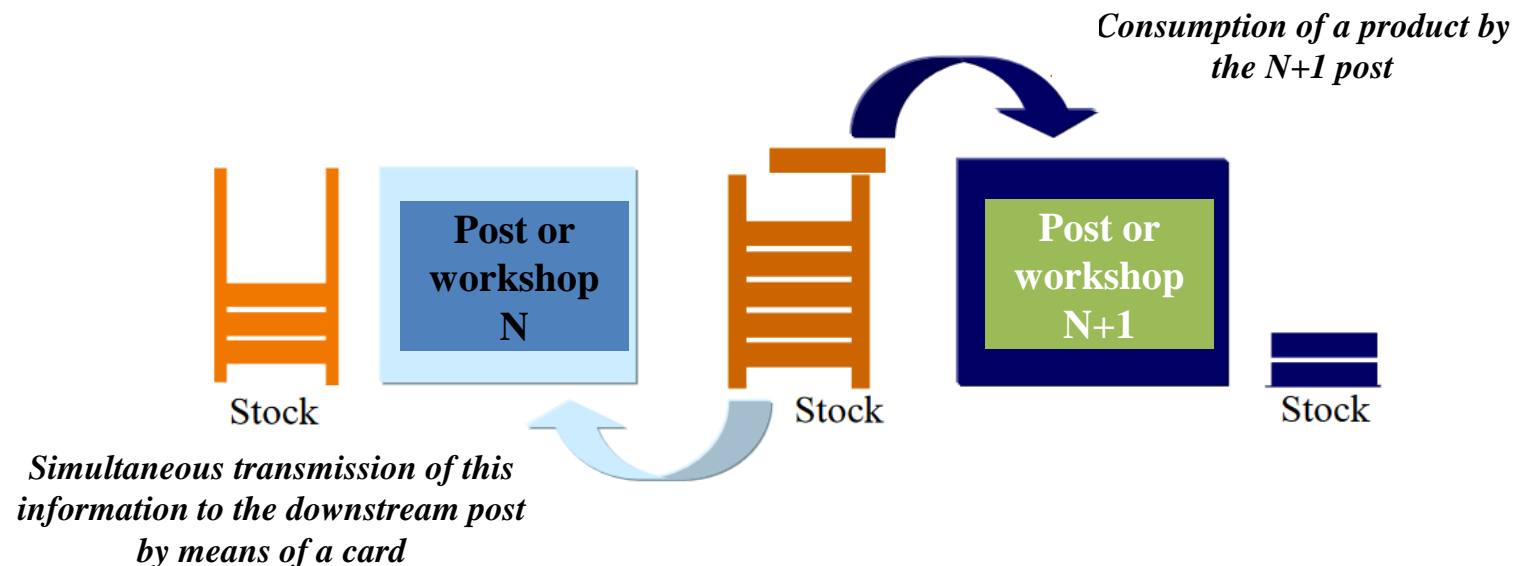
Kanban is a scheduling tool that relies on organizing workshops into autonomous production cells or islands



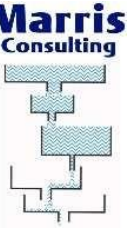
The Kanban ensures the transmission of information between a client workstation and a workstation provider.

■ 5 principles "dictate" the Kanban:

- The consumption process removes only the necessary quantities at the required time from the supplier's post.
- The supplier process will replenish only the consumed products in the quantity consumed.
- Defective products will not be sent to the consumer.
- The Kanban will need to reflect changes in demand and supplier capabilities.
- The number of Kanban labels, ie inventories of outstandings per workshop, will have to be reduced over time by using continuous improvement methods (non-qualities, availability of equipment, agent versatility, etc.)

