No Crystal Ball Gazing

Risk Management & Delivery with Kanban

Using qualitative risk assessment & probabilistic forecasting for better business results

Devlin
Linkoping, March 2013

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Understanding Kanban Systems

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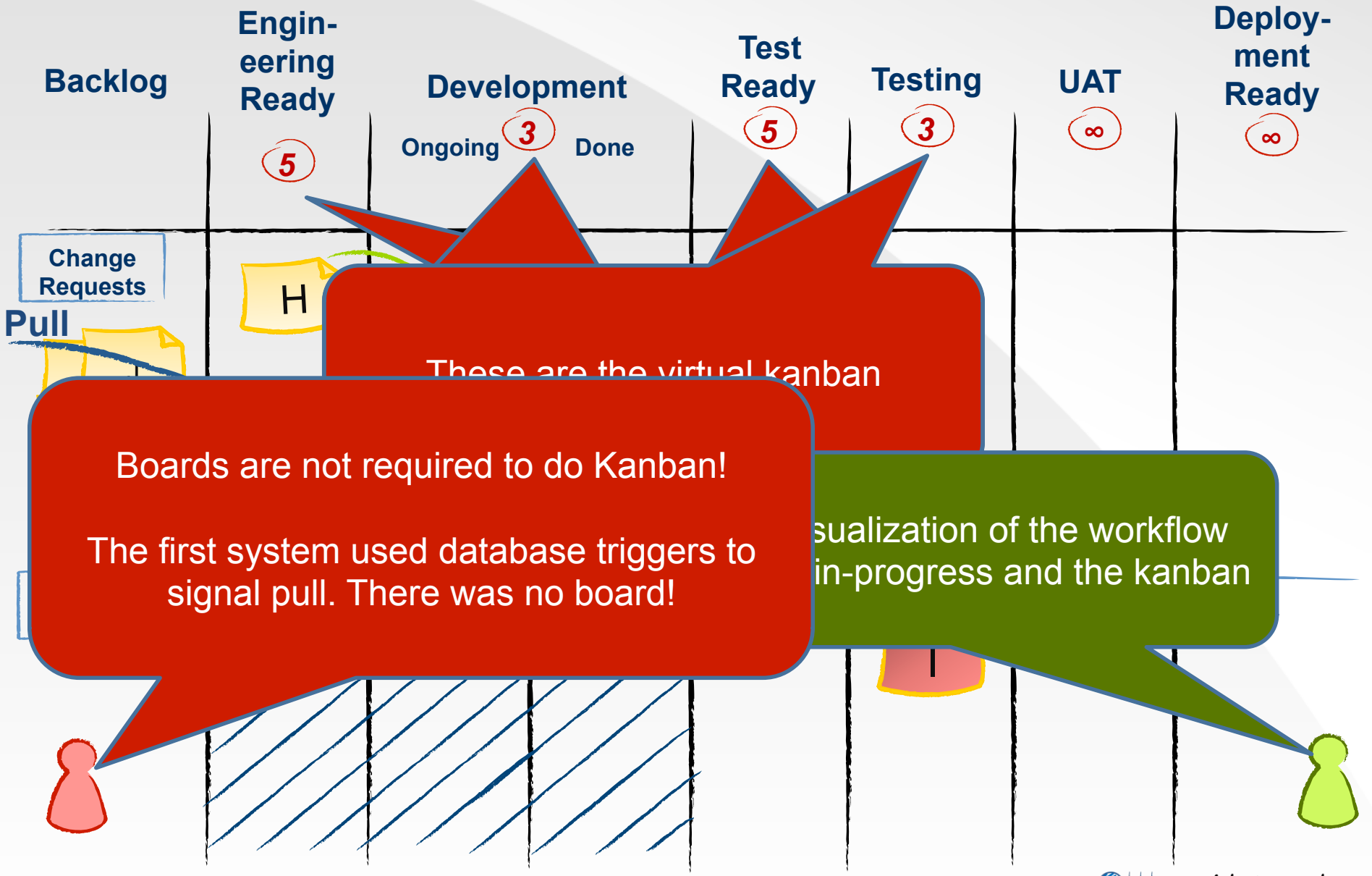
Kanban are virtual!



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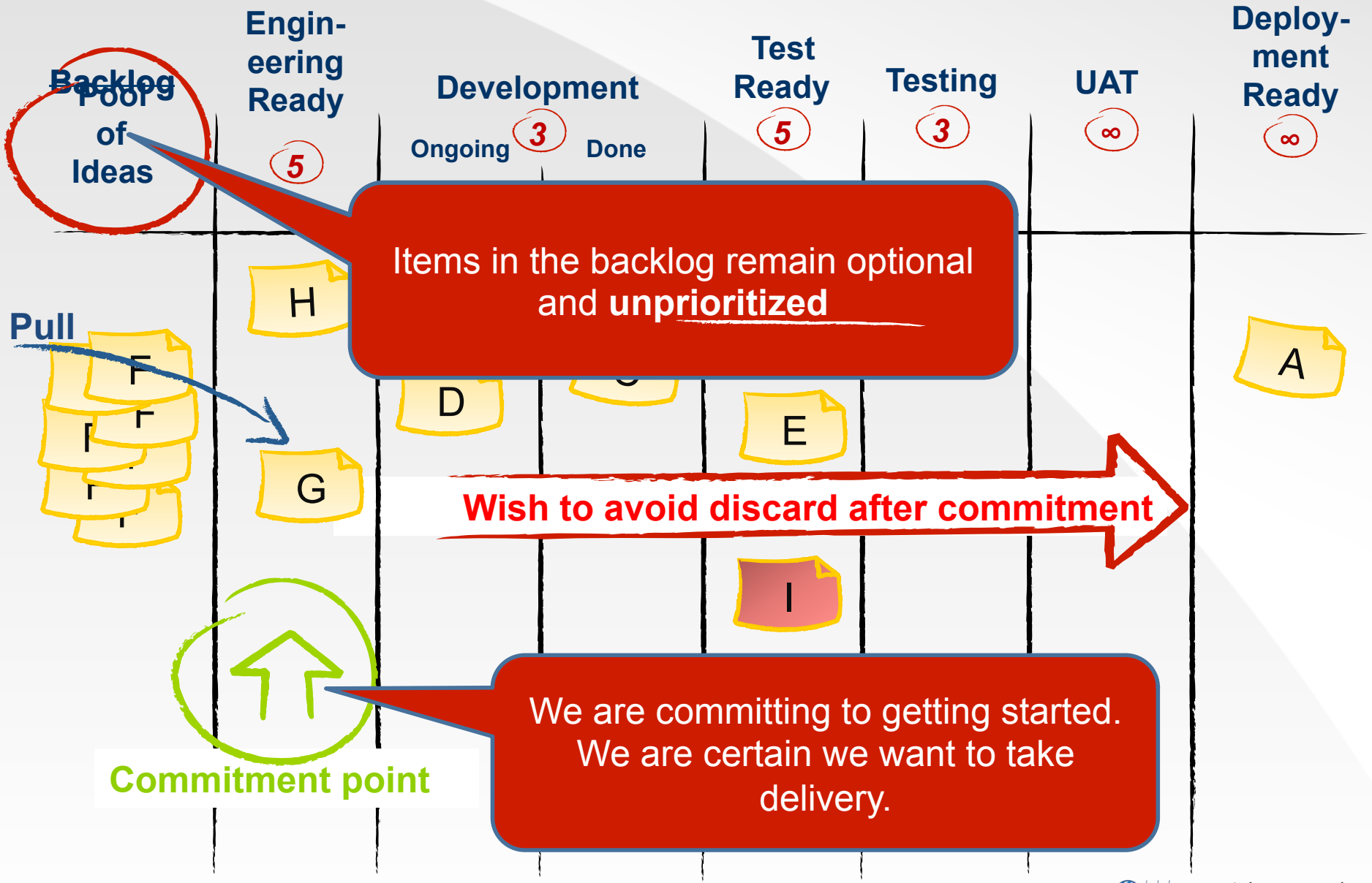
Commitment is deferred



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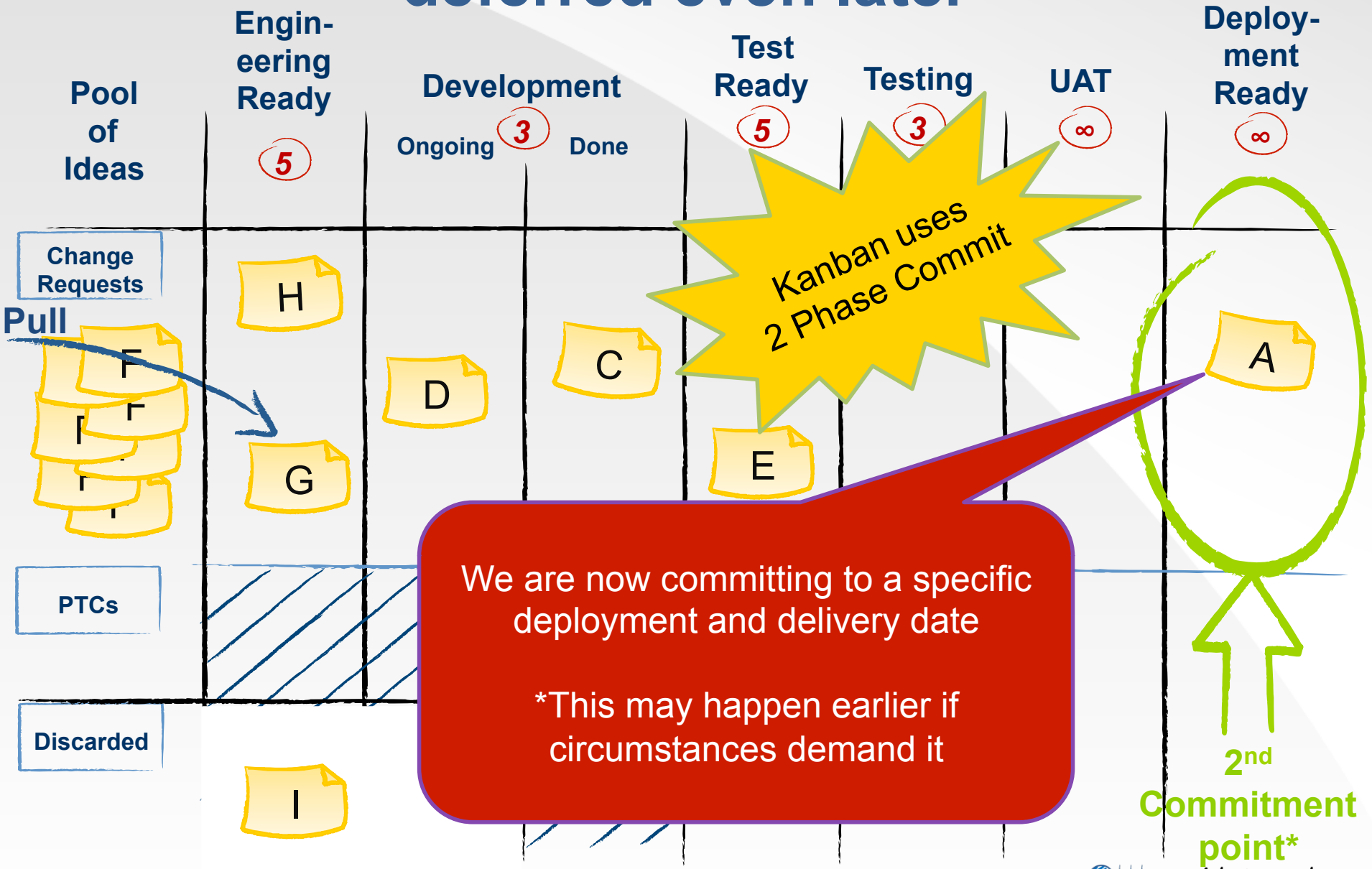
Specific delivery commitment may be deferred even later



