Part 2.3

Kanban Method

References Used in this Section – 1

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- Burrows, "Kanban from the inside", Blue Hole Press, 2014
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- DeGrangis, "Making Work Visible", IT Revolution, 2017
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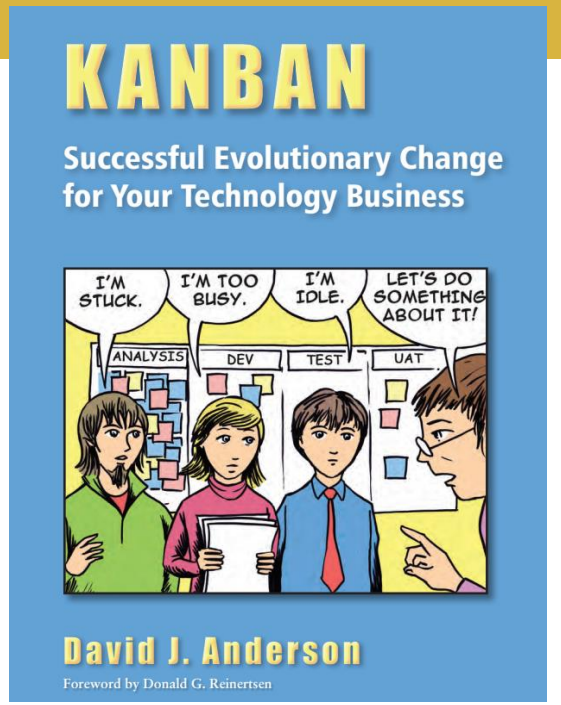

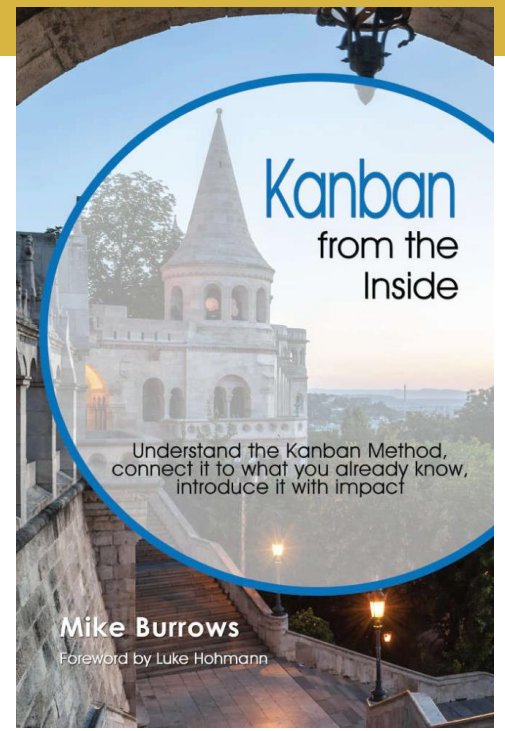

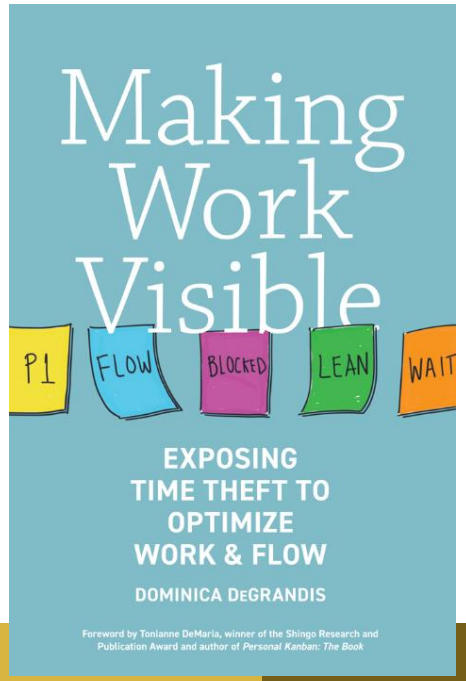

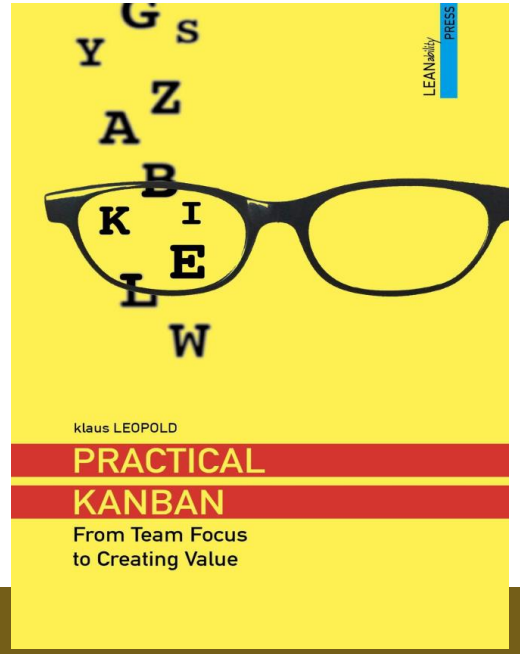

References Used in this Section – 2

- Vacanti, "Actionable Agile Metrics for Predictability", ActionableAgile Press, 2015
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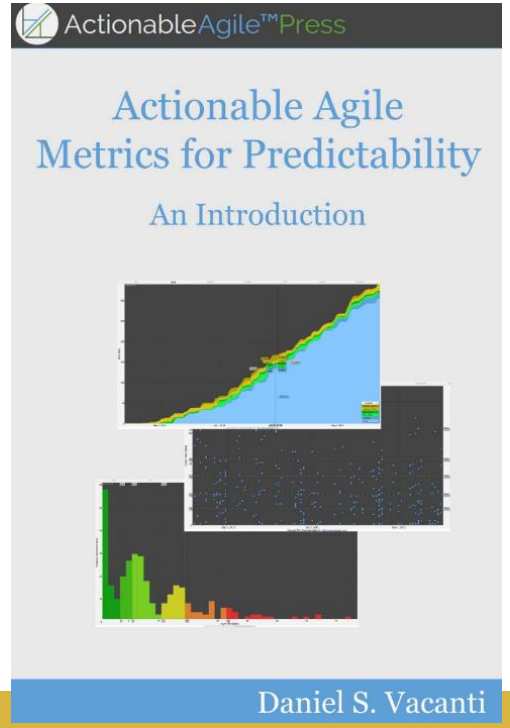
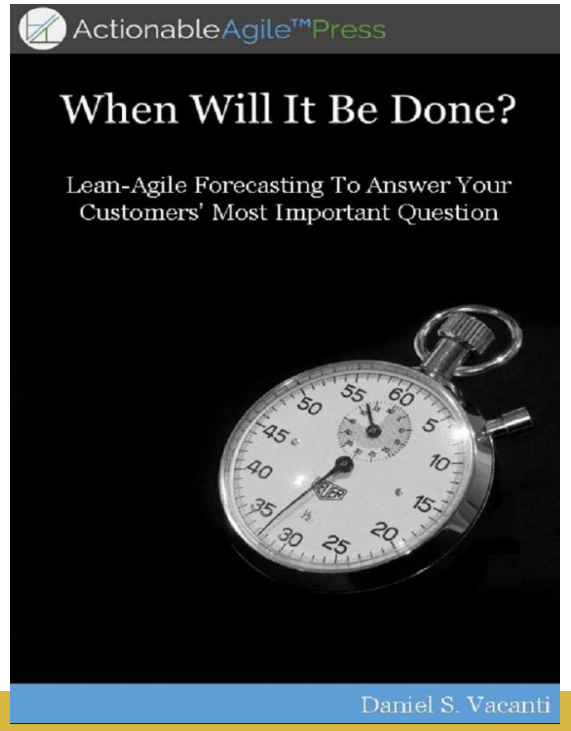
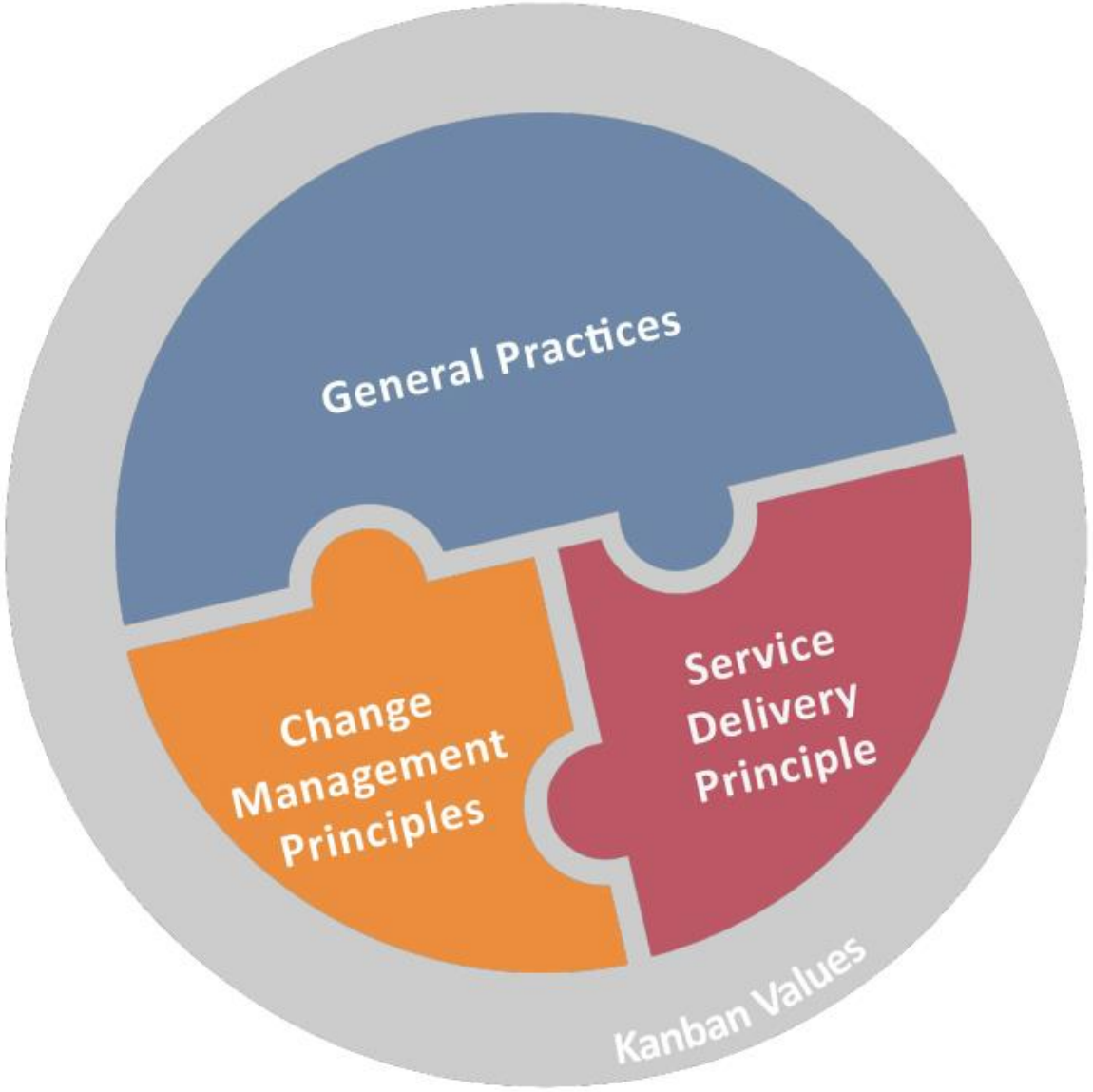
- Leopond & Kaltenecker, "Kanban Change Leadership", Wiley & Sons, 2015





Elements of the Kanban method



Kanban Practices – Revisited

Applied at a service-oriented Kanban System

"The aim of kanban is to make troubles come to the surface." —Taiichi Ohno

Five Thieves of Time that prevents us from getting work done

Too Much Work-in-Progress

Unknown Dependencies

Unplanned Work

Conflicting Priorities

Neglected Work

Five Thieves of Time (1/2)

- **Too Much Work-in-Progress (WIP)**

  Work that has started, but is not yet finished.

  Sometimes referred to as partially completed work.

- **Unknown Dependencies**

  Something you weren't aware of that needs to happen before you can finish.

- **Unplanned Work**

  Interruptions that prevent you from finishing something or from stopping at a better breaking point.

Five Thieves of Time (2/2)

- **Conflicting Priorities**

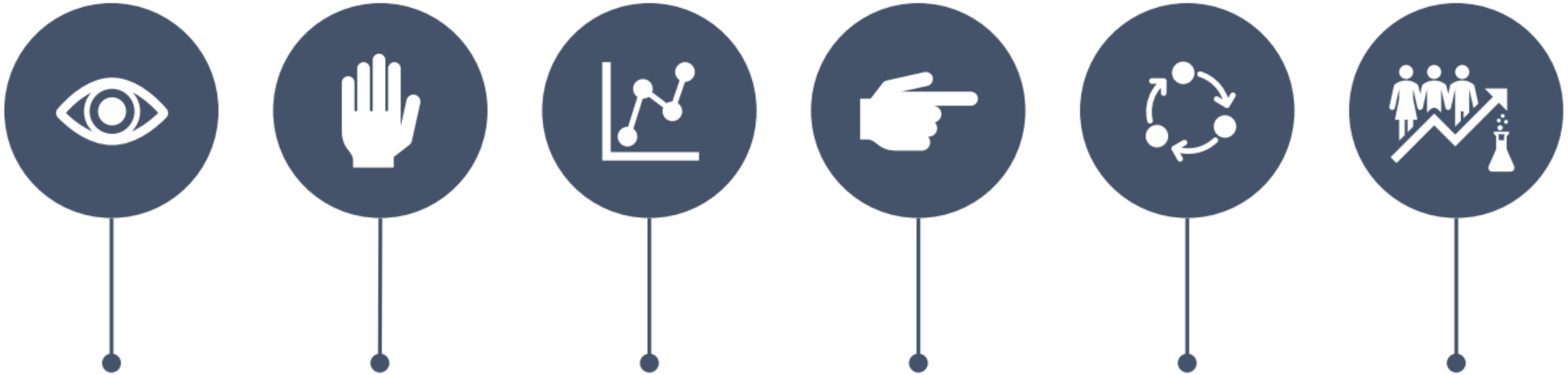
  Projects and tasks that compete with each other.