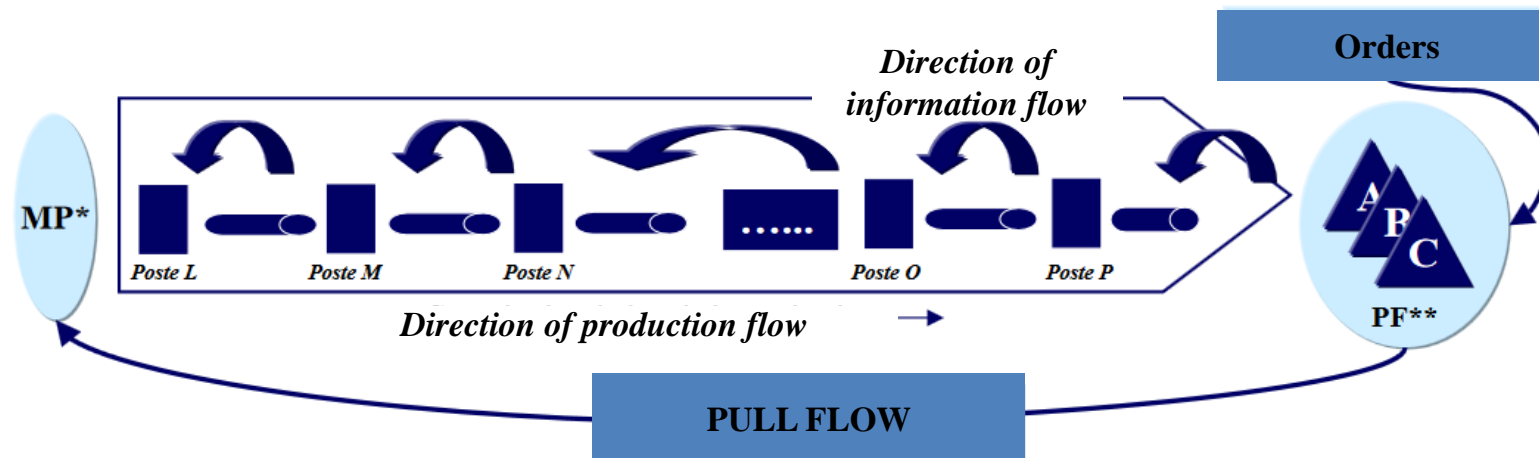


*It is the actual consumption of a product that triggers
The transmission of information to the upstream workshop*



The base principle of Kanban is the renewal of real consumption

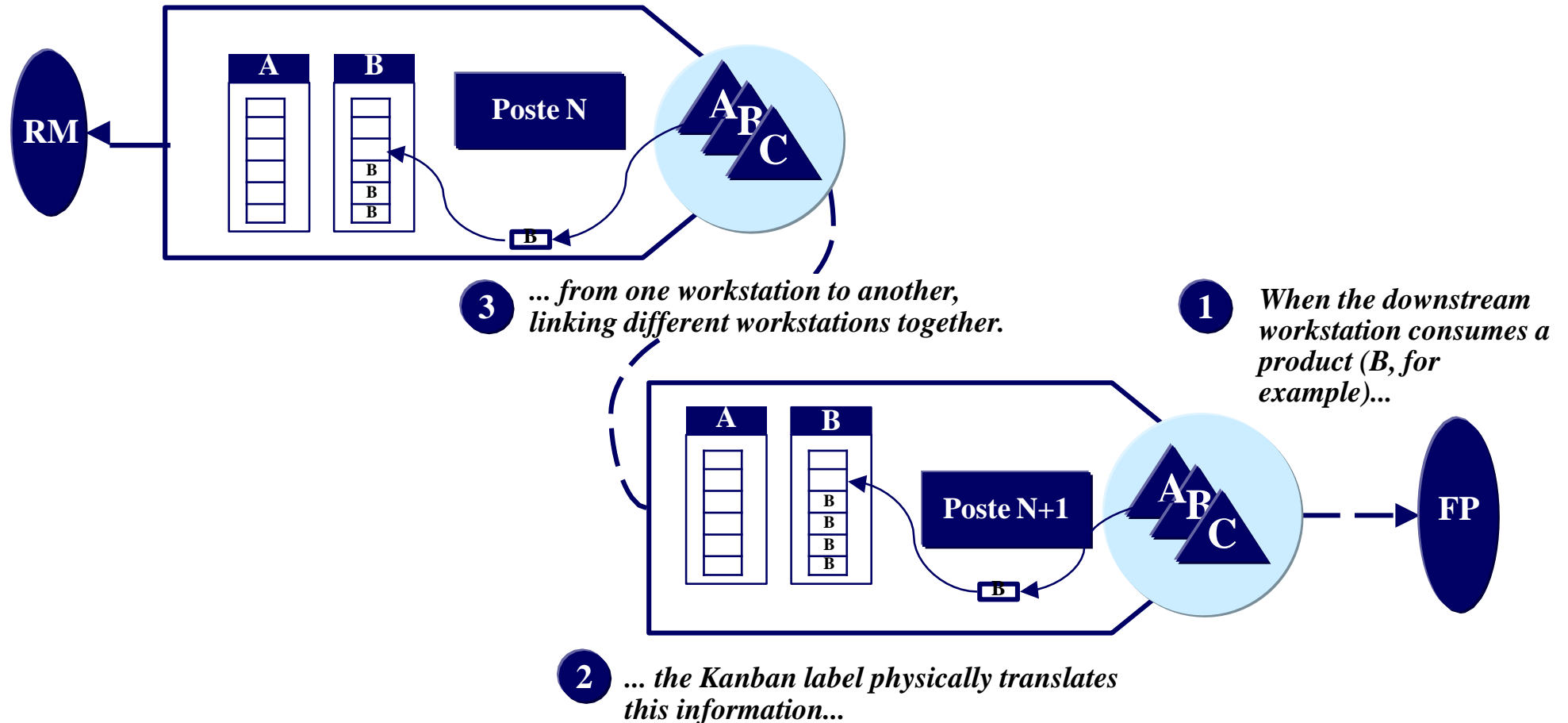
- Kanban is a production management tools with 4 principal objectives :
 - Ensure just-in-time production at every step of the process, so align production with customer demand,
 - Constantly checking the level of production in order to minimize the Cycle Time of production,
 - Delegate to the production line daily planning,
 - Give time to carry out actions of progress such as Kaizen, SMED, 5S, ...
- It is a visual and manual communication system, for all those involved in the manufacturing process, to control the manufacture of the products requested in the quantities requested at the requested time between two stages of the flow
- The demand is formalized by the Kanban labels ("Kanban" = label that informs)