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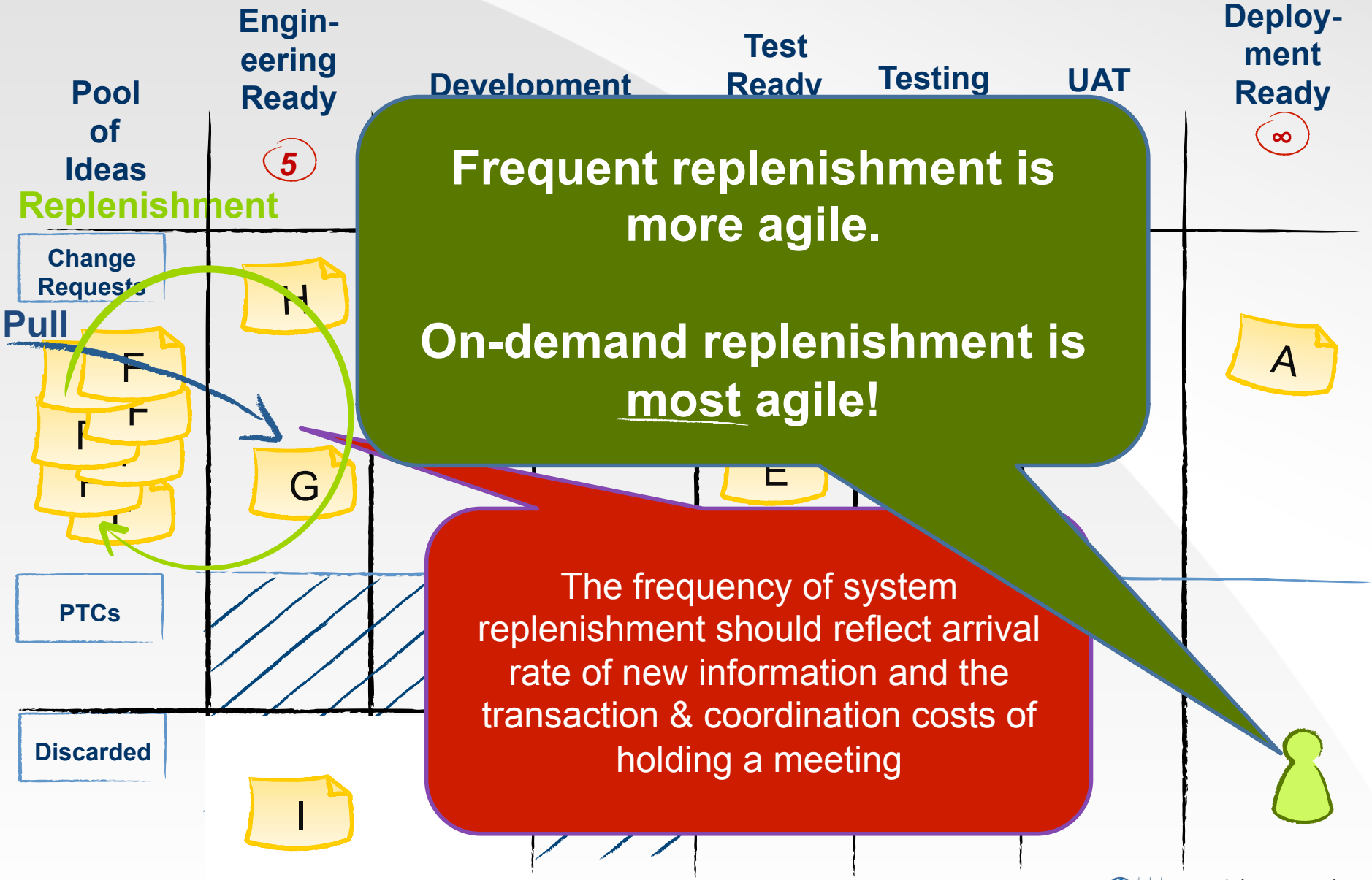
Replenishment Cadence



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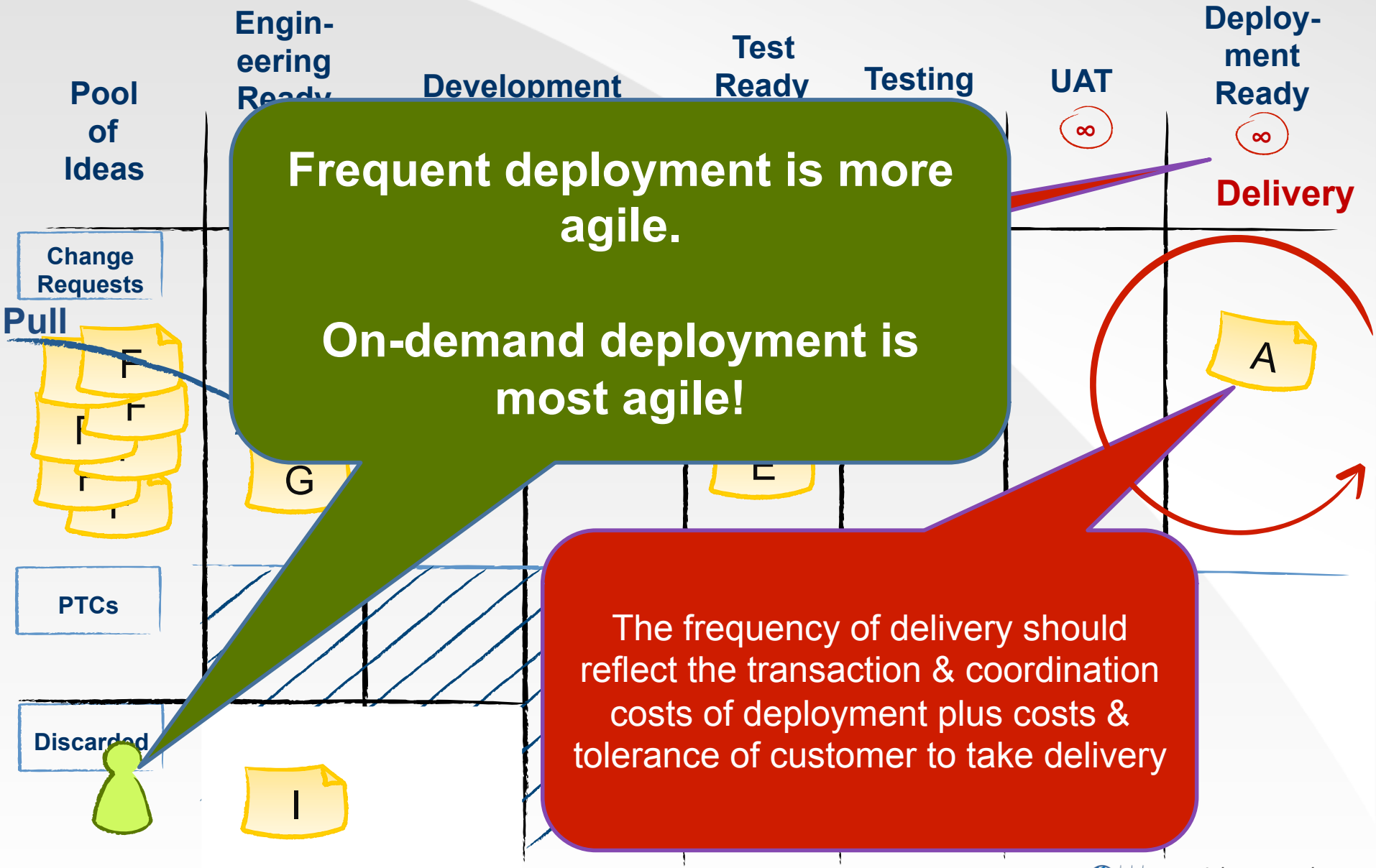
Delivery Cadence



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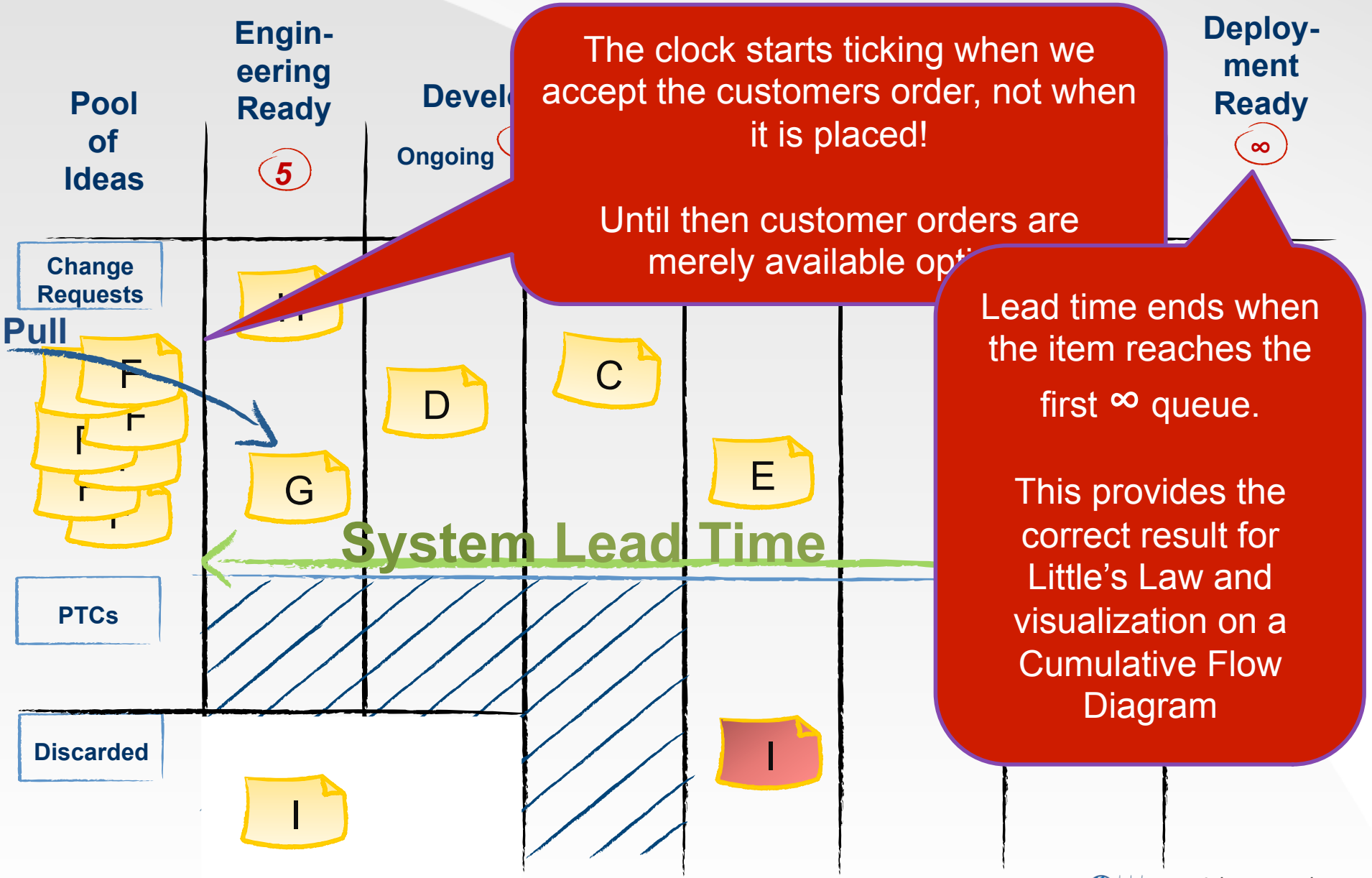
Defining Kanban System Lead Time