  This is exacerbated when you are uncertain about what the most important thing is to do.

- **Neglected Work**

  Partially completed work that sits idle on the bench.

Kanban Method: General Practices



Visualize

Limit WIP

Manage Flow

Make Policies Explicit

Implement Feedback Loops

Improve Collaboratively, Evolve Experimentally

(using models and the scientific method)

Limit Work in Progress (WIP)

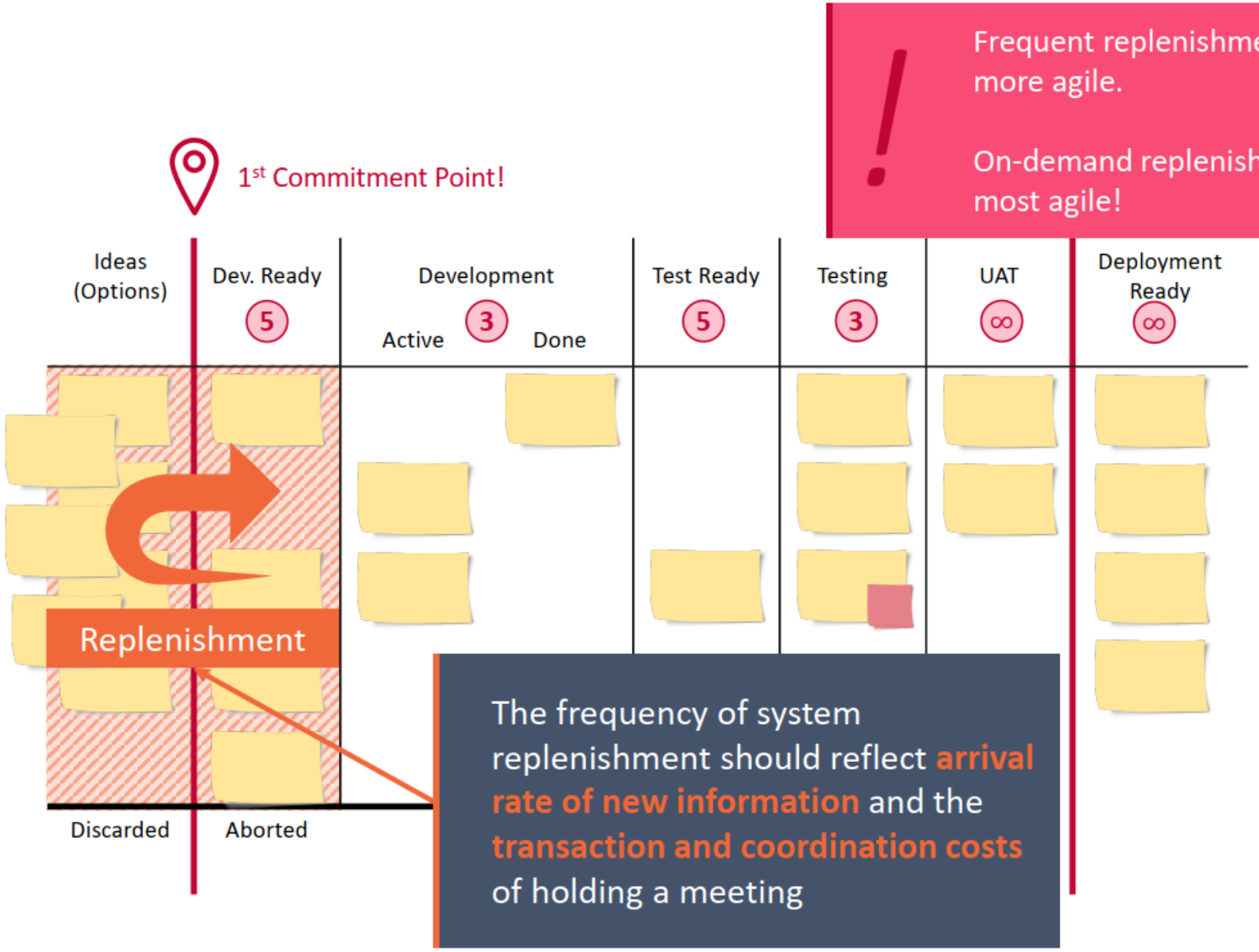
- Introducing and respecting WIP limits
  - Change a “push” into a “pull” system,
  - In which new items are not started until work is completed.

Agility is delivering the right work at the right time.

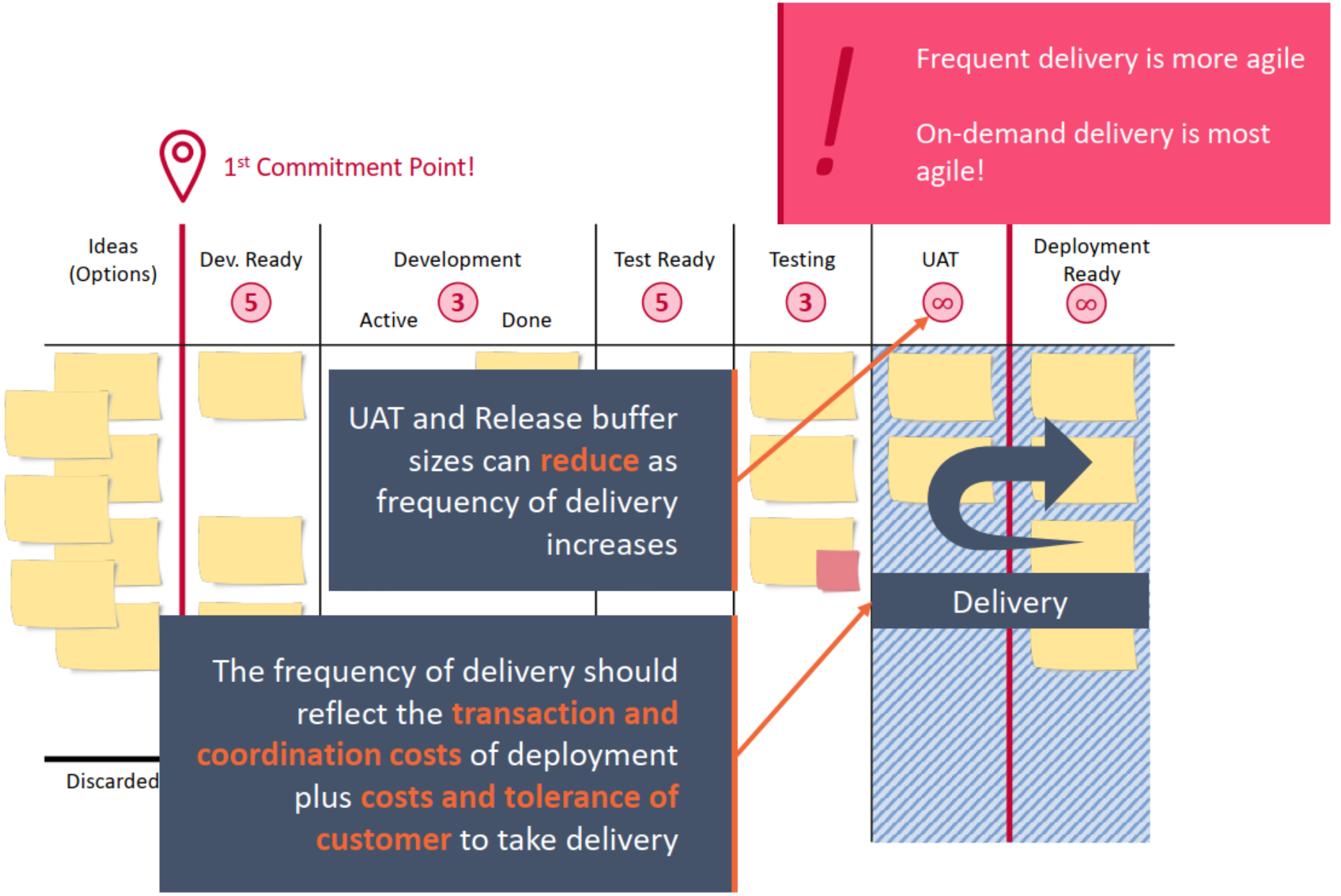
Managed replenishment and delivery options maximize agility.

To Replenish: to put new supplies into something, or to fill something again

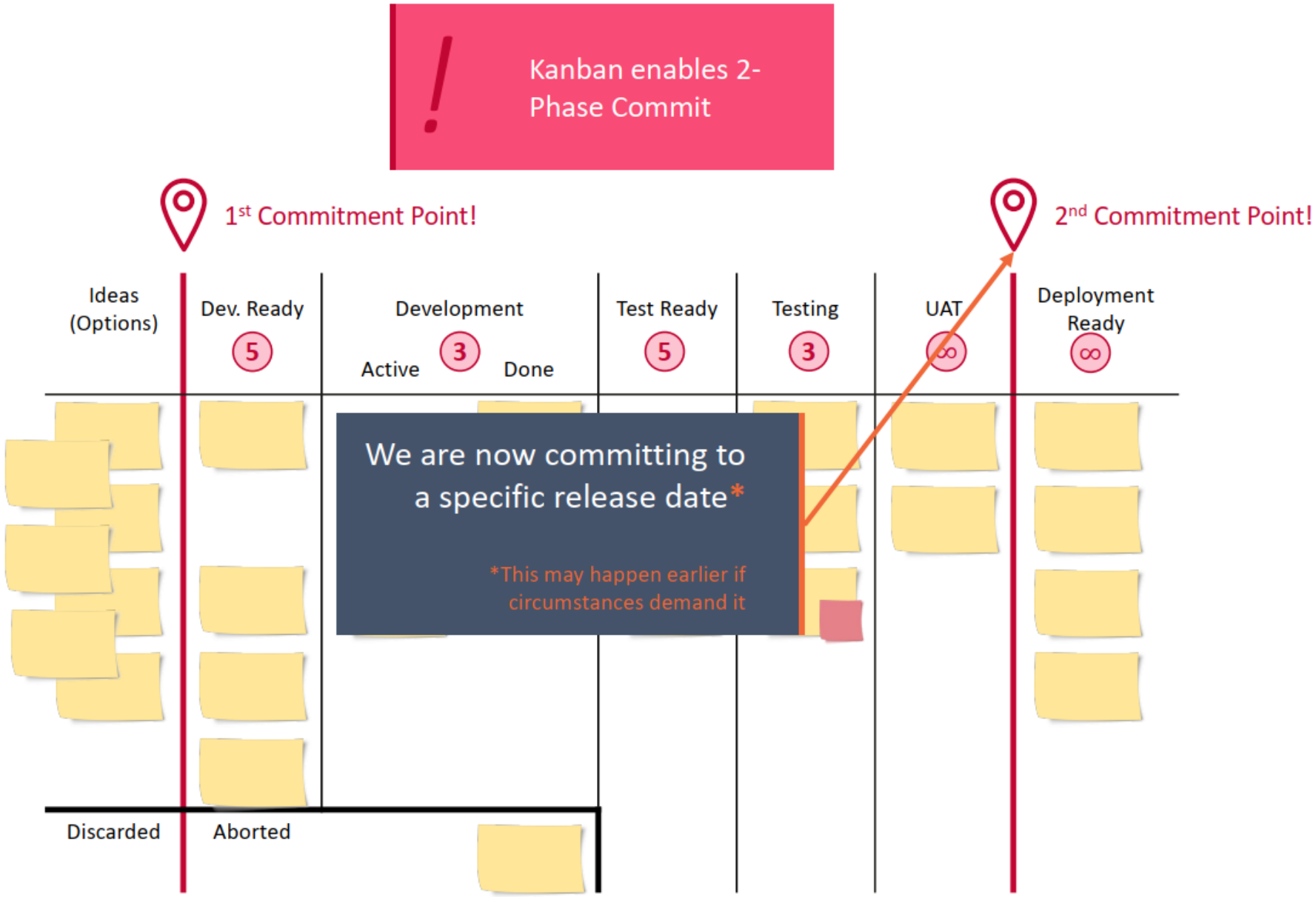
Replenishment Frequency



Delivery Frequency



Deferred Delivery Commitment



Manage Flow

- The Flow of Work in a Kanban System should
  - Maximize the delivery of value,
  - Minimize lead times,
  - And be as smooth (predictable) as possible

Core Kanban Metrics and Charts

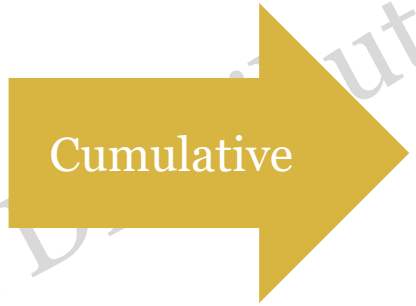
How can we measure and understand the behavior of flow-based systems?