* *MP* = Raw Materials

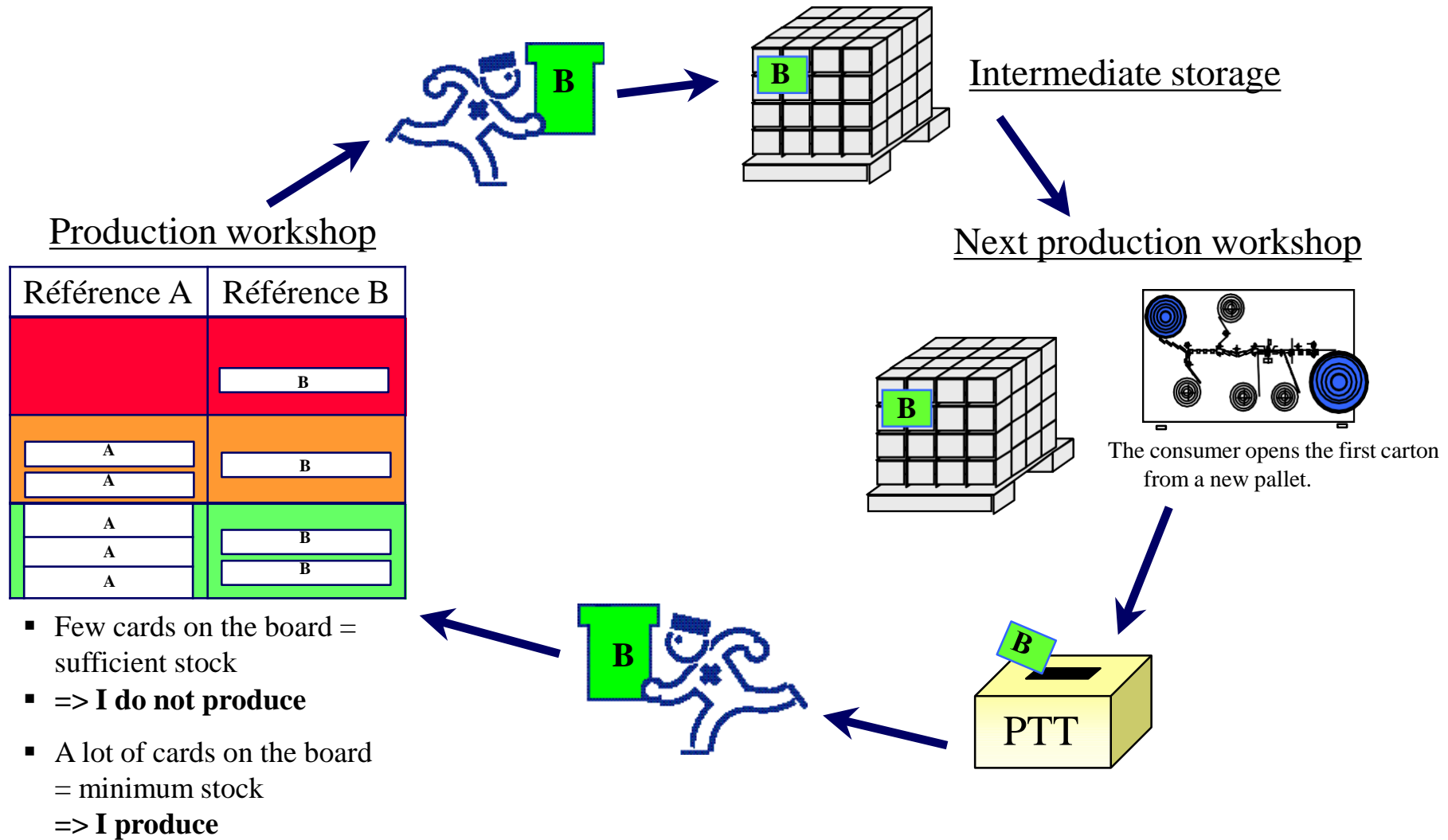
** *PF* = Finished Goods

The Kanban label or card physically materializes the transmission of information by accompanying the products