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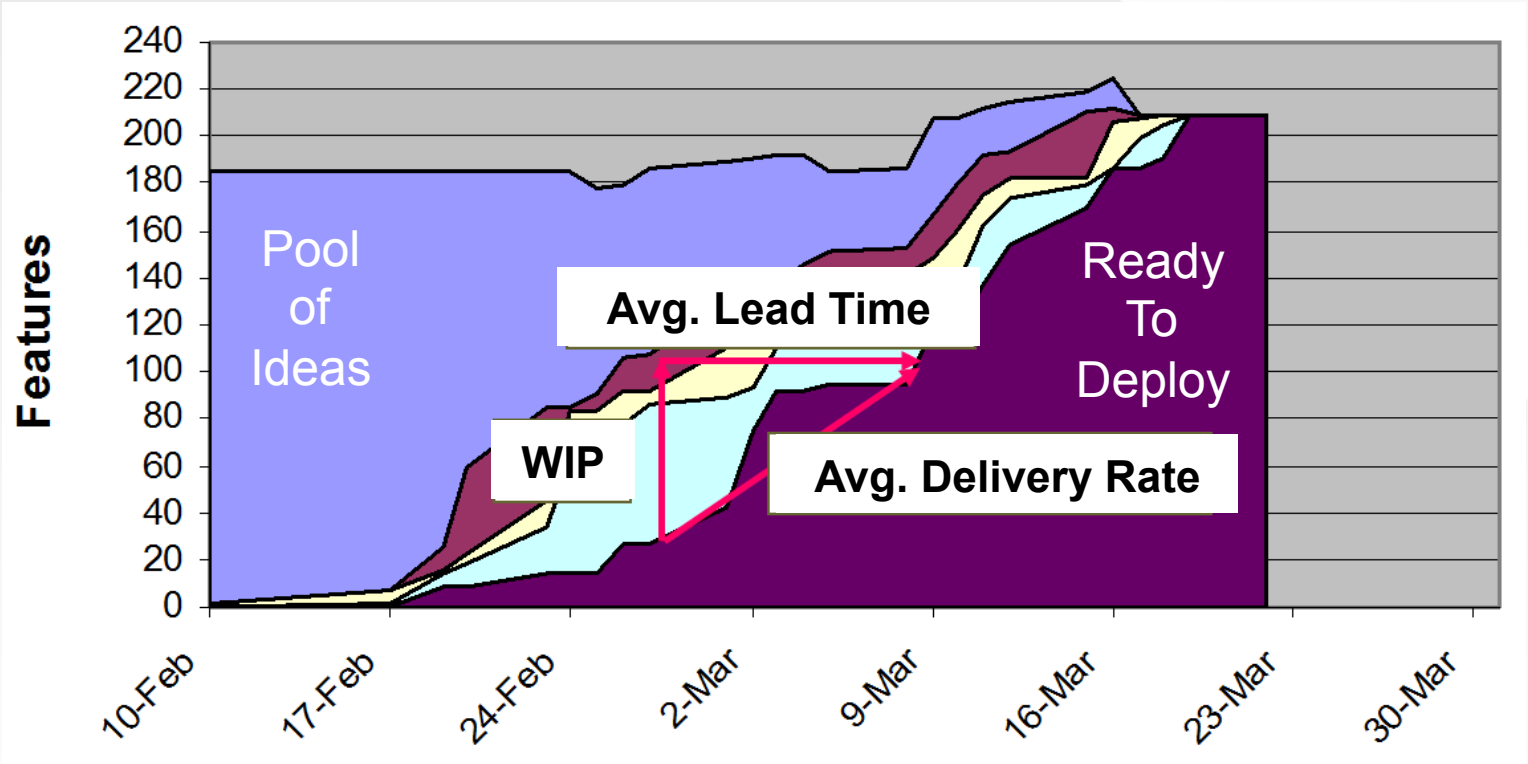
Little's Law & Cumulative Flow

$$\frac{}{\text{Delivery Rate}} = \frac{\text{WIP}}{\frac{}{\text{Lead Time}}}$$



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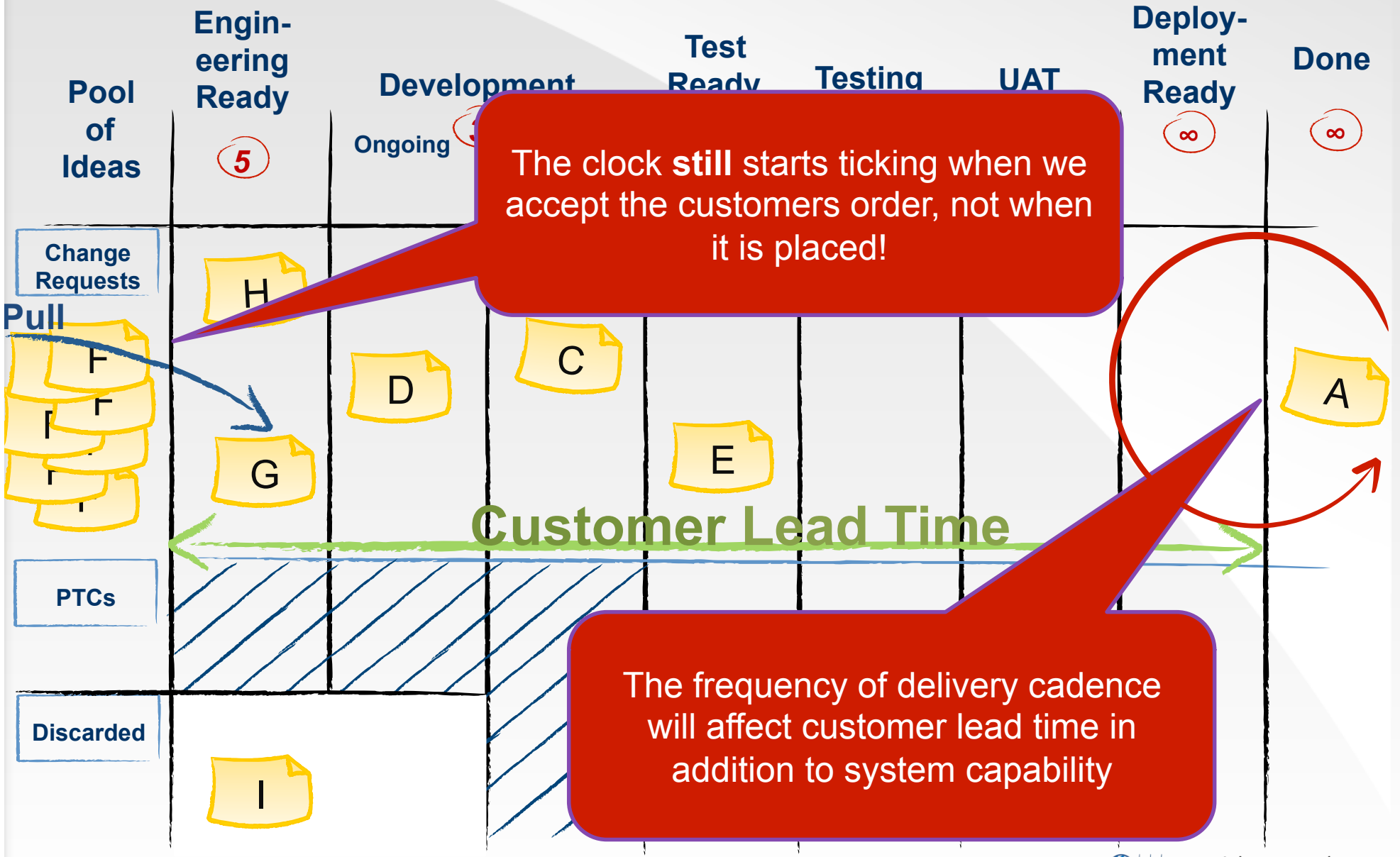
Defining Customer Lead Time



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Flow Efficiency

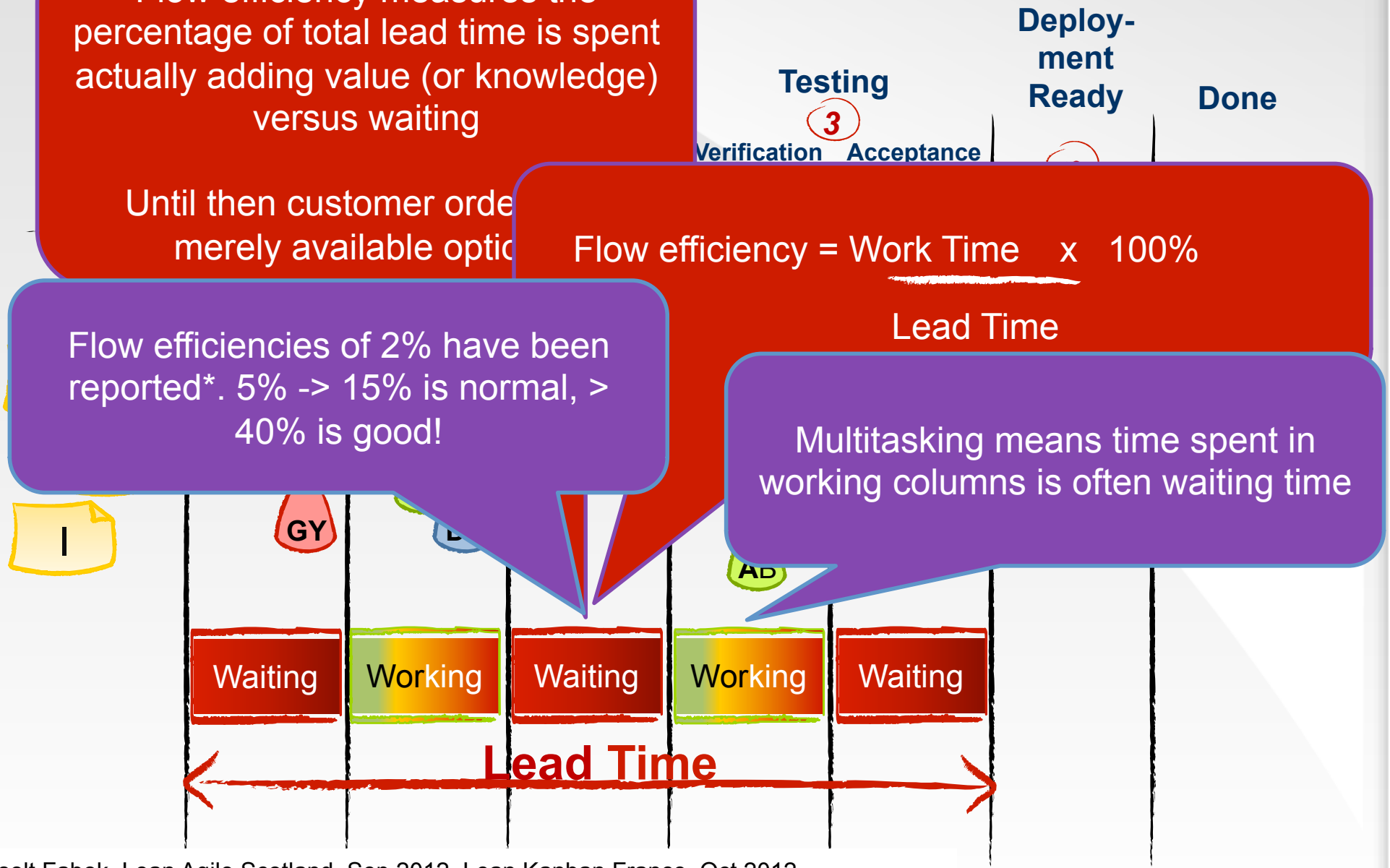
Flow efficiency measures the percentage of total lead time is spent actually adding value (or knowledge) versus waiting

Until then customer orde
merely available optic

Flow efficiency = Work Time x 100%
Lead Time

Flow efficiencies of 2% have been reported*. 5% -> 15% is normal, > 40% is good!