An example

Hour	Entered Shop	Exited Shop
7:30 to 8:00	11	0
8:00 to 9:00	13	8
9:00 to 10:00	6	7
10:00 to 11:00	1	8
11:00 to 12:00	26	8
12:00 to 13:00	9	17
13:00 to 14:00	8	14
14:00 to 15:00	6	7
15:00 to 16:00	15	2

Make it cumulative

Hour	Entered Shop	Exited Shop
7:30 to 8:00	11	0
8:00 to 9:00	13	8
9:00 to 10:00	6	7
10:00 to 11:00	1	8
11:00 to 12:00	26	8
12:00 to 13:00	9	17
13:00 to 14:00	8	14
14:00 to 15:00	6	7
15:00 to 16:00	15	2



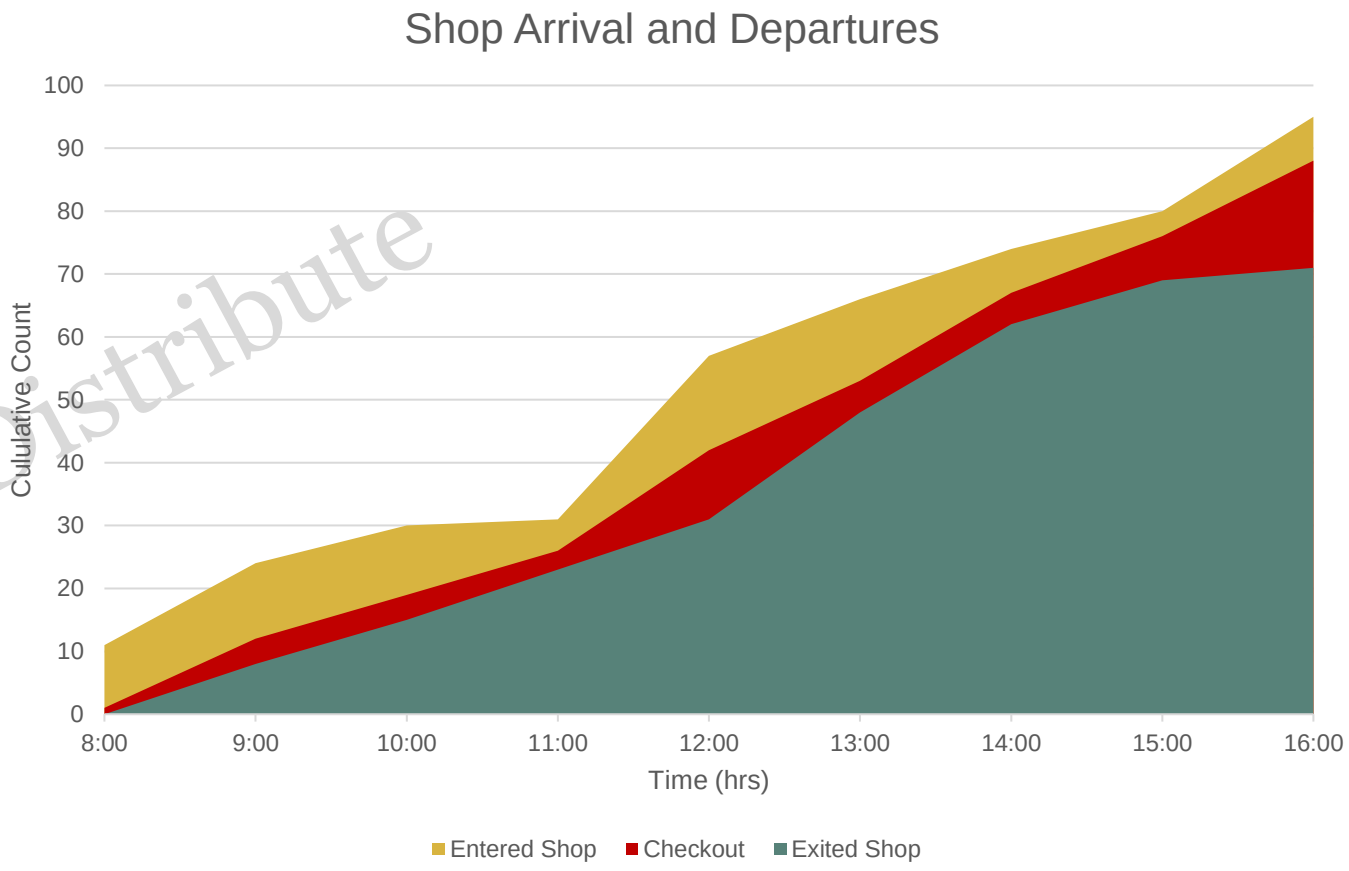
Hour	Entered Shop	Exited Shop
8:00	11	0
9:00	24	8
10:00	30	15
11:00	31	23
12:00	57	31
13:00	66	48
14:00	74	62
15:00	80	69
16:00	95	71

Cumulative Flow Diagram

Hour	Entered Shop	Exited Shop
8:00	11	0
9:00	24	8
10:00	30	15
11:00	31	23
12:00	57	31
13:00	66	48
14:00	74	62
15:00	80	69
16:00	95	71

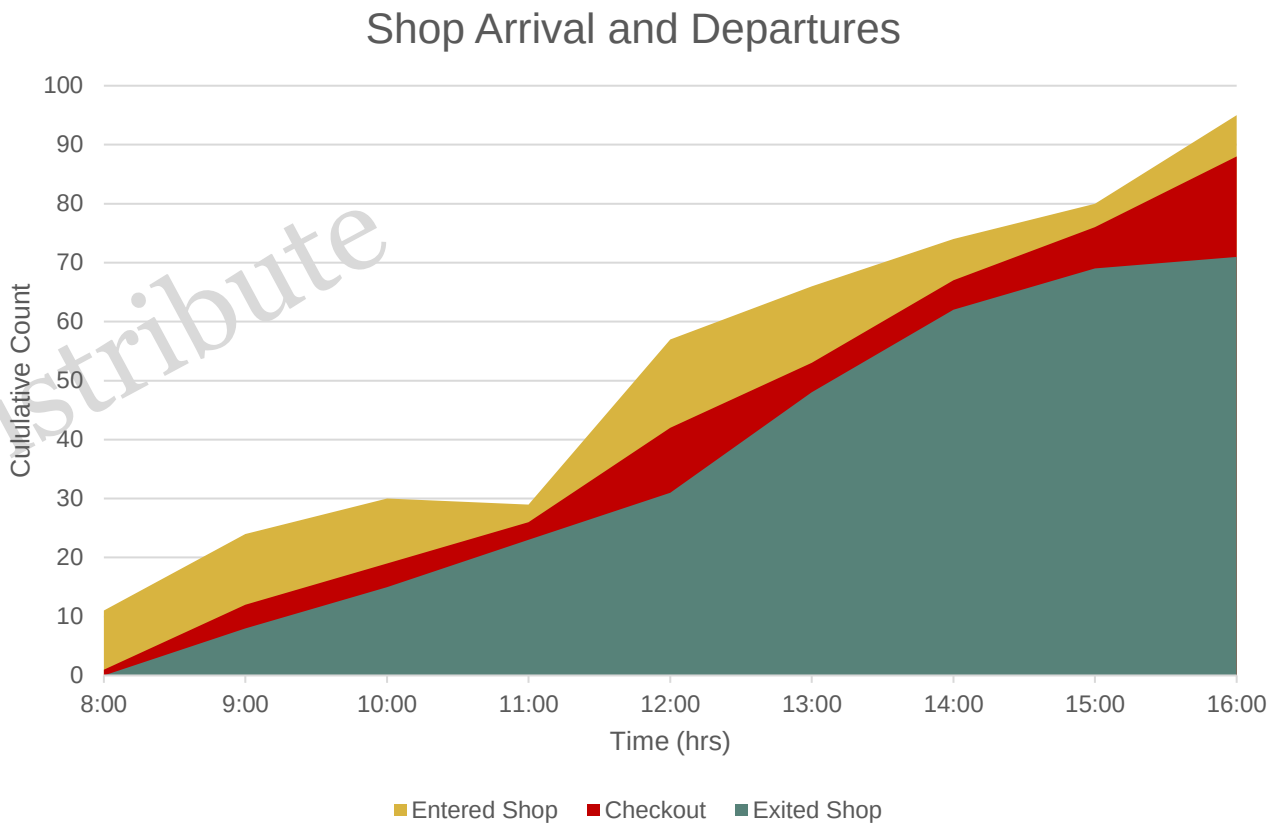
Adding another phase

Hour	Entered Shop	Checkout	Exited Shop
8:00	11	1	0
9:00	24	12	8
10:00	30	19	15
11:00	31	26	23
12:00	57	42	31
13:00	66	53	48
14:00	74	67	62
15:00	80	76	69
16:00	95	88	71



How is it different?

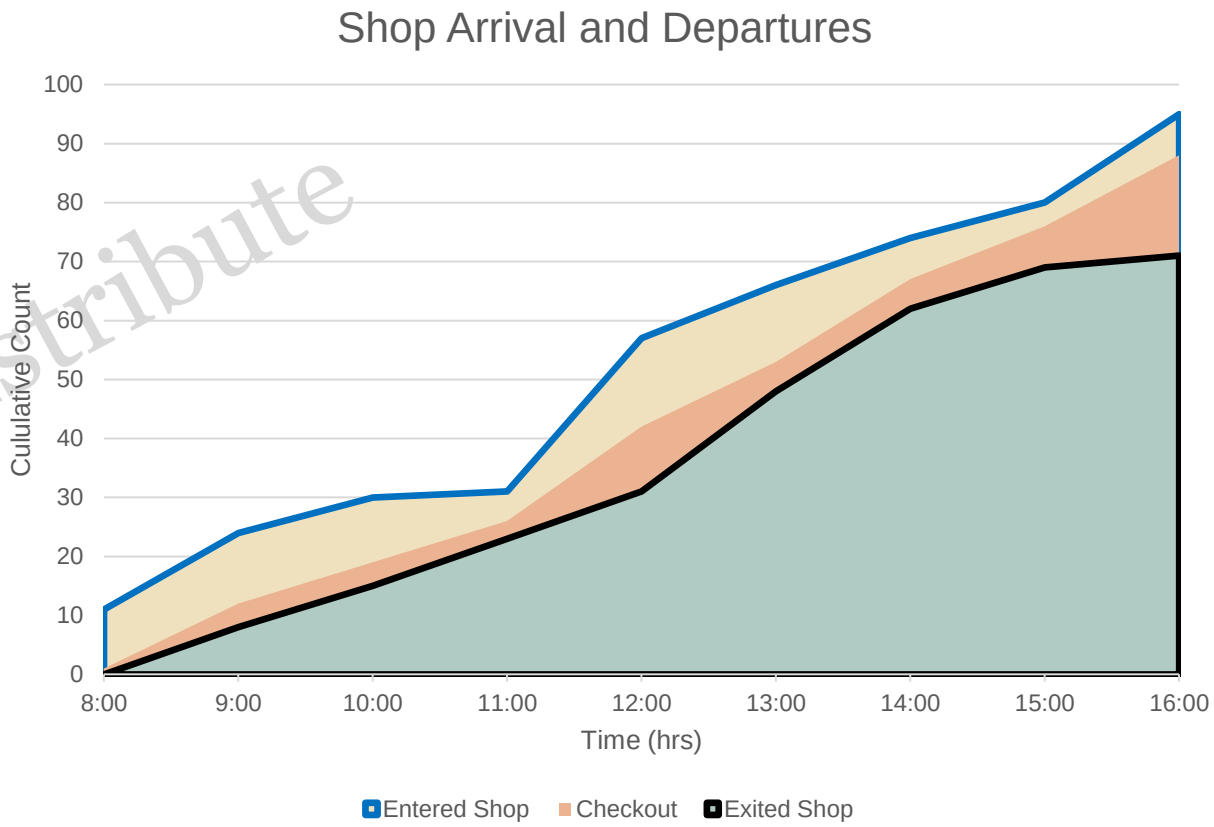
Hour	Entered Shop	Checkout	Exited Shop
8:00	11	1	0
9:00	24	12	8
10:00	30	19	15
11:00	29	26	23
12:00	57	42	31
13:00	66	53	48
14:00	74	67	62
15:00	80	76	69
16:00	95	88	71



Top Line, Bottom Line

CFD Property #1:

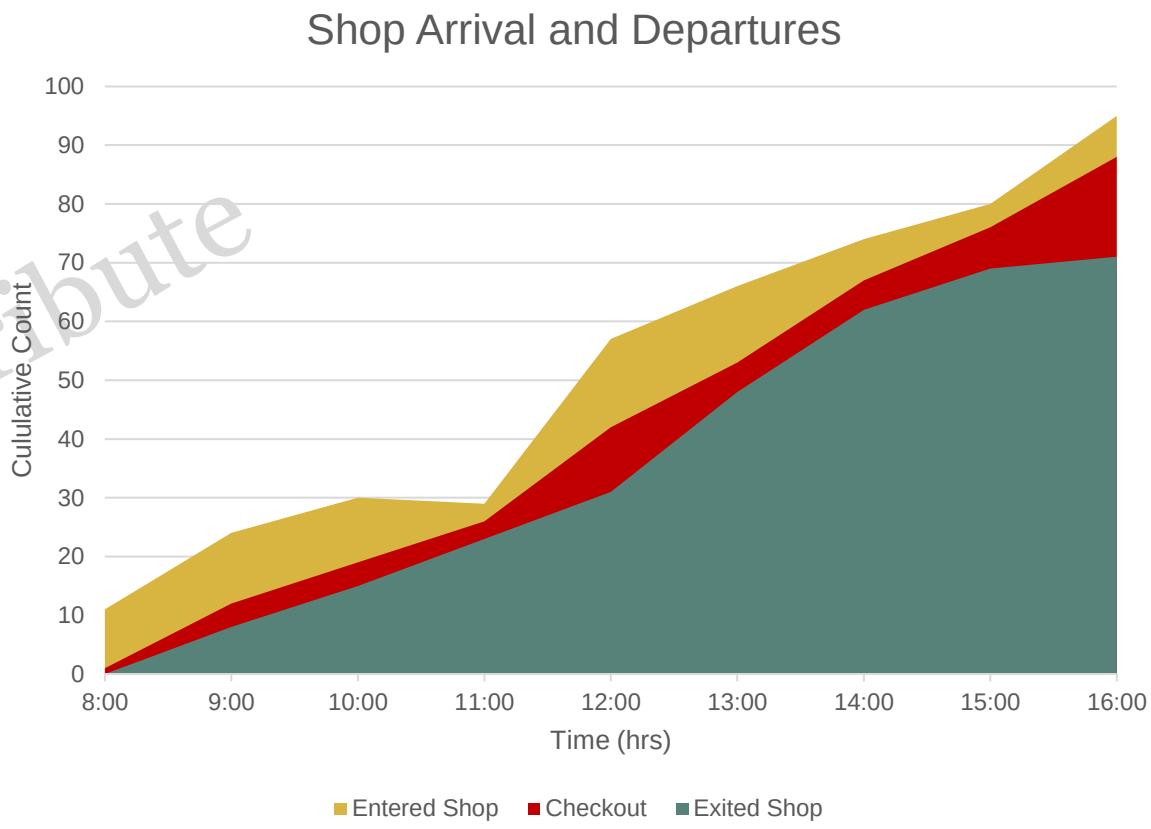
- The top line of a Cumulative Flow Diagram *always* represents the cumulative arrivals to a process.
- The bottom line on a CFD *always* represents the cumulative departures from a process.



Can this line decrease?

- CFD Property #2:

  Due to its cumulative nature, no line on a CFD can ever decrease (go down).

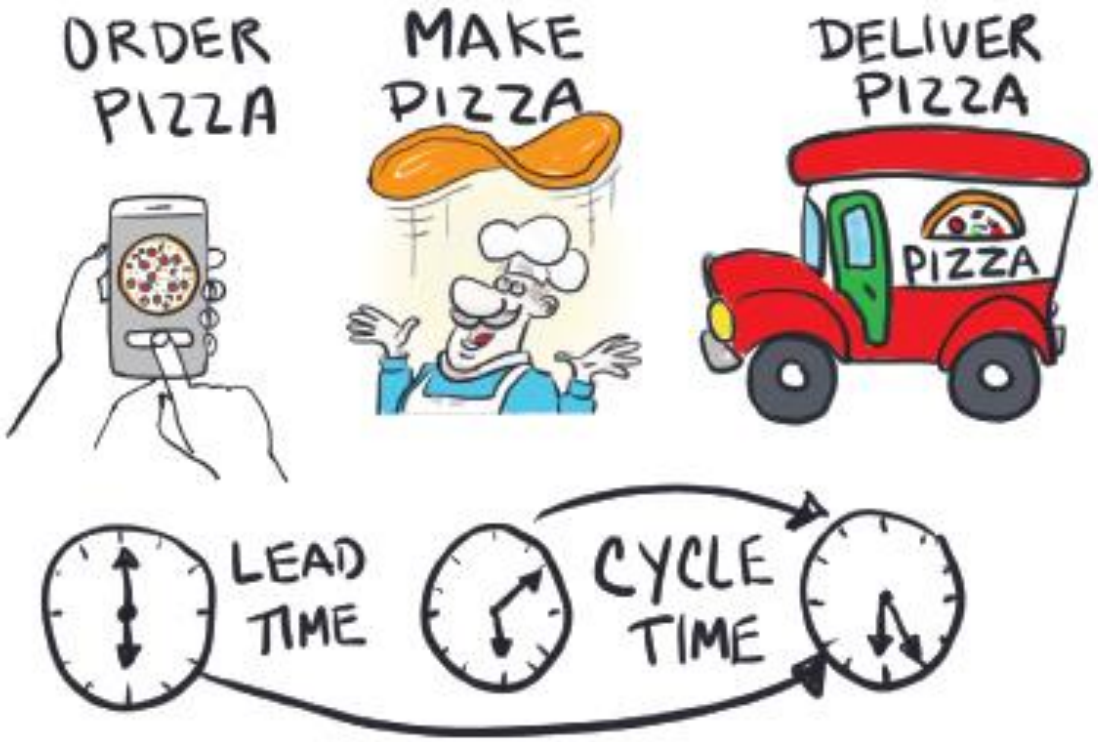


Why we need Lead time

Persons	Entered at	Checkout at	Exited Shop at	Explanation
#1	8:10	8:50	9:10	
#2	8:25	8:45	8:57	
#3	8:30	9:10	9:26	
#4	8:40	9:25	9:35	
#6	9:00	9:38	9:47	
#7	9:05	9:42	9:43	Bought nothing
#8	9:10	-	-	Returned after entering
#9	9:30	10:10	10:22	
#10	9:32	10:05	10:27	

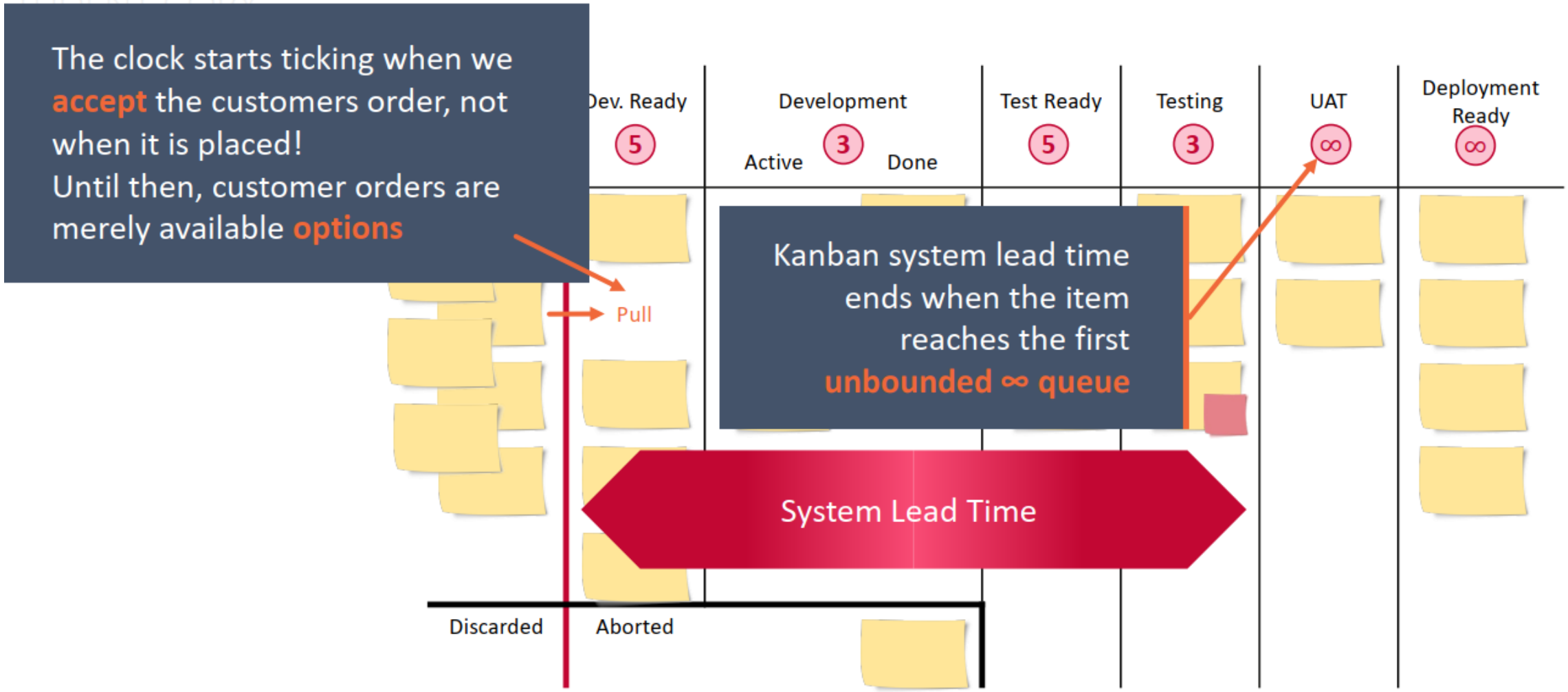
Key Metrics: Lead Time

- Time it takes to fulfill requests from the point of commitment
- Two types of Lead Time:
  - System Lead Time
  - Customer Lead Time