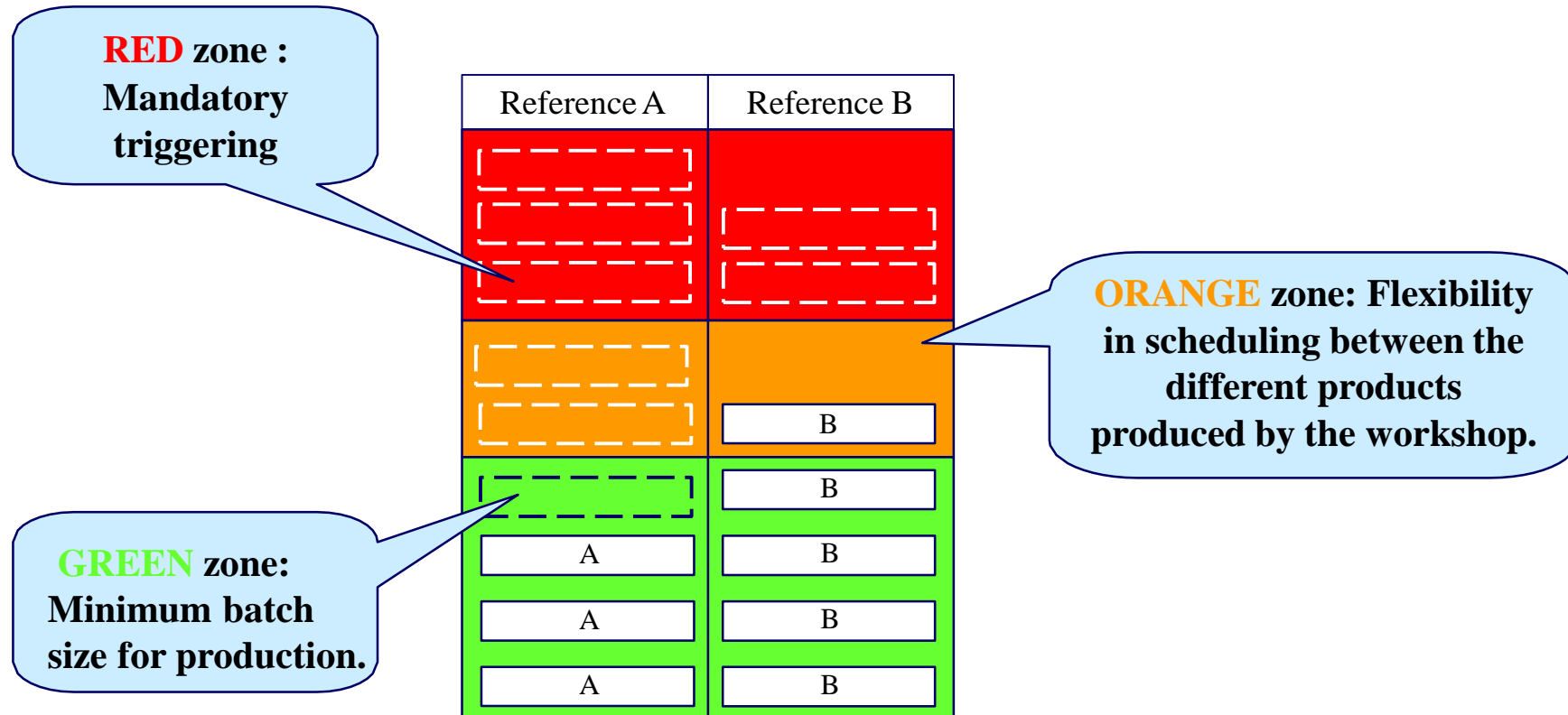


One Kanban card represents a batch of partially consumed products at the downstream workstation.

This Kanban card circulates and can be found either on the Kanban board, on the stocks, or in a mailbox.



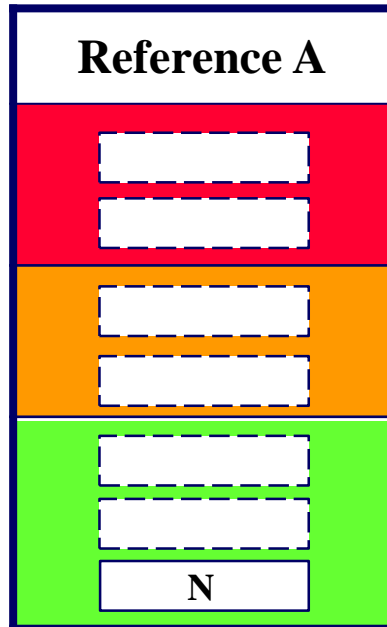
Grouped in a board, the Kanban labels drive production launches.



One column per product reference.

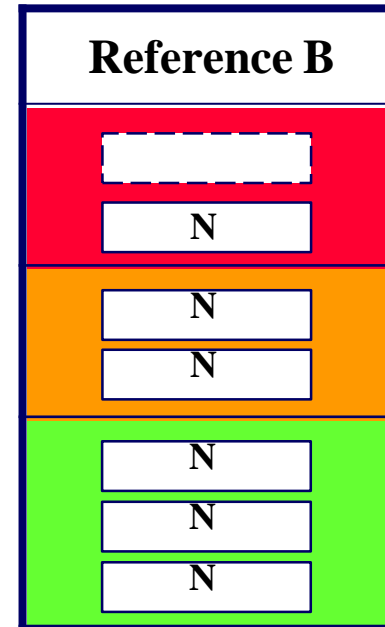
One Kanban label on the board corresponds to one packaging unit.

Reading the Kanban board provides production instructions and provides information about the downstream stock



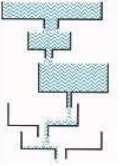
- Labels are not on the Kanban boards:
 - They are either in the WIP stock at the workstation,
 - or on containers being consumed by the downstream workstation
- Therefore, the product needs are covered.