Multitasking means time spent in working columns is often waiting time



* Zsolt Fabok, Lean Agile Scotland, Sep 2012, Lean Kanban France, Oct 2012

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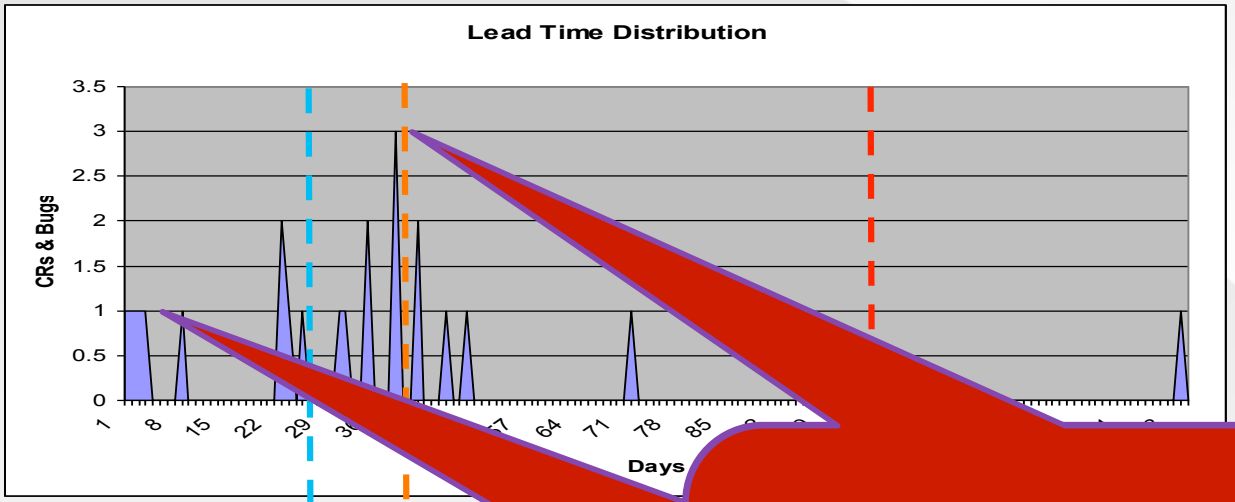
Observe Lead Time Distribution as an enabler of a Probabilistic Approach to Management



This is multi-modal data!

The work is of two types: Change Requests (new features); and Production Defects

Mean of 31 days

SLA expectation of
44 days with 85% on-time

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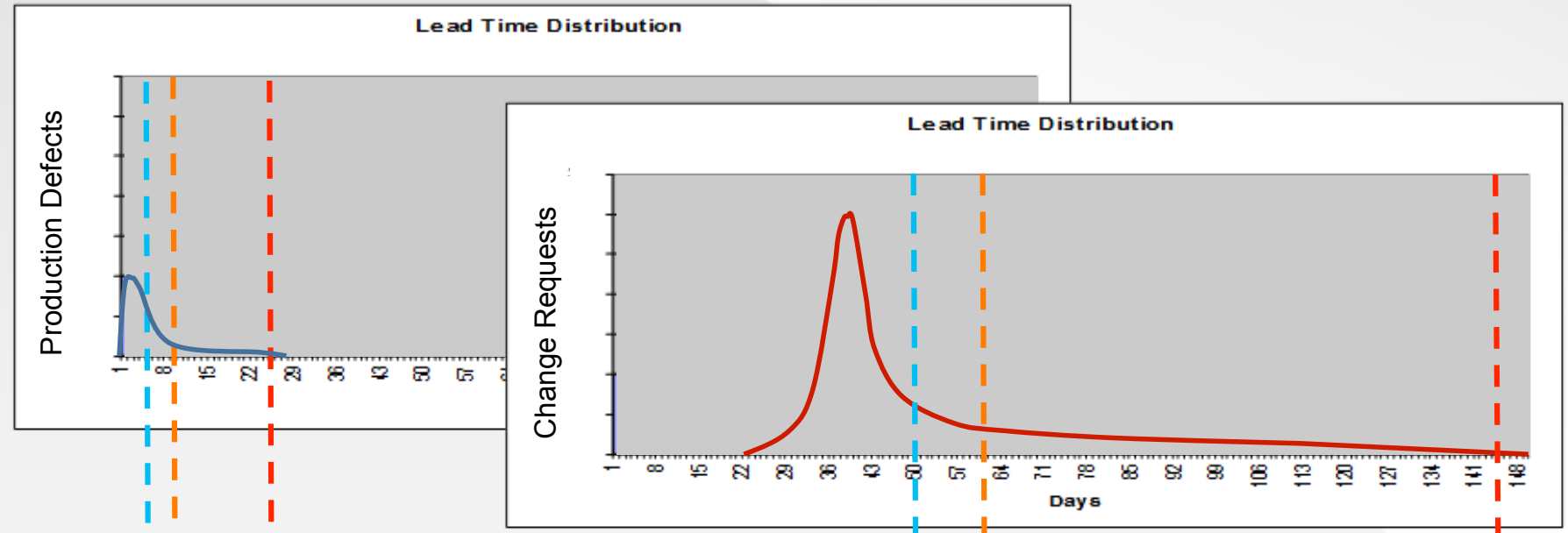
Filter Lead Time data by Type of Work (and Class of Service) to get Single Mode Distributions



Mean
5 days

98% at
25 days

85% at
10 days

Mean
50 days

85% at
60 days

98% at
150 days

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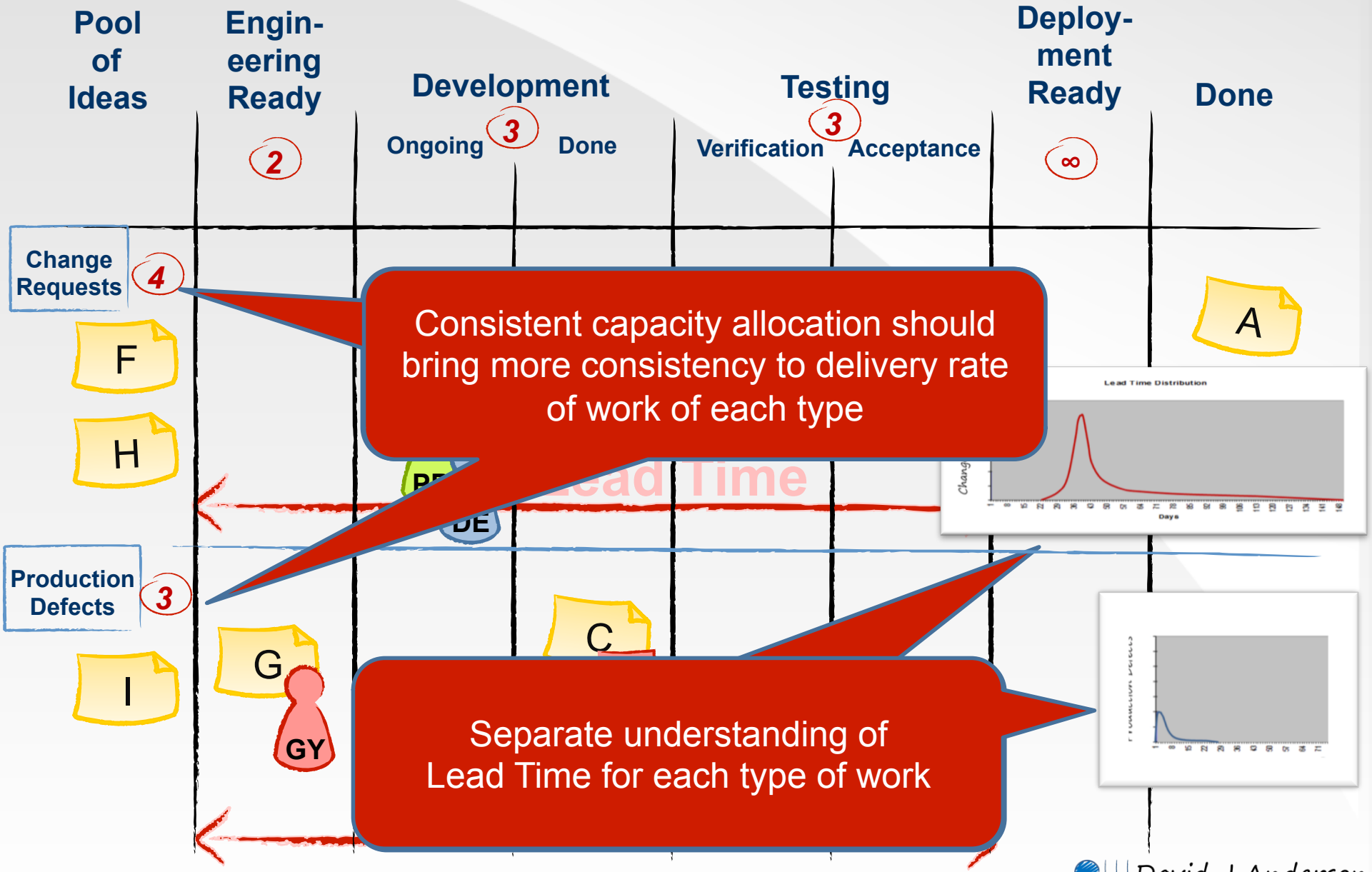
Allocate Capacity to Types of Work



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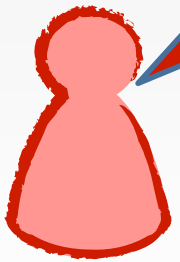
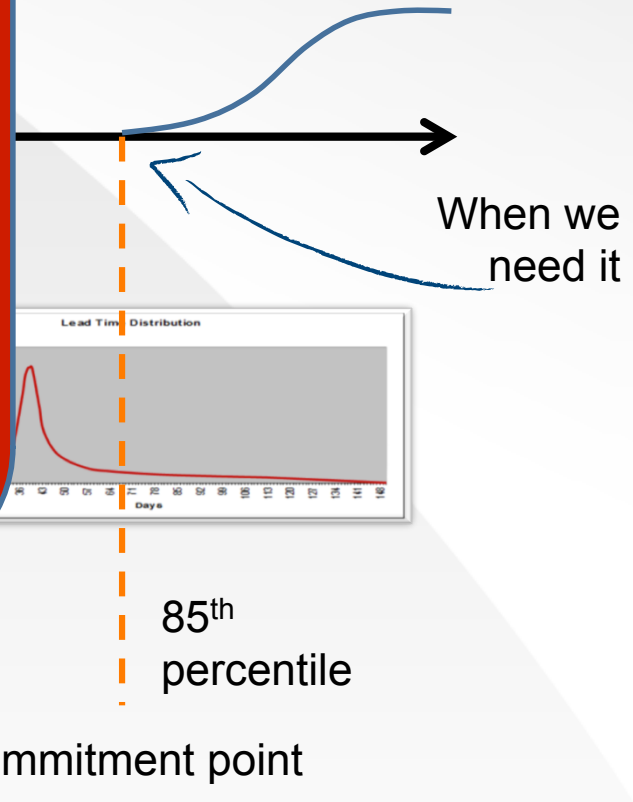
The Optimal Time to Start

If we start too early, we forgo the option and opportunity to do something else that may provide value.