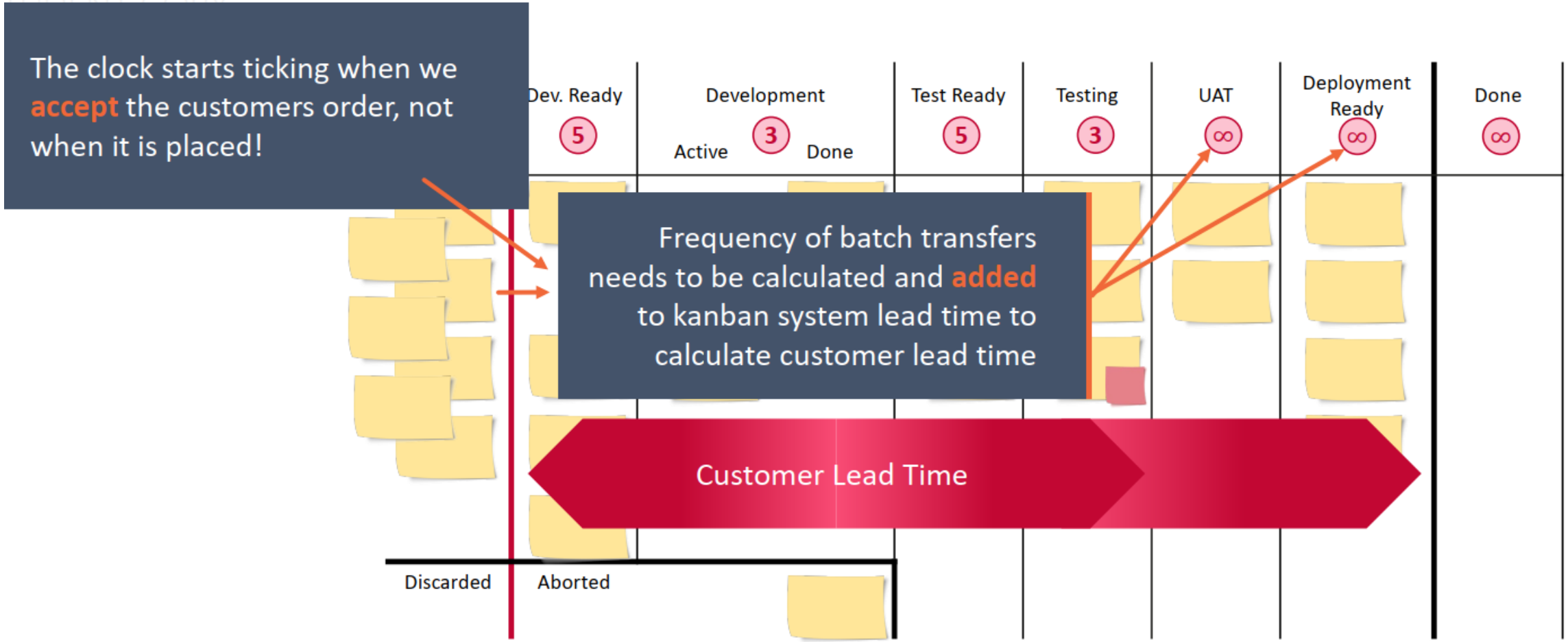


- Lead Time vs. Cycle Time
- Useful or not?
- 2 causes for distinction

Metric Definition: Kanban System Lead Time

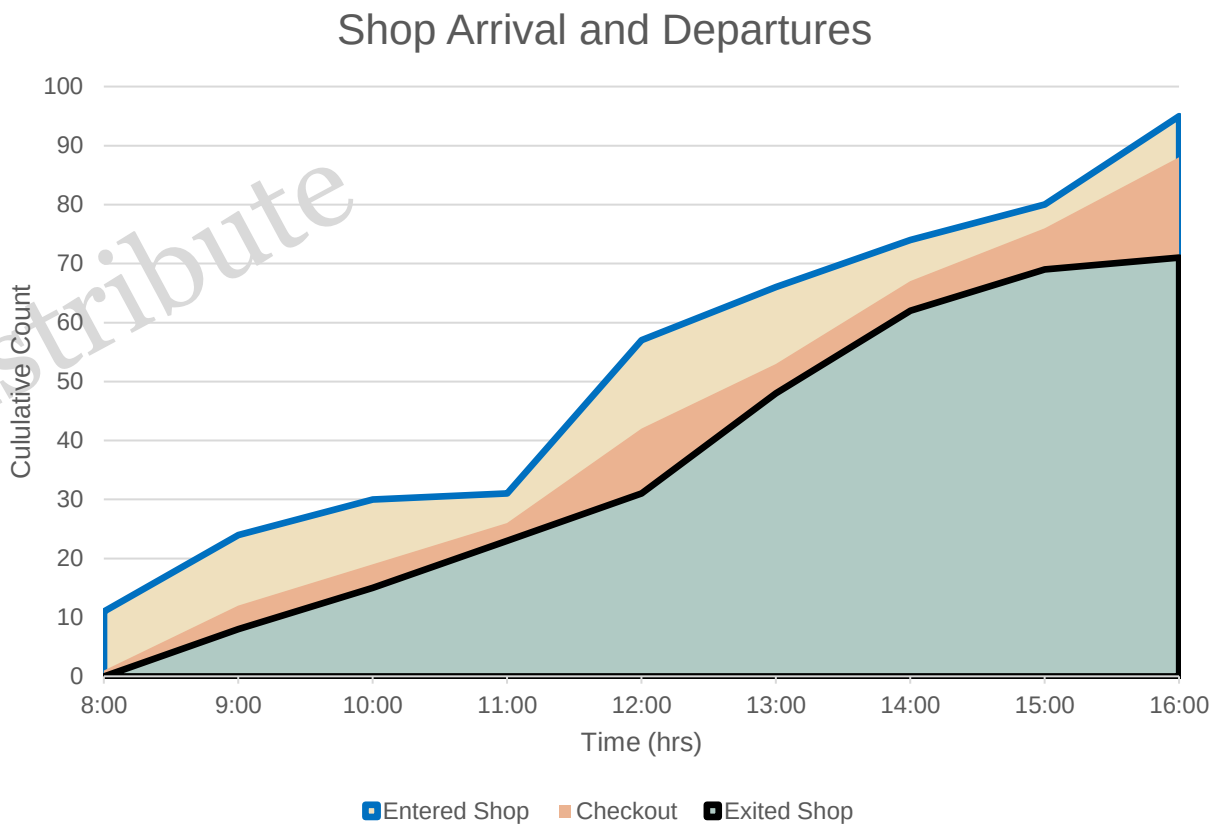


Metric Definition: Customer Lead Time



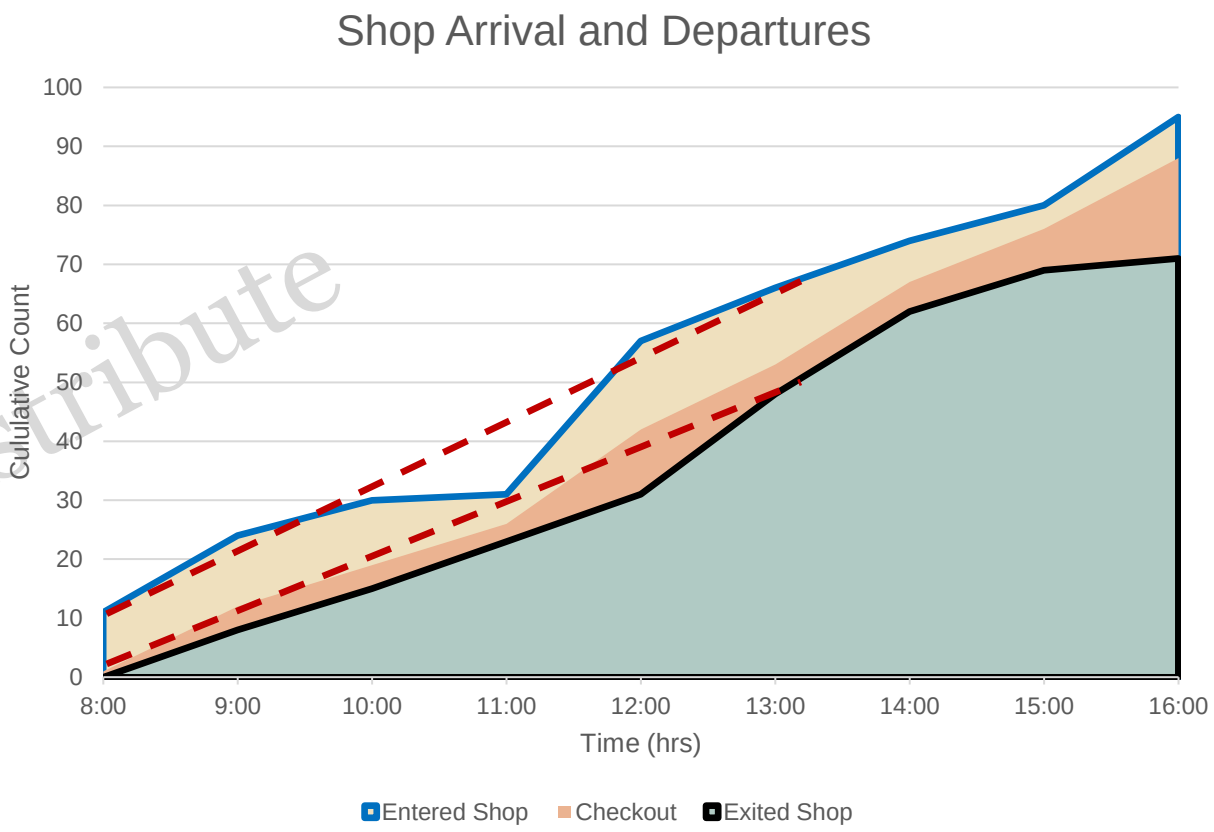
Delivery Rate

- Also called throughput
- Completed items per unit of time
- Measures completion rate



Arrival and Departure rates

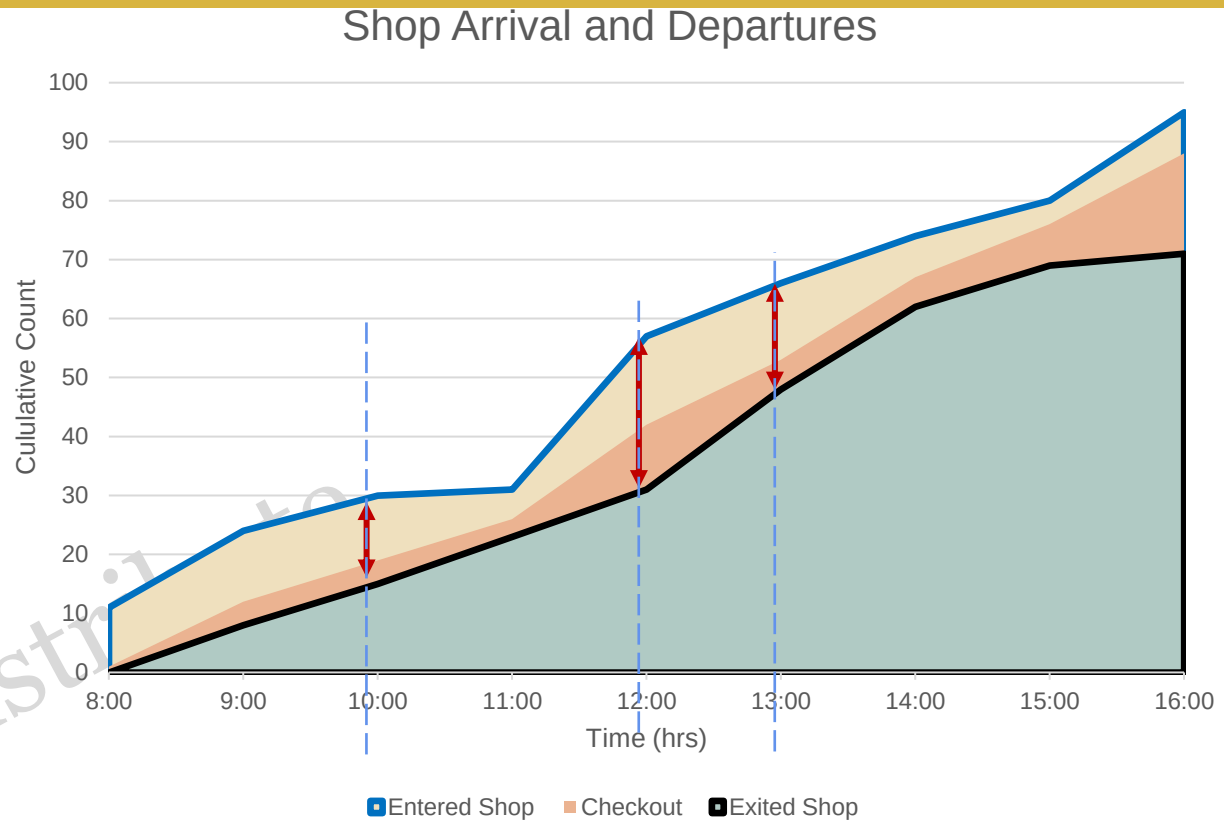
- What is arrival rate?
- What is departure rate?
- What can we infer from these two?



Vertical Distance

- CFD Property #3:

  The vertical distance between any two lines on a CFD is the total amount of work that is in progress between the two workflow steps represented by the two chosen lines.

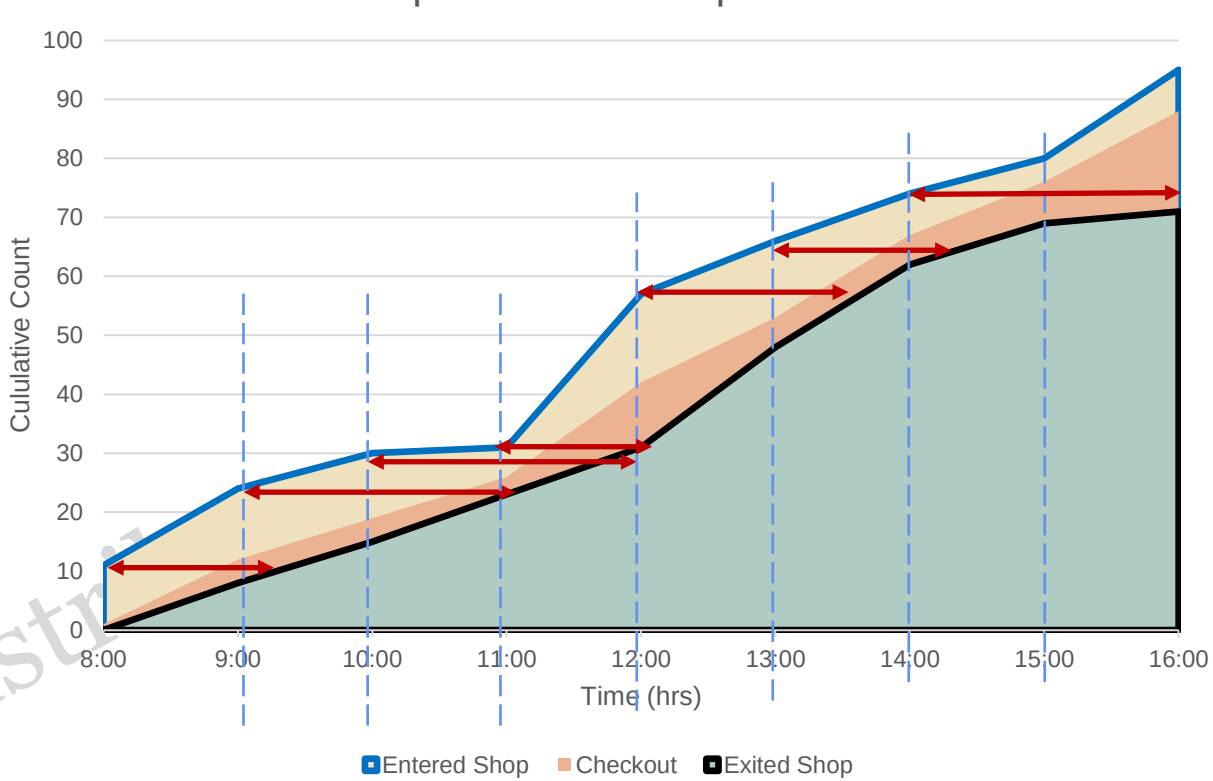


Hour	Entered Shop	Exited Shop	Vertical Distance
8:00	11	0	11
9:00	24	8	16
10:00	30	15	15
11:00	31	23	8
12:00	57	31	26
13:00	66	48	18
14:00	74	62	12
15:00	80	69	11
16:00	95	71	24

Horizontal Distance

- CFD Property #4:

  The horizontal distance between any two lines on a CFD represents the Approximate Average Cycle Time for items that finished between the two workflow steps represented by the chosen two lines



Hour	Entered Shop	Exited Shop	Horizontal Distance
8:00	11	0	1:10
9:00	24	8	1:00
10:00	30	15	2:00
11:00	31	23	1:05
12:00	57	31	1:30
13:00	66	48	1:15
14:00	74	62	1:30
15:00	80	69	1:40
16:00	95	71	2:30