CONCLUSION
I do not produce

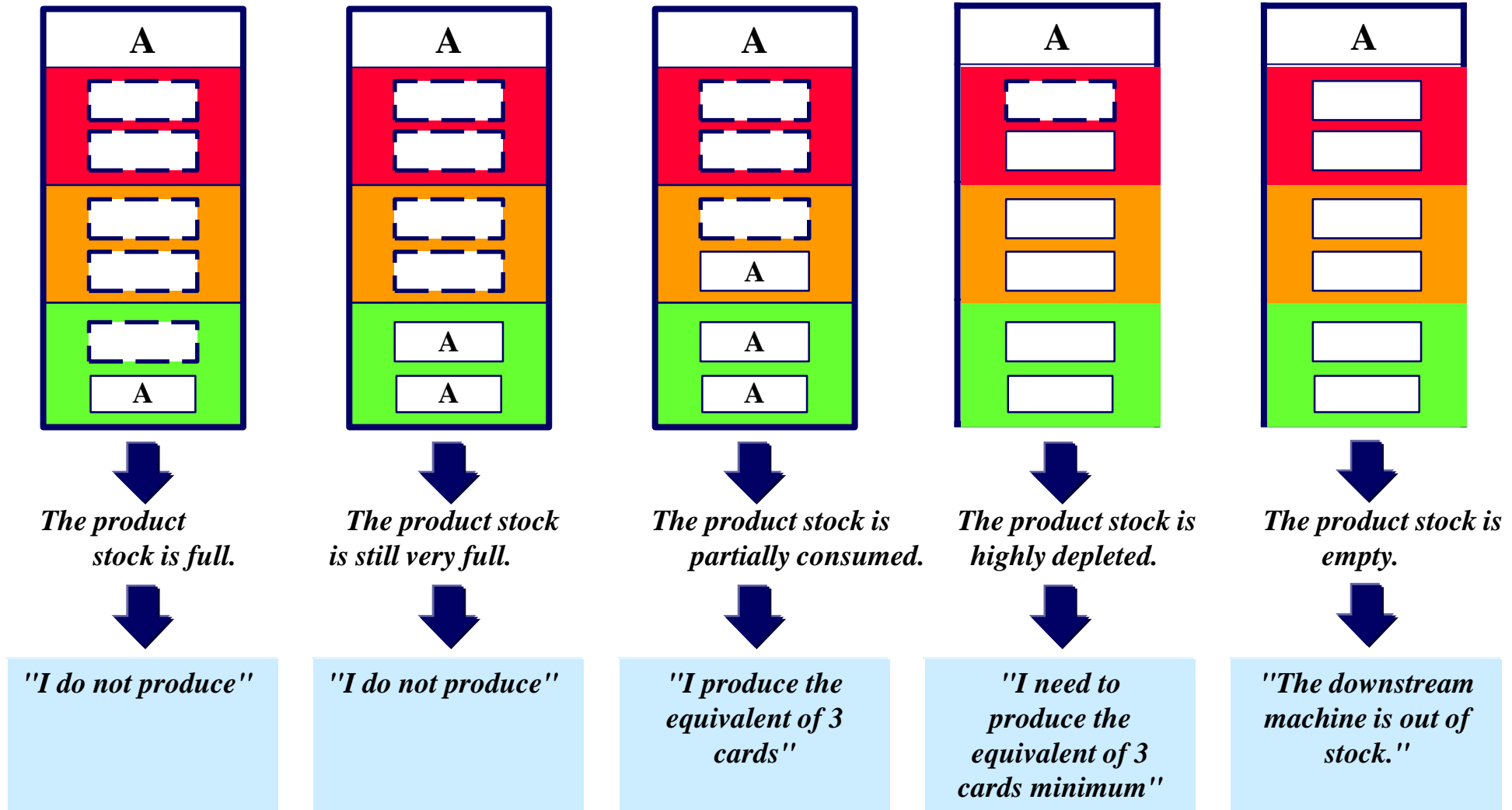


- Labels are on Red zone:
 - there is only a minimum amount of work-in-progress inventory in front of or being produced by the downstream machine.
 - if I do not produce, the downstream machine will no longer be fed, and the entire line will gradually experience shortages.
- So, the downstream has consumed reference N and will soon run out if we continue to consume that reference..

CONCLUSION
I produce



The Kanban board allows us to describe all possible production situations.



In summary, five principles "dictate" Kanban

- The consumption process only withdraws from the supplying workstation the necessary quantities at the required time.
- The supplying process will only replenish the consumed products in the consumed quantity.
- Defective products will not be sent to the consuming workstation.
- The Kanban should reflect changes in demand and supplier capacity.
- The number of Kanban labels, and therefore the work-in-progress stocks per workstation, should be reduced over time using continuous improvement methods (non-quality issues, equipment availability, operator versatility, etc.)

The proper functioning of a Kanban loop depends on the strict adherence to a few rules.

- Rules for the operation of the workshop.:
 - scheduling :
 - guidelines for utilizing flexibility in scheduling,
 - guidelines for scheduling between "related references",
 - treatment of specific cases:
 - handling of lot rework,
 - exceptional breakdowns,
 - products in the testing phase...
- Rules for Kanban System Maintenance:
 - adjustment of production batch sizes and packaging,
 - monitoring of production capacity of resources: Kanban operates at finite capacity,
 - reduction of emergency production orders: in coordination with the production plan,
 - responsibilities and roles of different stakeholders: communication rules regarding production status, role of workshop managers and operators in adhering to Kanban rules,
 - tracking performance indicators specific to Kanban: Kanban machine fill rate, rate of supply disruption for the downstream machine.