If we start too late we risk incurring the cost of delay

With a 6 in 7 chance of on-time delivery, we can always expedite to insure on-time delivery





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Metrics for Kanban Systems

Cumulative flow integrates demand, WIP, approx. avg. lead time and delivery rate capabilities

Lead time histograms show us actual lead time capability

Flow efficiency, value versus failure demand (rework), initial quality, and impact of blocking issues are also useful

Scaling Up
(Probabilistic Forecasting)

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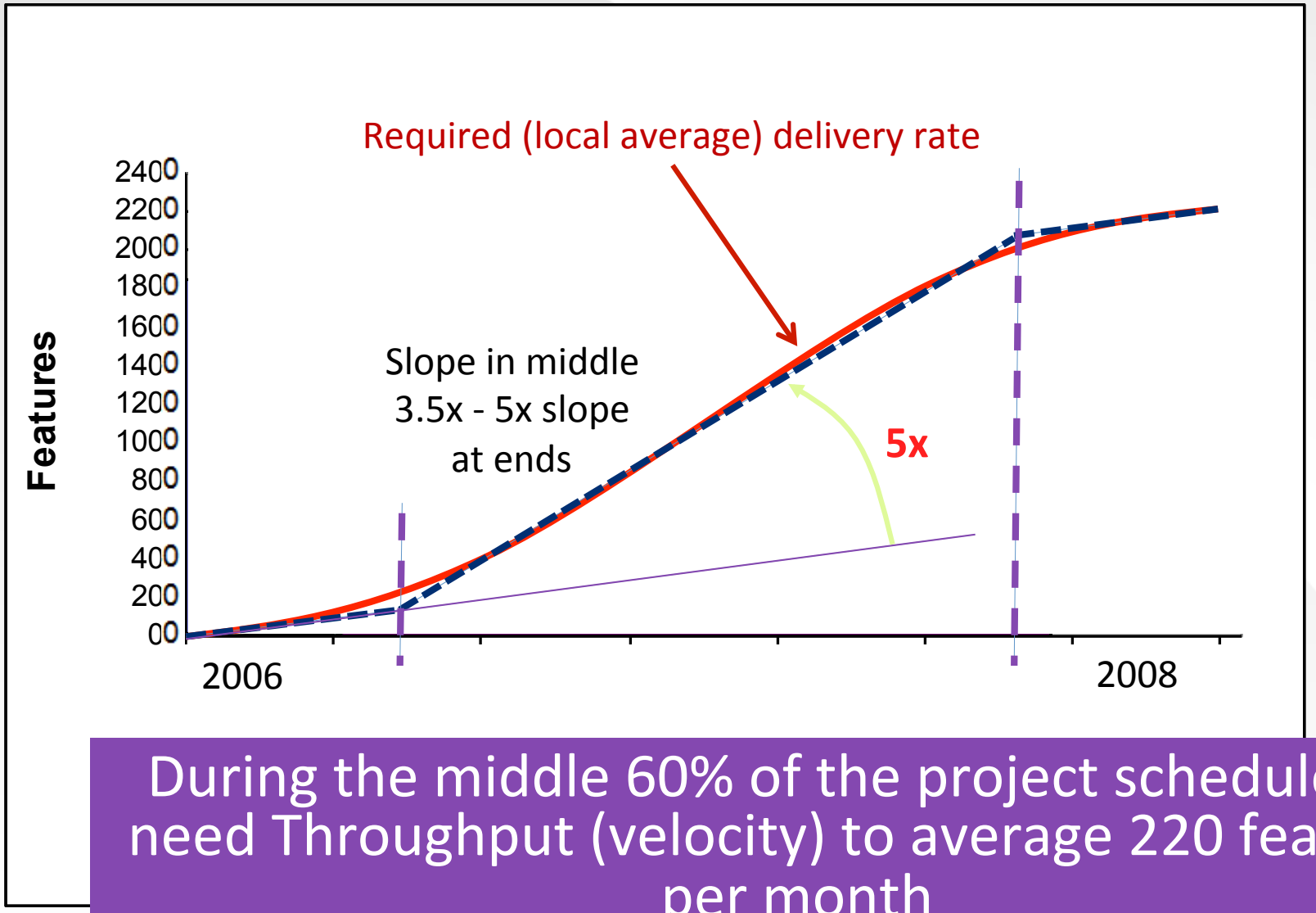
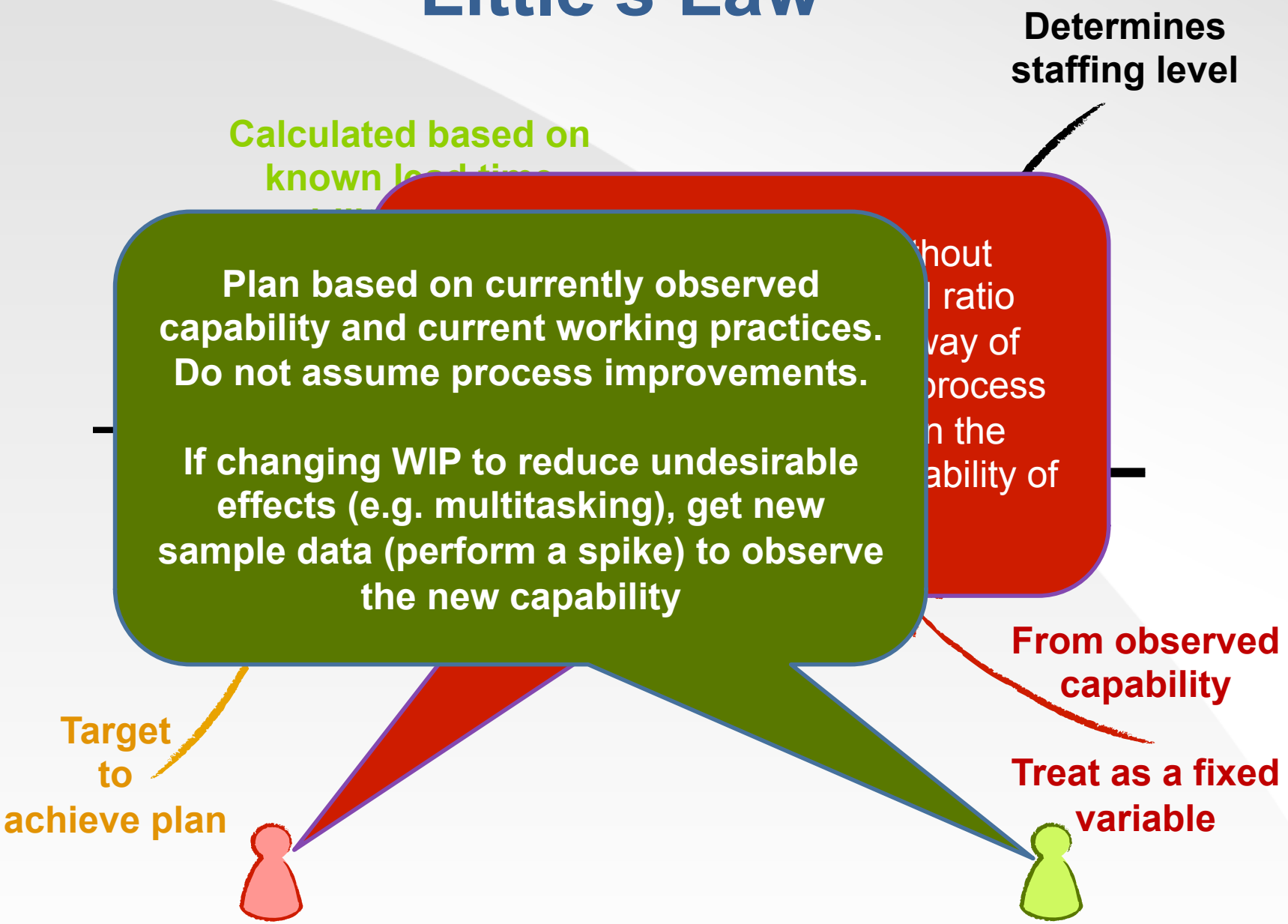
Scaling Up - Planning a big project



During the middle 60% of the project schedule we need Throughput (velocity) to average 220 features per month

Little's Law


Determines staffing level
Calculated based on known lead time
hout
ratio
vay of
rocess
n the
ability of
Plan based on currently observed capability and current working practices. Do not assume process improvements.
If changing WIP to reduce undesirable effects (e.g. multitasking), get new sample data (perform a spike) to observe the new capability
From observed capability
Target to achieve plan
Treat as a fixed variable