Properties 5 and 6

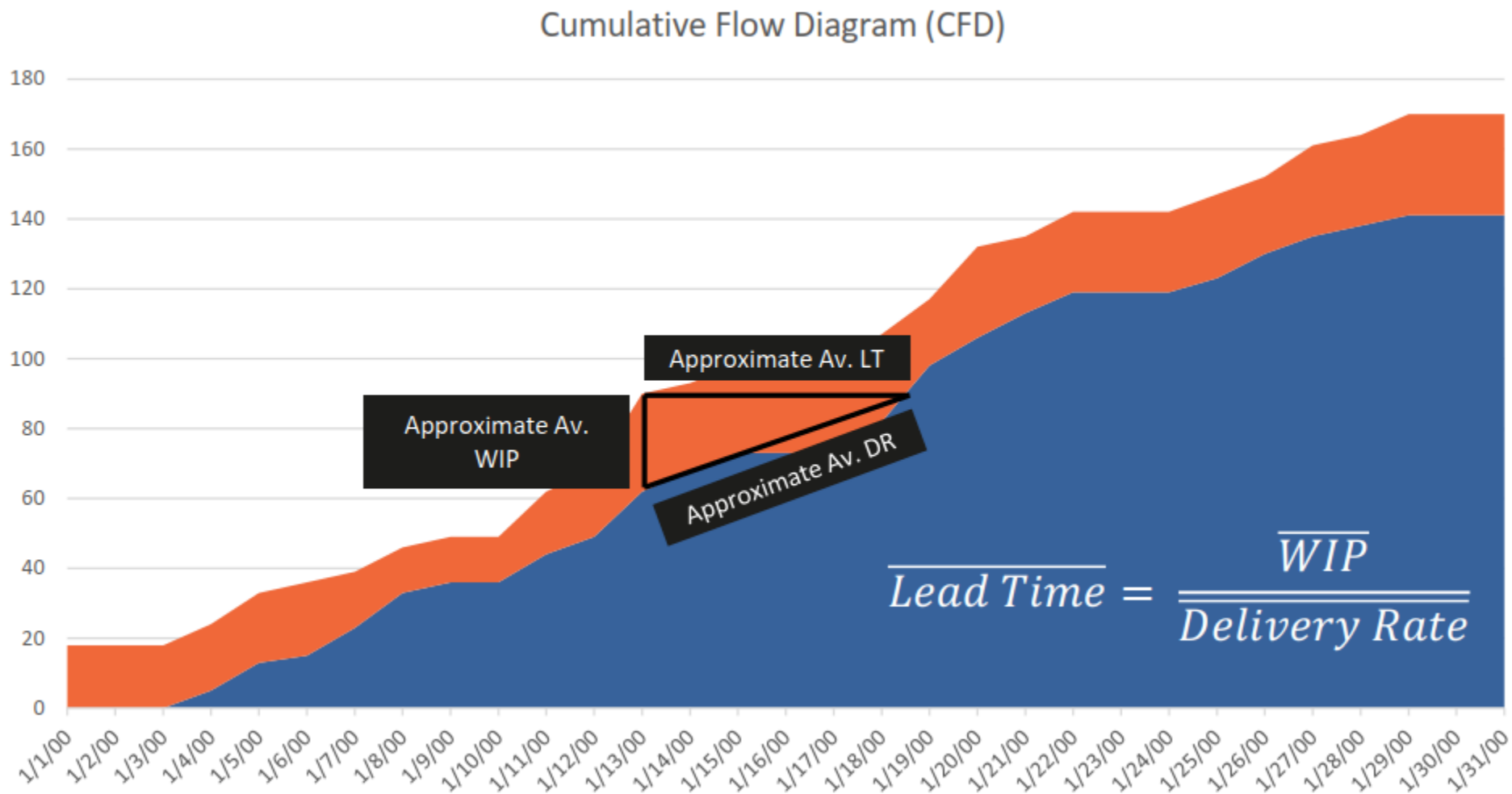
- CFD Property #5:

  The data displayed on a CFD depicts only what *has* happened for a given process. Any chart that shows any type of projection is not a CFD.

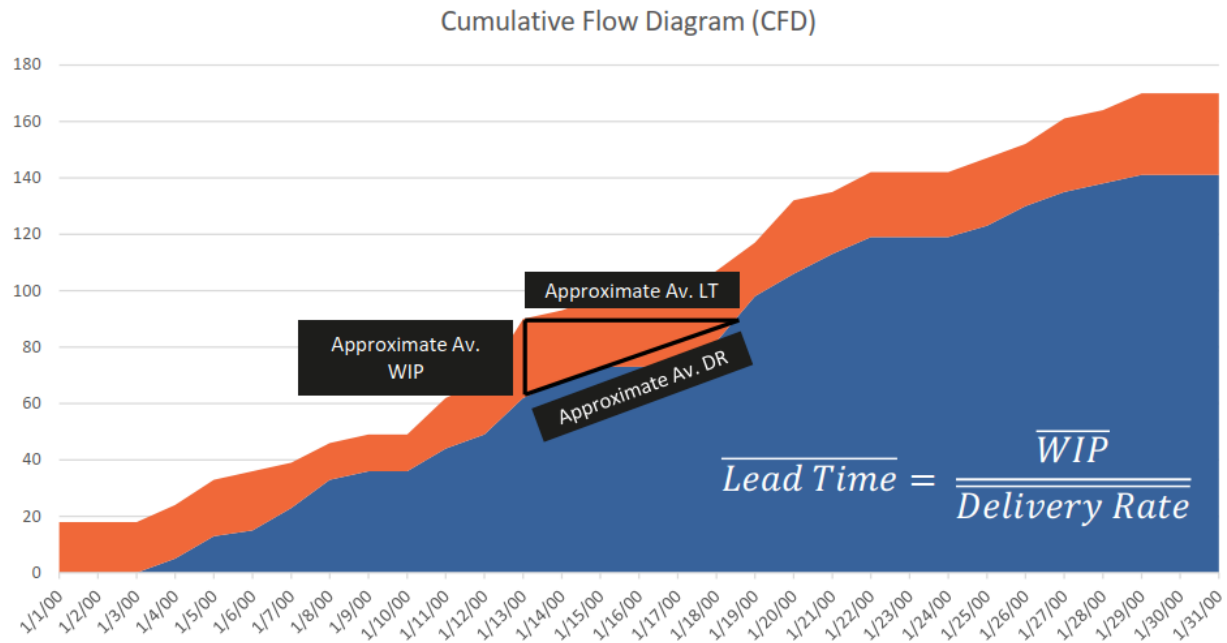
- CFD Property #6:

  The slope of any line between any two reporting intervals on a CFD represents the exact Average Arrival Rate of the process state represented by the succeeding band.

Little's Law – a Relationship of Averages

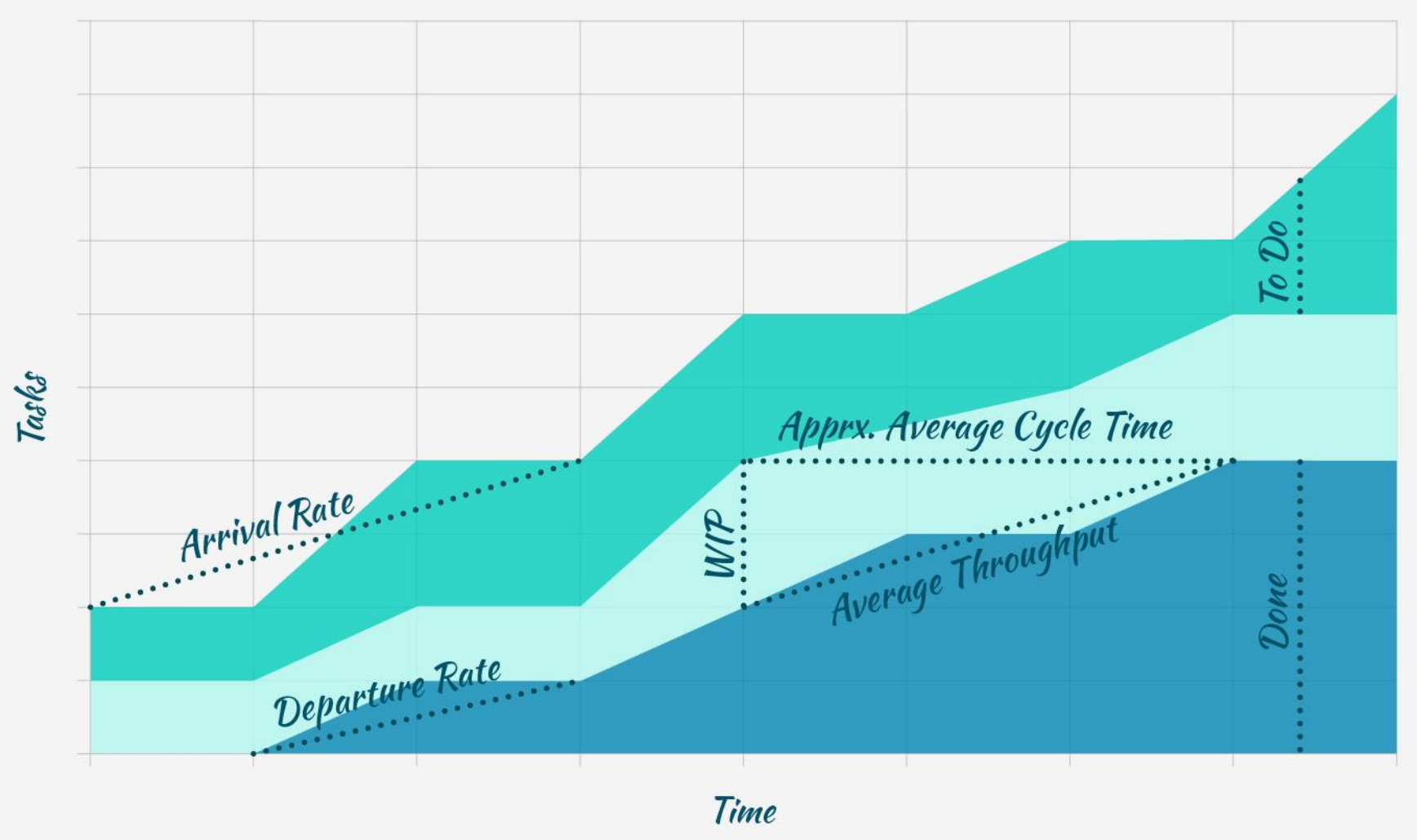


Little's Law



- Assume that the system is not "trending" over the period of averaging.

- The number of items entering and leaving system must be similar, and the average "age" of items in progress must not be increasing or decreasing.
- Despite this restriction, the formula has proven useful in many circumstances for understanding **how flow systems behave as WIP changes**

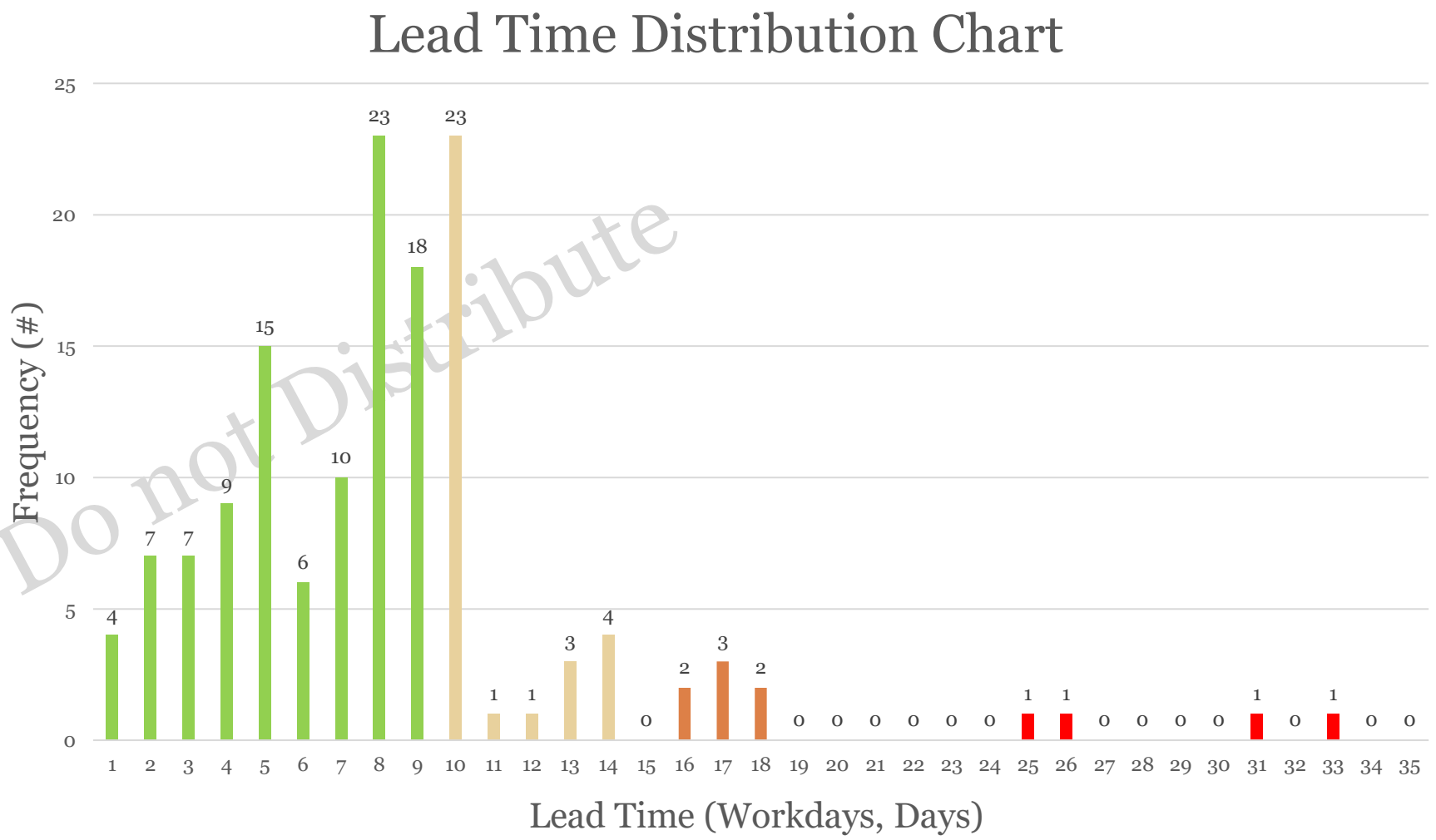

Tasks
Arrival Rate
Departure Rate
WIP
Apprx. Average Cycle Time
Average Throughput
To Do
Done
Time

What is Histogram?