Using Little's Law

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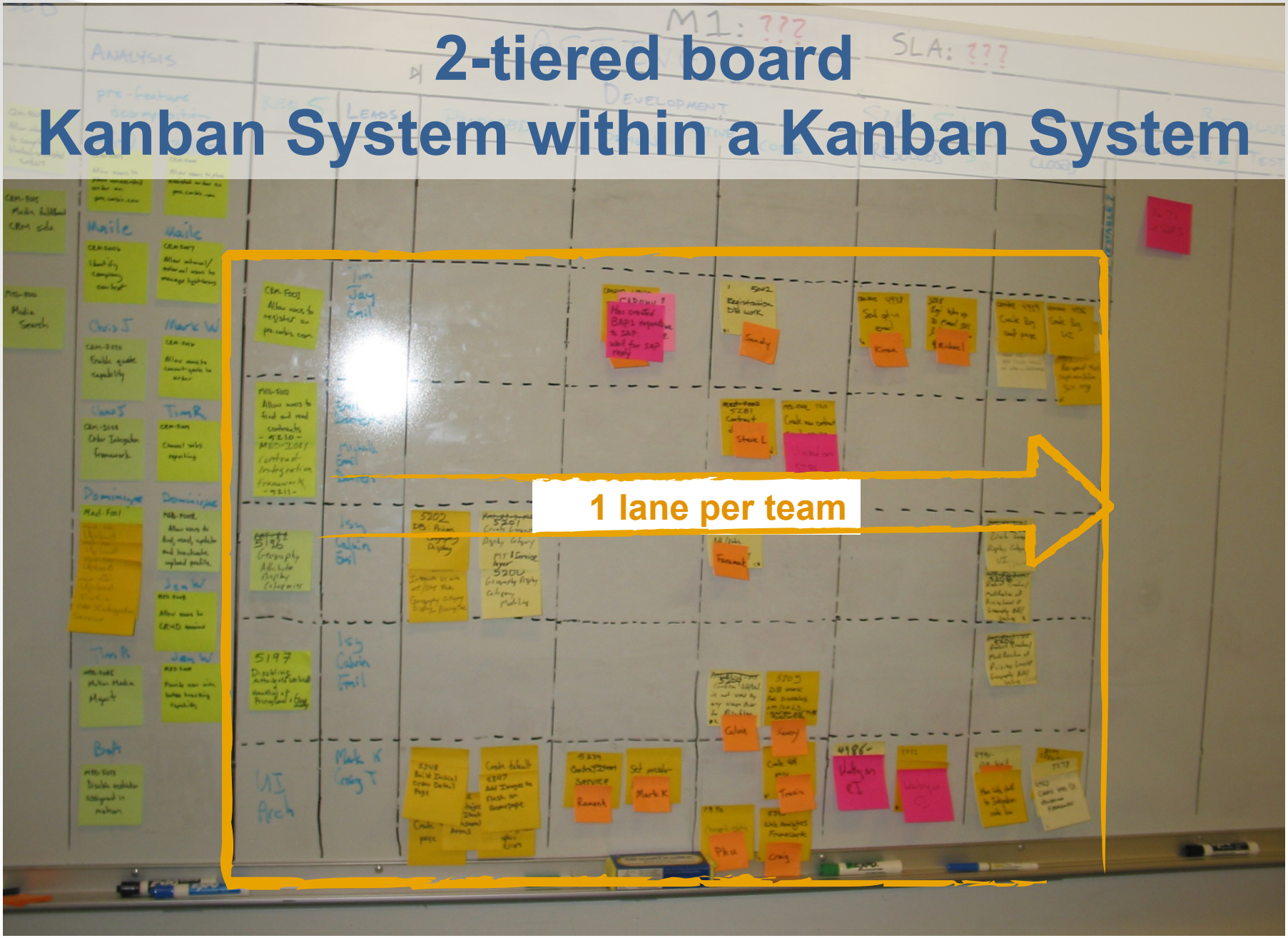
2-tiered board
Kanban System within a Kanban System



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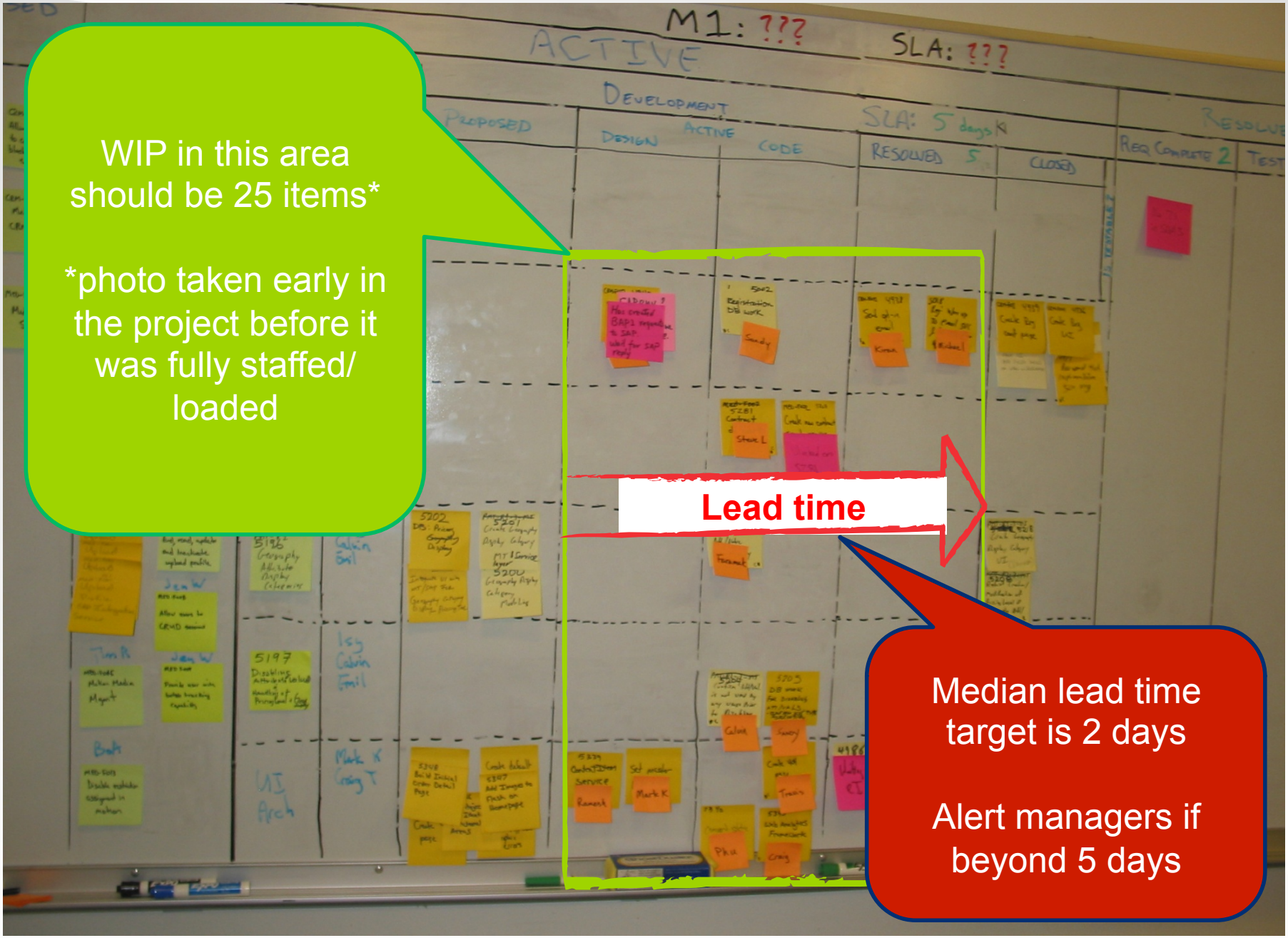

WIP in this area should be 25 items*

*photo taken early in the project before it was fully staffed/ loaded

Median lead time target is 2 days

Alert managers if beyond 5 days

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Risks & Qualitative Assessment

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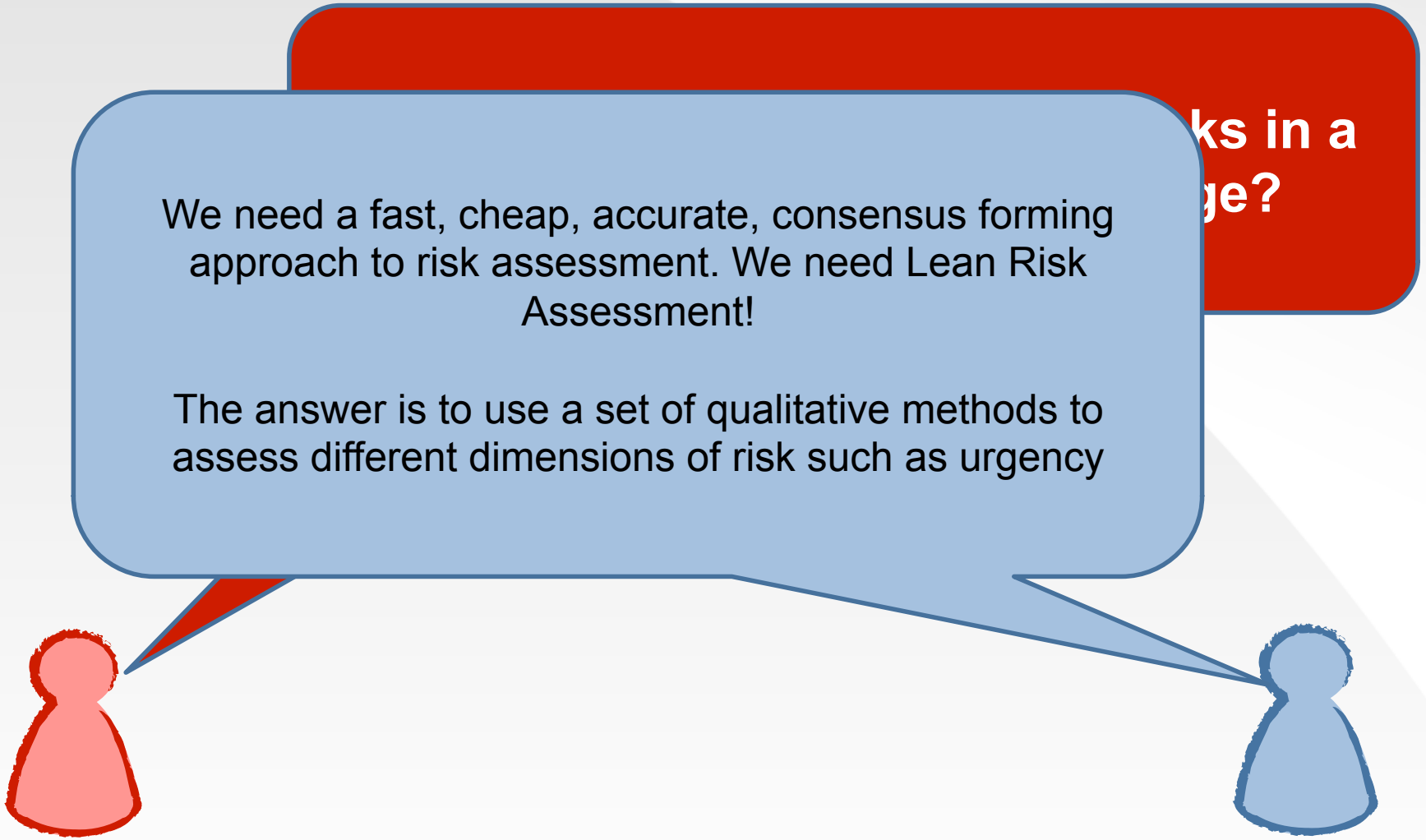
A Lean approach to alignment with business risks uses Qualitative Assessment



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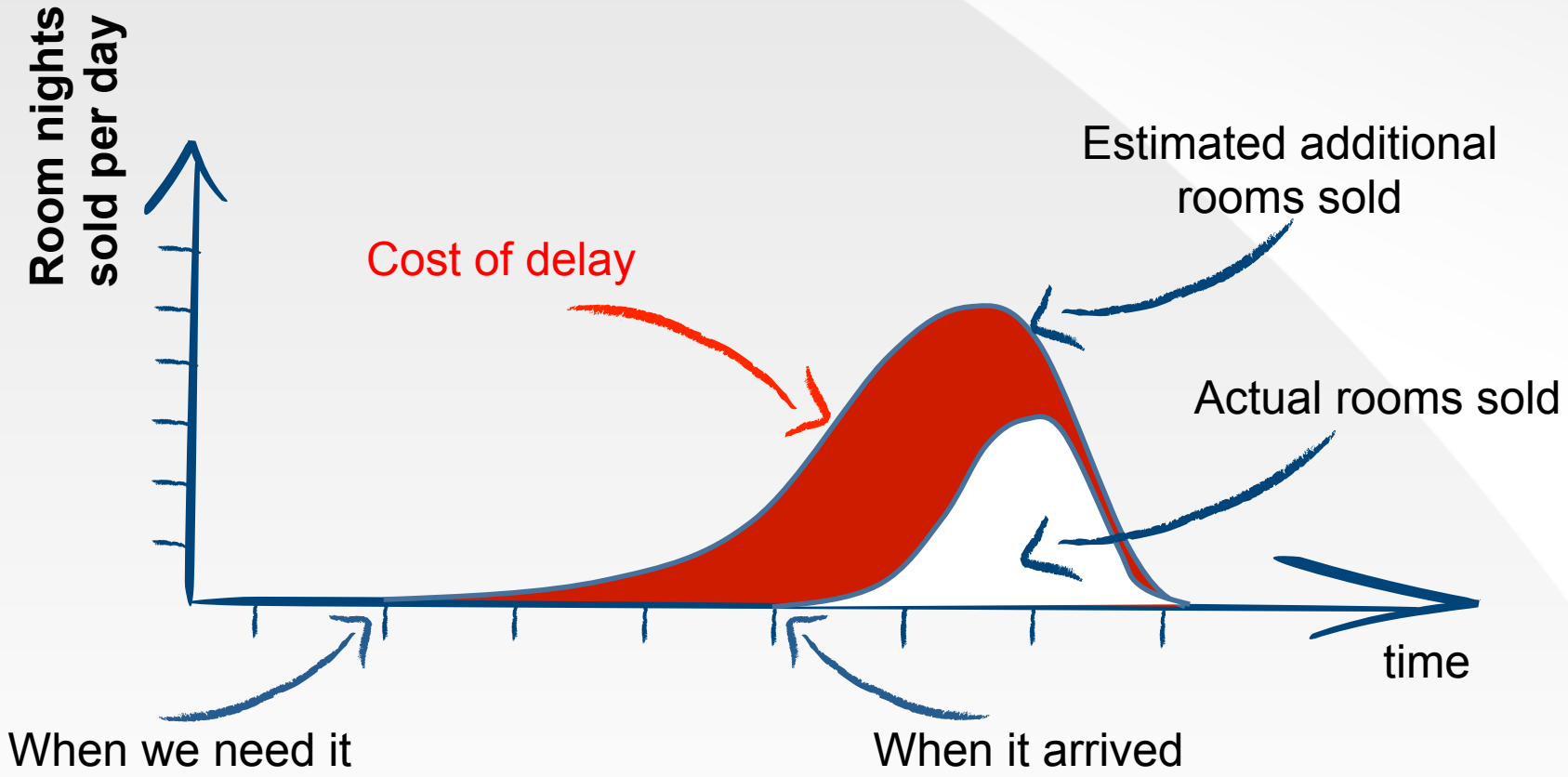
Sketch market payoff function

Cost of delay for an online Easter holiday marketing promotion is difference in integral between the two curves



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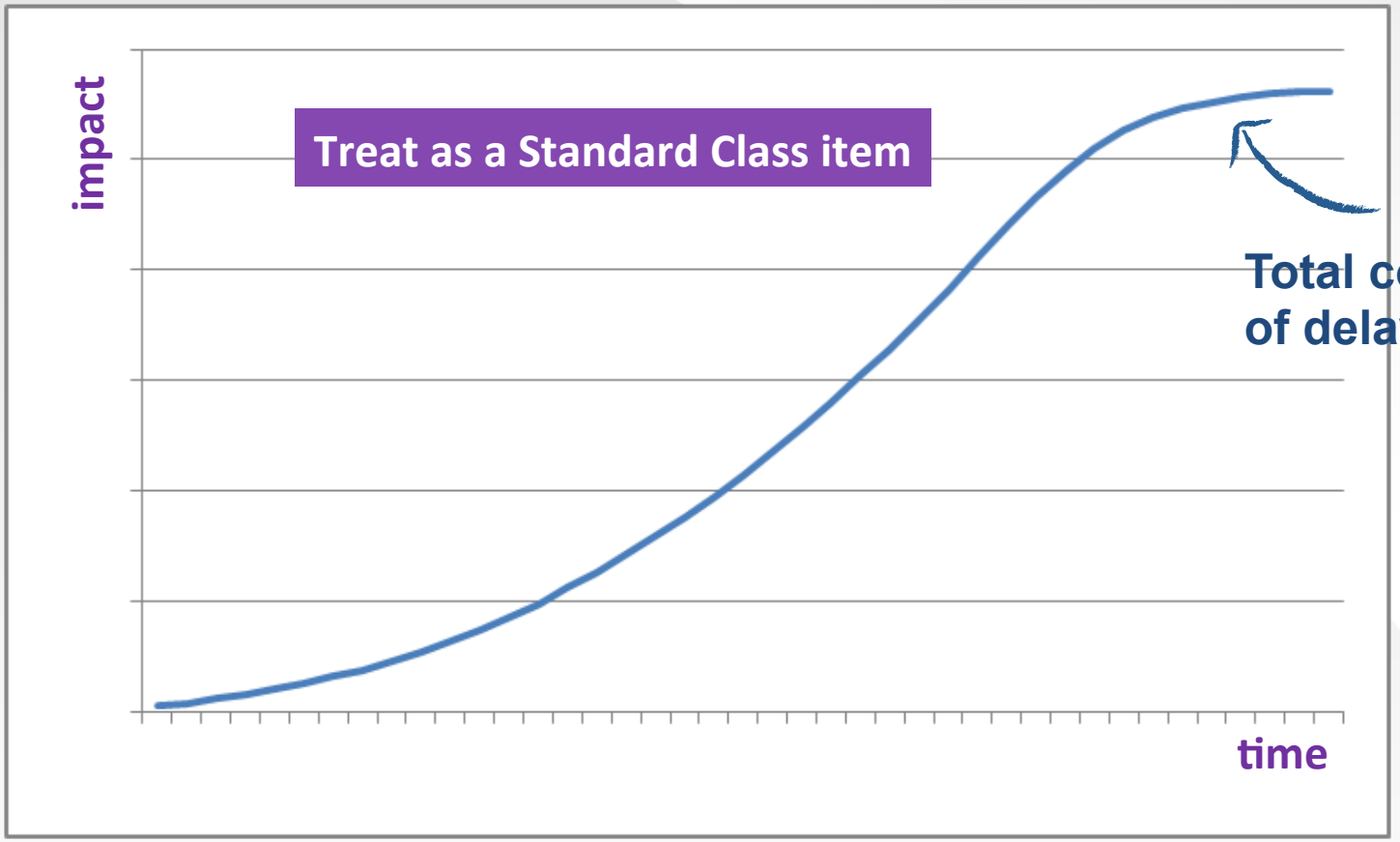
Cost of Delay based on Market Payoff Sketches



Cost of delay function for an online Easter holiday marketing campaign delayed by 1 month from mid-January
(based on diff of 2 integrals on previous slide)

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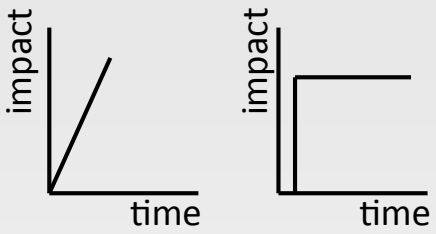
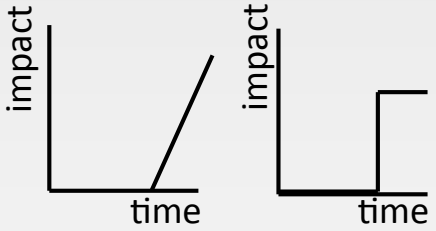
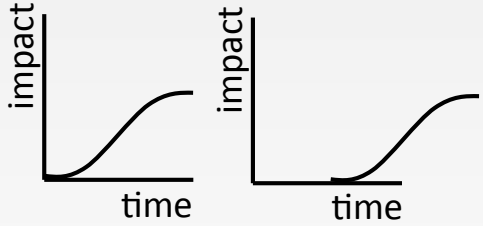
Establish urgency by qualitative matching of cost of delay sketches



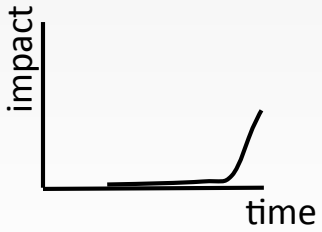
Expedite – critical and immediate cost of delay; can exceed kanban limits (bumps other work)



Fixed date – cost of delay goes up significantly after deadline; Start early enough & dynamically prioritize to insure on-time delivery



Standard - cost of delay is shallow but accelerates before leveling out; provide a reasonable lead-time expectation



Intangible – cost of delay may be significant but is not incurred until much later; important but not urgent

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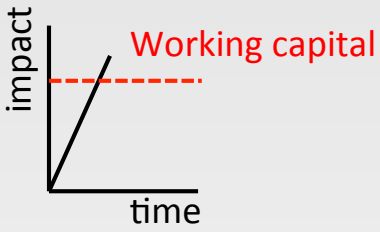
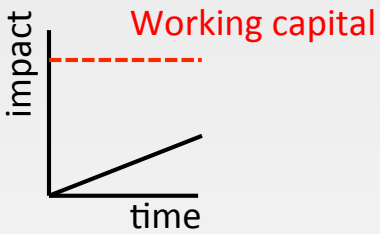
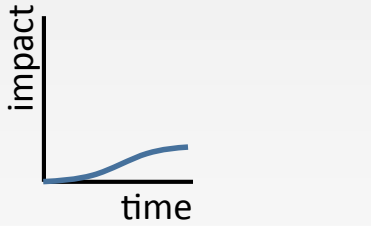
Cost of Delay has a 2nd Dimension



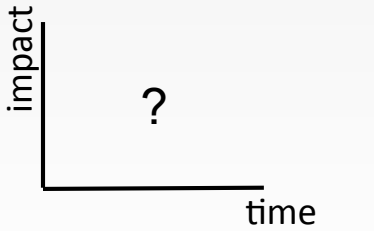
Extinction Level Event – a short delay will completely deplete the working capital of the business



Major Capital – the cost of delay is such that a major initiative or project will be lost from next year's portfolio or additional capital will need to be raised to fund it



Discretionary Spending – departmental budgets may be cut as a result or our business misses its profit forecasts



Intangible – delay causes embarrassment, loss of political capital, affects brand equity, mindshare, customer confidence, etc