What does it show?

- For Lead Time = 10, frequency is 23

Zero Day Lead Time is meaningless, make it One!

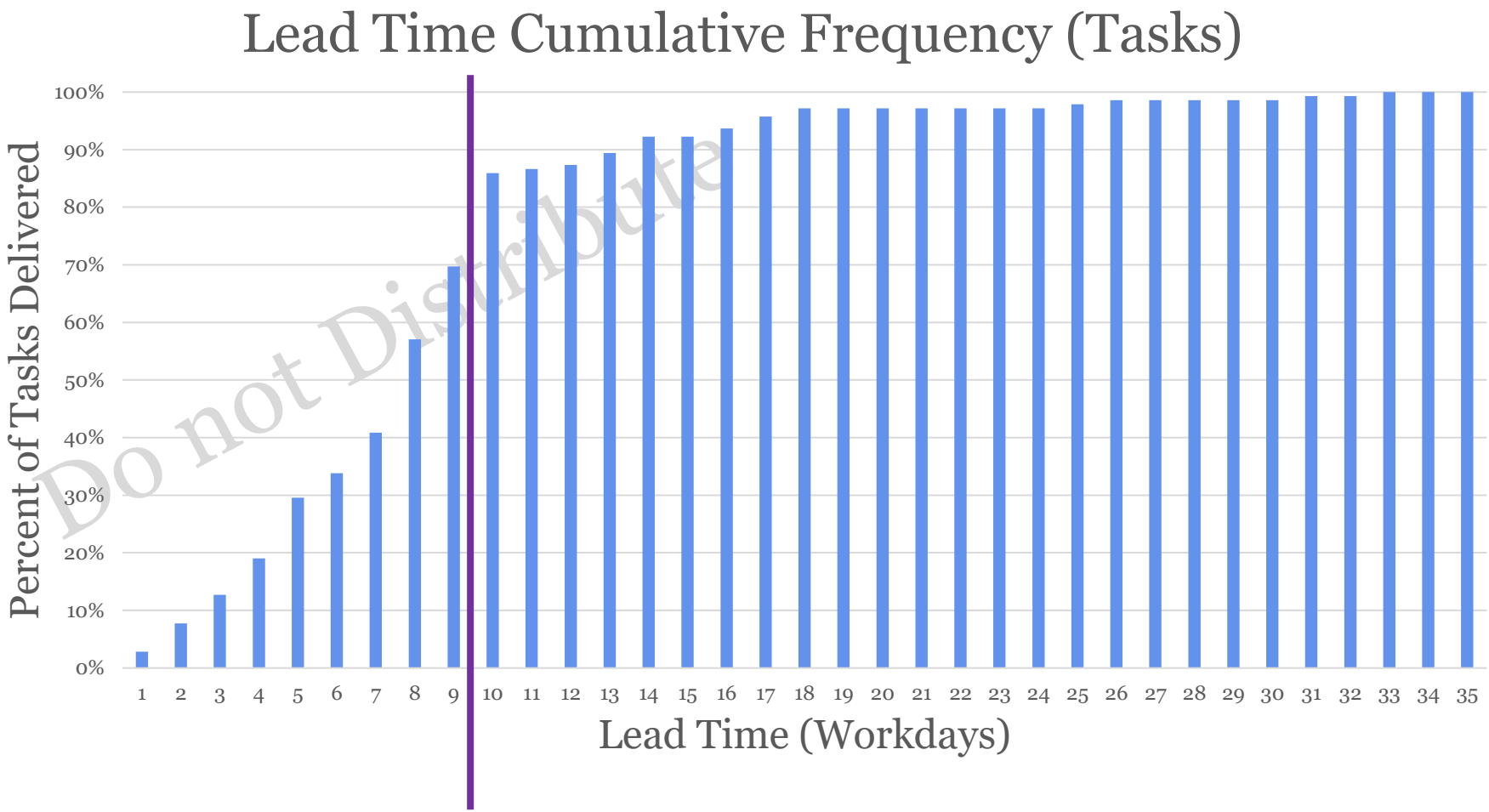


Cumulative Lead Time Frequency

What does it show?

For Lead Time of Less than 10 Days, the probity is 70 %

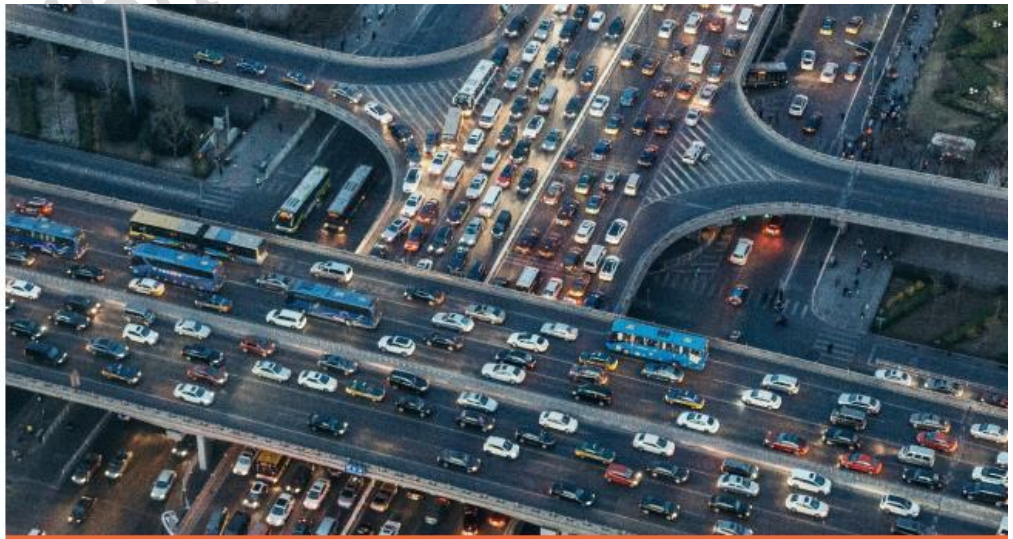
How else we can use it?



Flow Efficiency - Introduction

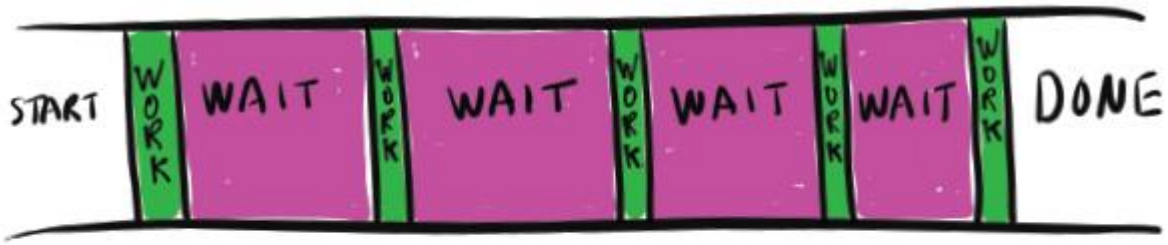
- Where would you prefer to travel?
- How fast and smooth will your travel be?

Few delays



Traveling time largely determined by delays

Flow Efficiency



$$\frac{\text{WORK}}{\text{WAIT} + \text{WORK}} (100\%) = \text{FLOW EFFICIENCY}$$

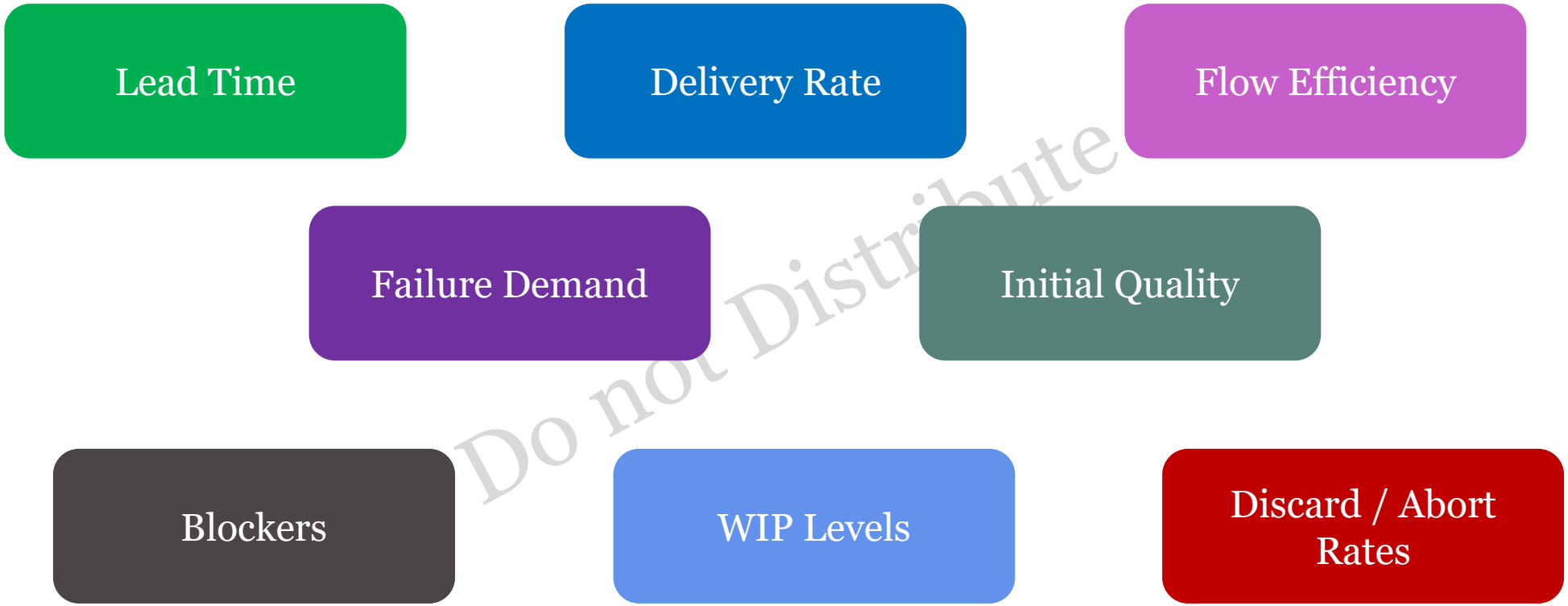
$$Flow\ Efficiency = \frac{Work\ Time}{Lead\ Time}$$

Flow Efficiency

$$Flow\ Efficiency = \frac{Work\ Time}{Lead\ Time}$$

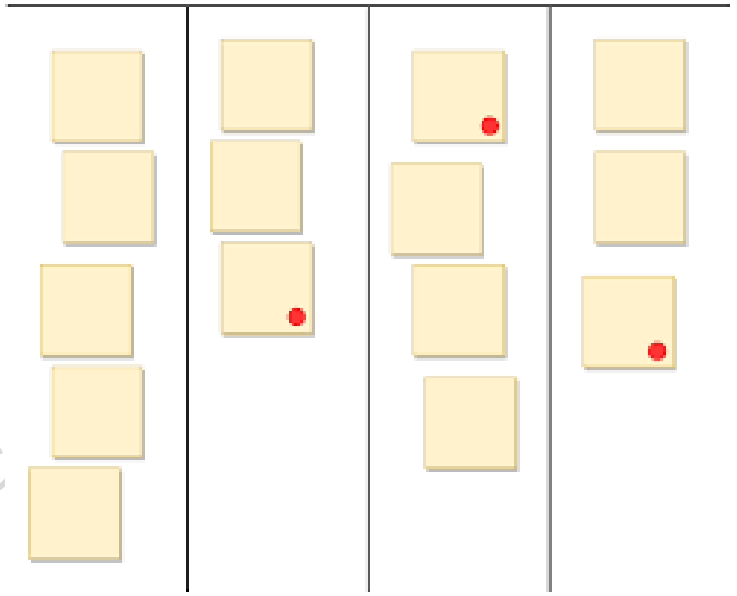
- Flow efficiency measures the share of total lead time which is spent actually adding value (or knowledge)
  - Work item is the sum of all the times during which a work item is actively being worked on
  - Work time excludes wait time caused by delays
  - The higher the flow efficiency , the less delays

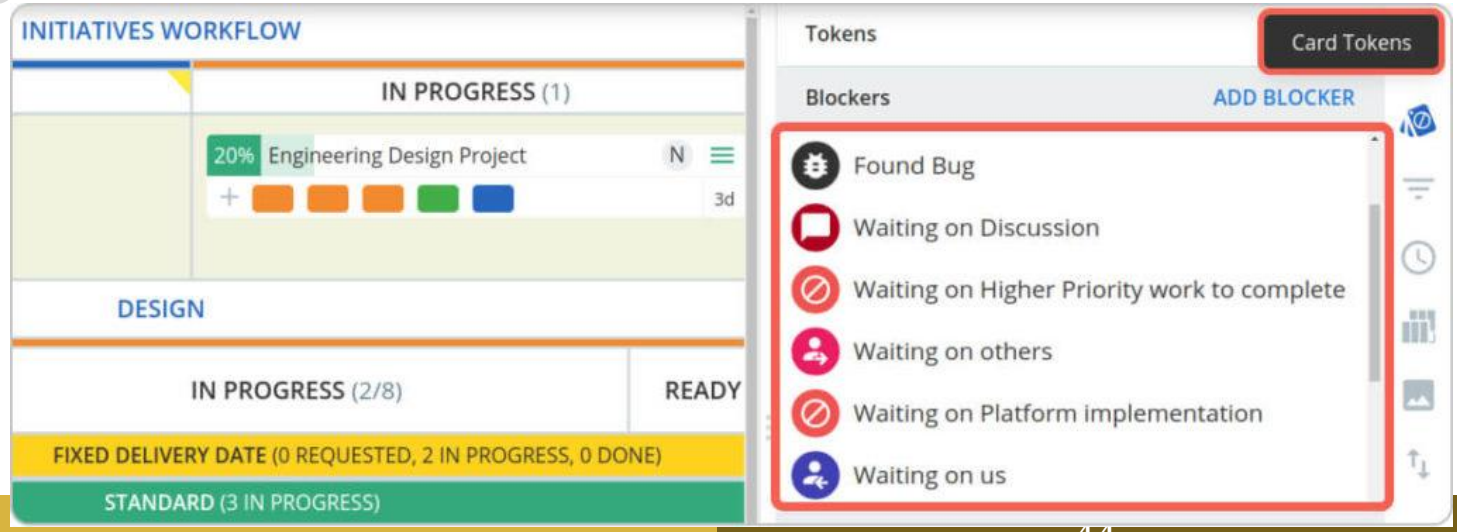
Summary: Key Metrics to Understand System behavior



Blockers

- We can add stickies to blocked cards to show they are Blocked
- Or attach a sticky to it, describing what caused it to be blocked, and How Many Days it's been like this





Make Policies Explicit

A process expressed as workflow and policies

- Creates constraints in action,
- Is empowering within constraints,
- And results in emergent characteristics than can be tunes by experiment.

Classes of Services (CoS)

- Defines how categories of items are treated in a system, a set of policies is defined that apply to certain work type(s)
- Recognize different kinds of customer expectation
- Treat of work items in a differentiated manner to better manage lead times and risks – be able to respond at reasonable cost
- Can impact order of selection and delivery – qualitative categories before any quantitative ranking

CoS - Cont

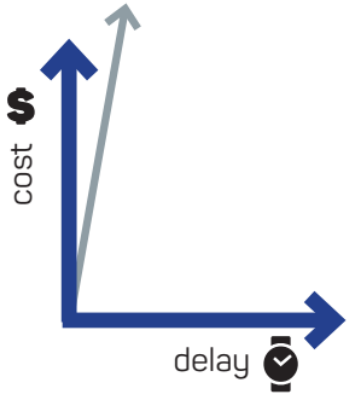
- Make explicit both internally and externally
- Can be indicated with colors, shapes, stickers, swim lanes, etc.

- … forming the basis for reliable commitments to stakeholders!

Classes of Services mapped to Cost or Impact of Delay

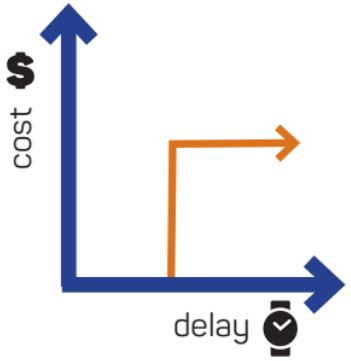
Called also

Level of Expectation



EXPEDITE

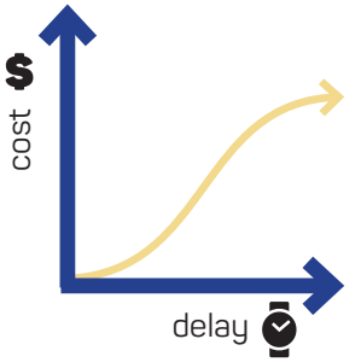
Critical and immediate cost of delay; it can exceed other kanban limit (bumps other work).



FIXED DATE

Cost of delay goes up significantly after deadline.

What will happen if you don't finish the item at that time?



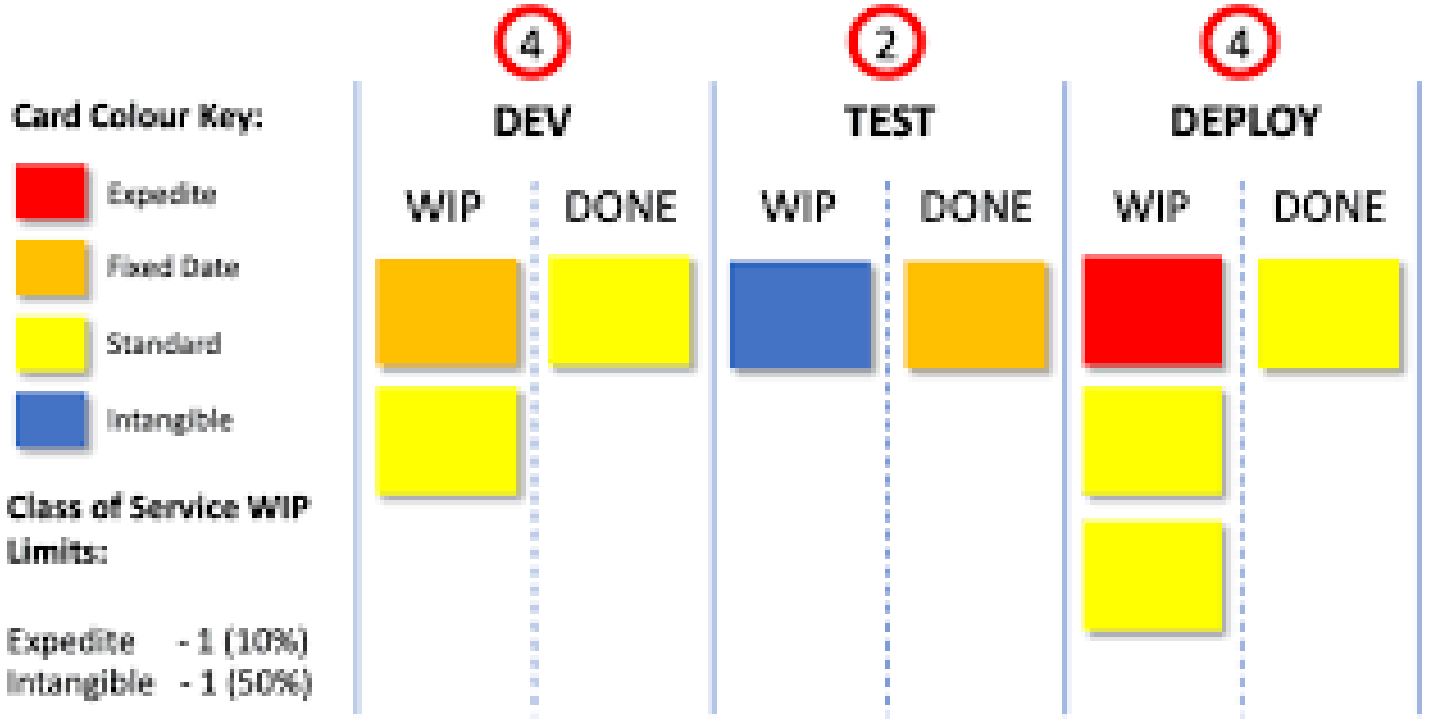
STANDARD

Increasing urgency, cost of delay is shallow but accelerates before levelling out.

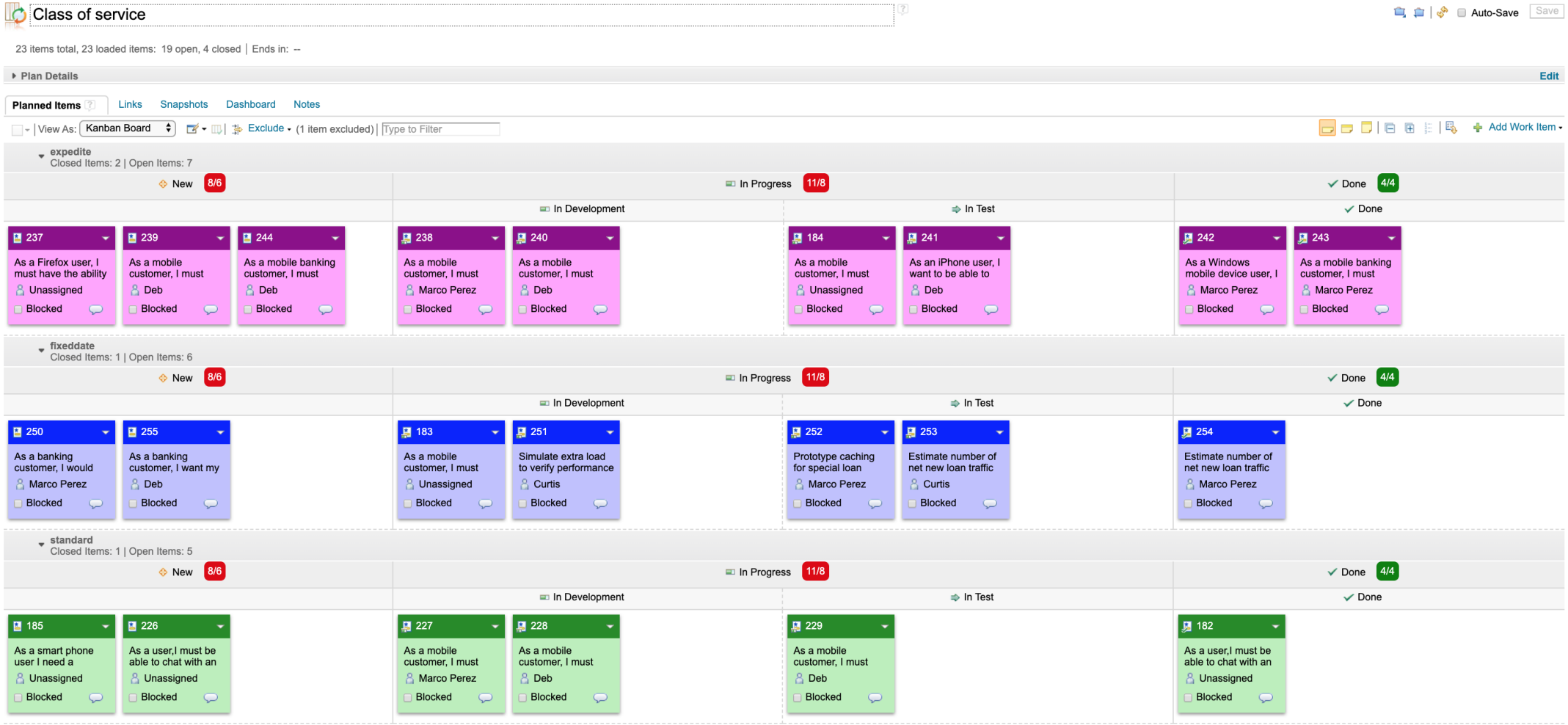
INTANGIBLE

Cost of delay may be significant but is not incurred until significantly later (if at all).

CoS in different colored cards



CoS in in different SwimLanes



Implement Feedback Loops

- Feedback loops are an essential part of any controlled process
- Are especially important for evolutionary change.
- Kanban defines specific feedback opportunities called “cadences”.

- Cadence: the beat, time, or measure of rhythmical motion or activity

Workflow Kanban Meeting

Involve the service teams in a collaborative conversation about the status of the work, queues between stages of the workflow and problems that affect the flow of work.

- Commitments
- Decisions about new initiatives and capacity allocation
- Policy changes

- Shared understanding of how to best to flow current work
- Improvement suggestions

Immediate service group or team doing the work (4-50 people)

Scope: End-to-end workflow of a service

The identified issues are resolved after the meeting by team members with relevant knowledge and skills

Weekly, depending on coordination cost

10-20 mins

How to Run a Workflow Kanban Meeting

- One person facilitates
- **“Walk the bord”** from right to left:

  Go through the tickets from right (most close to completion) to left (most recently started)
- Remember to **manage work, not workers!**
- The facilitator may solicit a status update on a ticket or simply ask if there is additional information that is not on the board yet.

How to Run a Workflow Kanban Meeting – cont.

- More mature organizations may only discuss blocked items, and not discuss every ticket on the board
- There will be discussion of pullable tickets in “Done” queues. Which ticket should be pulled next and by whom?

Flow Review

Develop an initial quantitative understanding of the delivered service, facilitating work planning and improving predictability.

- Progress and system capability data from Kanban Meeting and tracking system
- Actions from Risk Review

- Defined actions to improve capability
- Communication of decisions

(parts of the) service delivery team, optionally team leads

Compare current capability with defined target conditions
Discuss possible improvement actions

Twice a month

30 min

Typical Data Prepared for a Flow Review

- **Distribution of the demand** per work type
- **Range of Blocker time per blocker cause**
- **Range of defect and rework time** per cause
- Work items with **high age**
- Average and distribution of:
  - **Customer Lead Time** per type of work
  - **Arrival rate** of the demand
  - **Throughput** per type of work for a period
  - **System lead time** per type of work

All Cadences by Maturity Level