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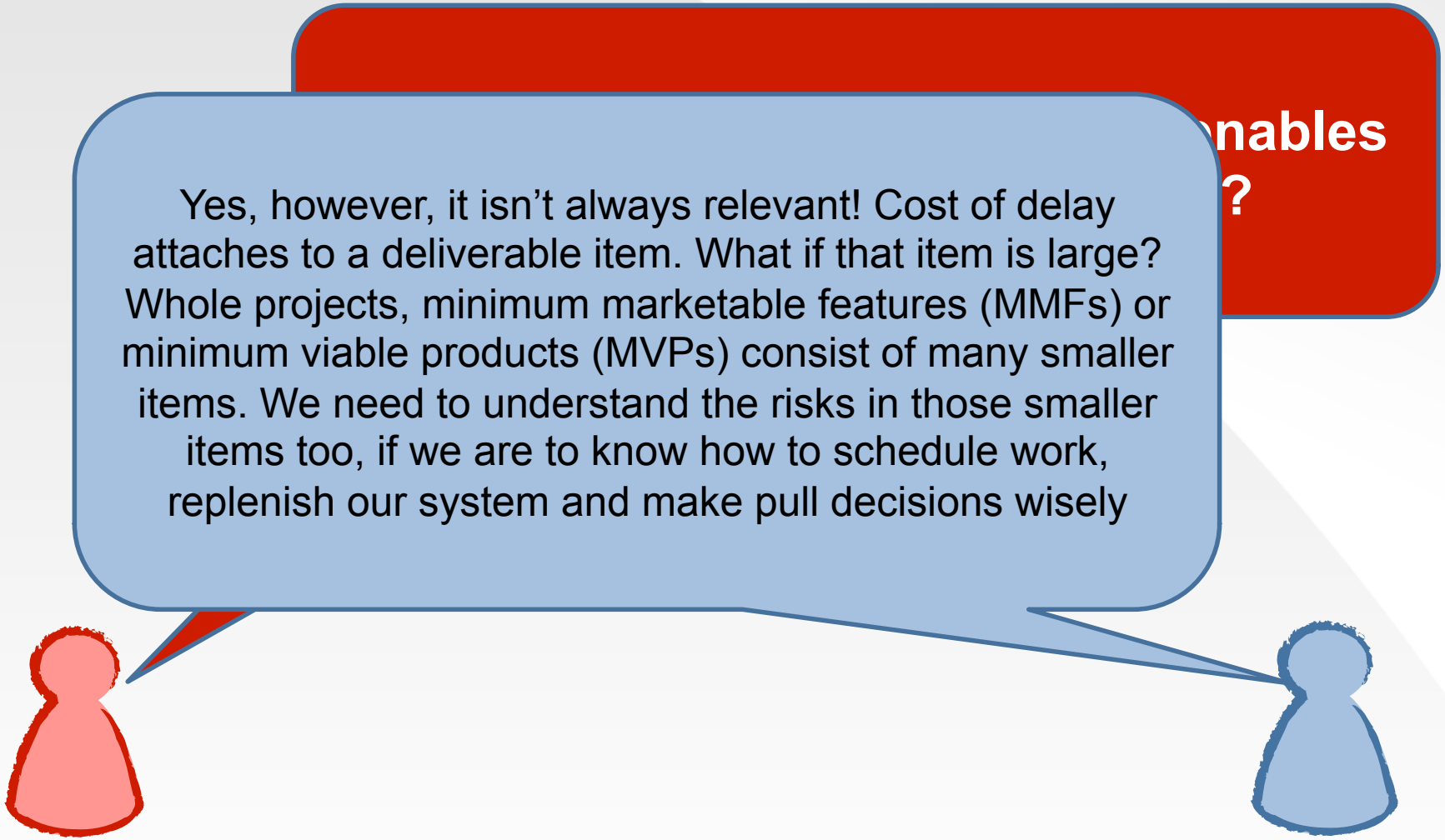
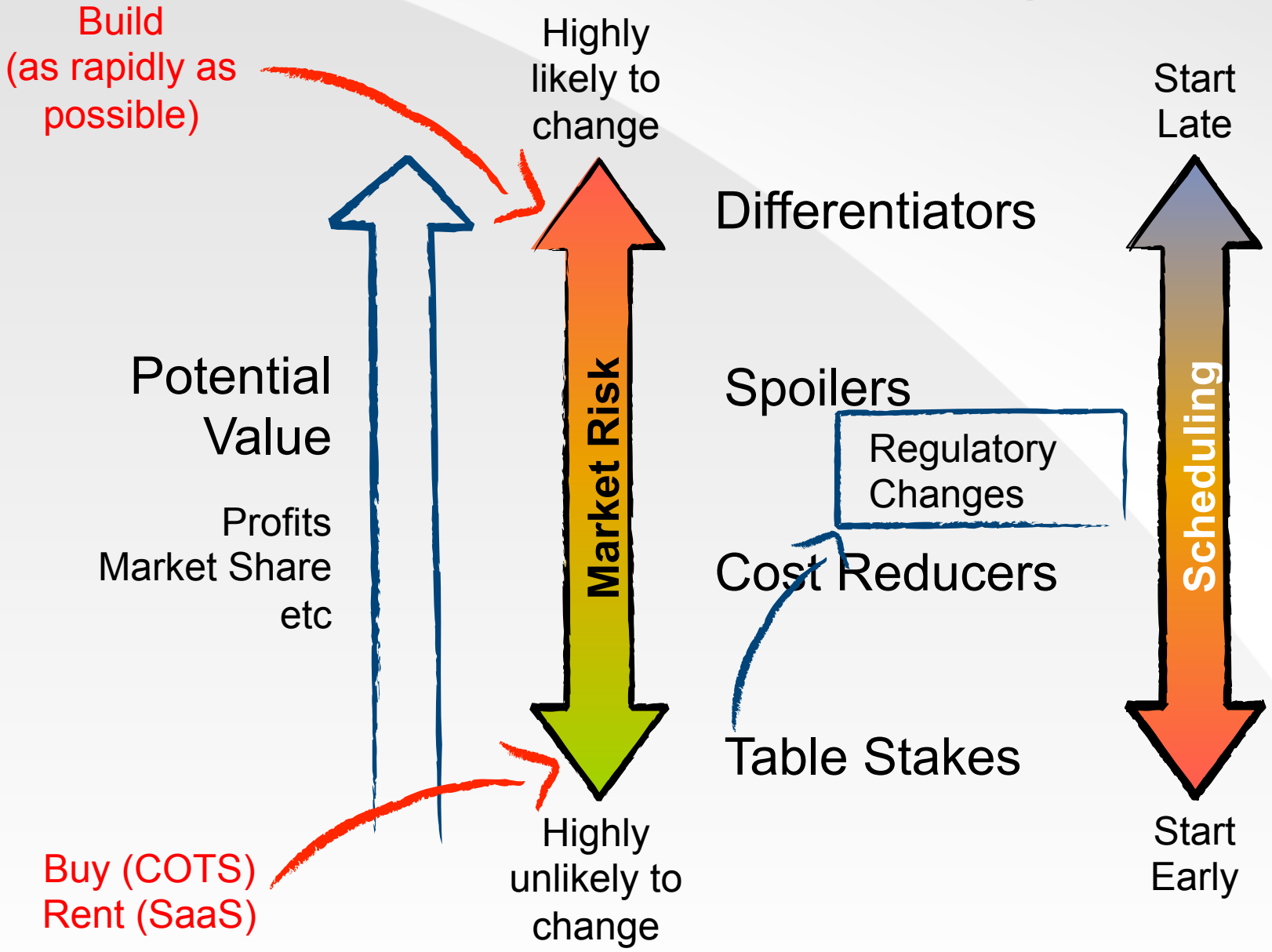
Risk is a multi-dimensional problem



Market Risk of Change



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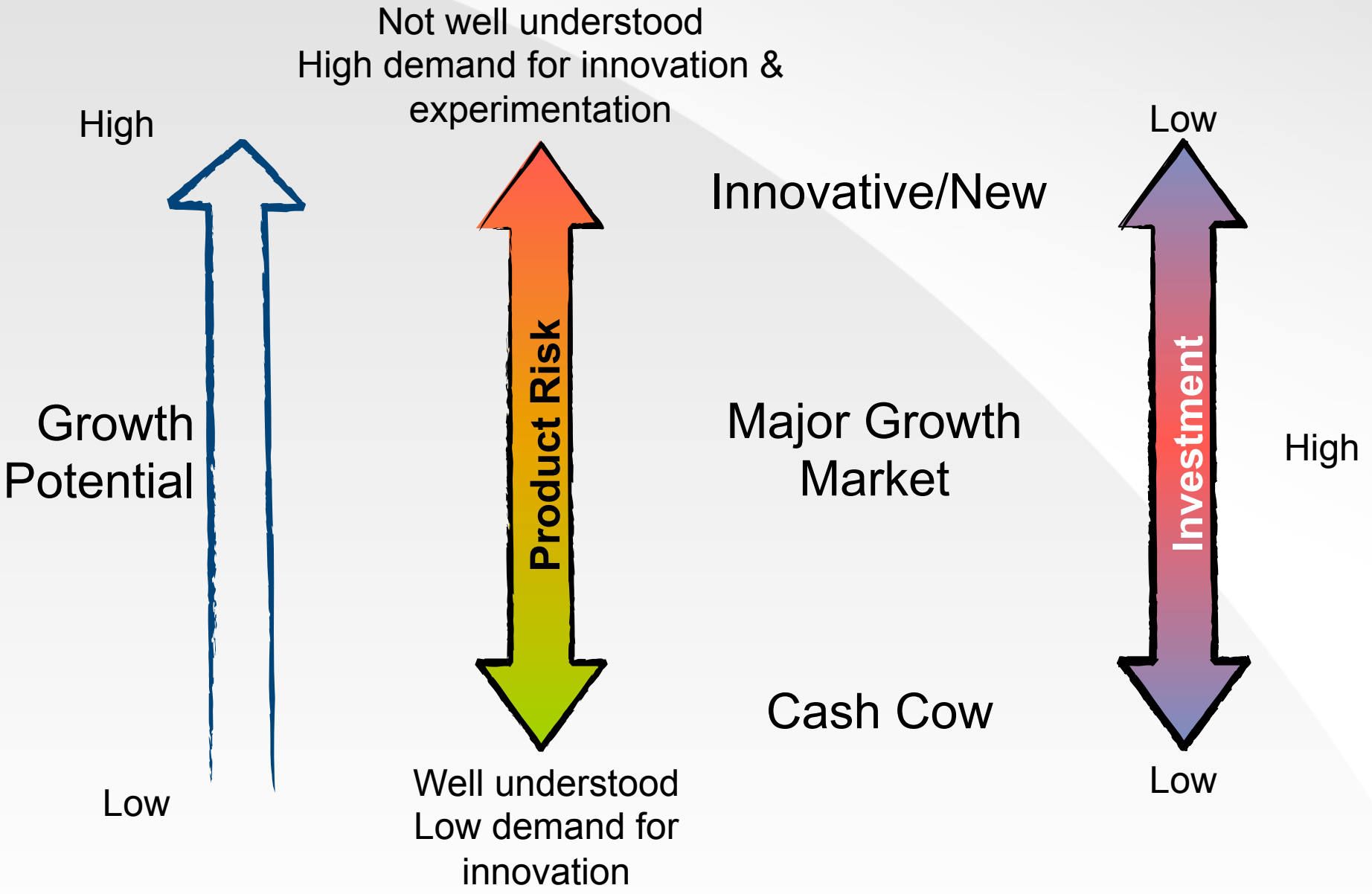
Product Lifecycle Risk



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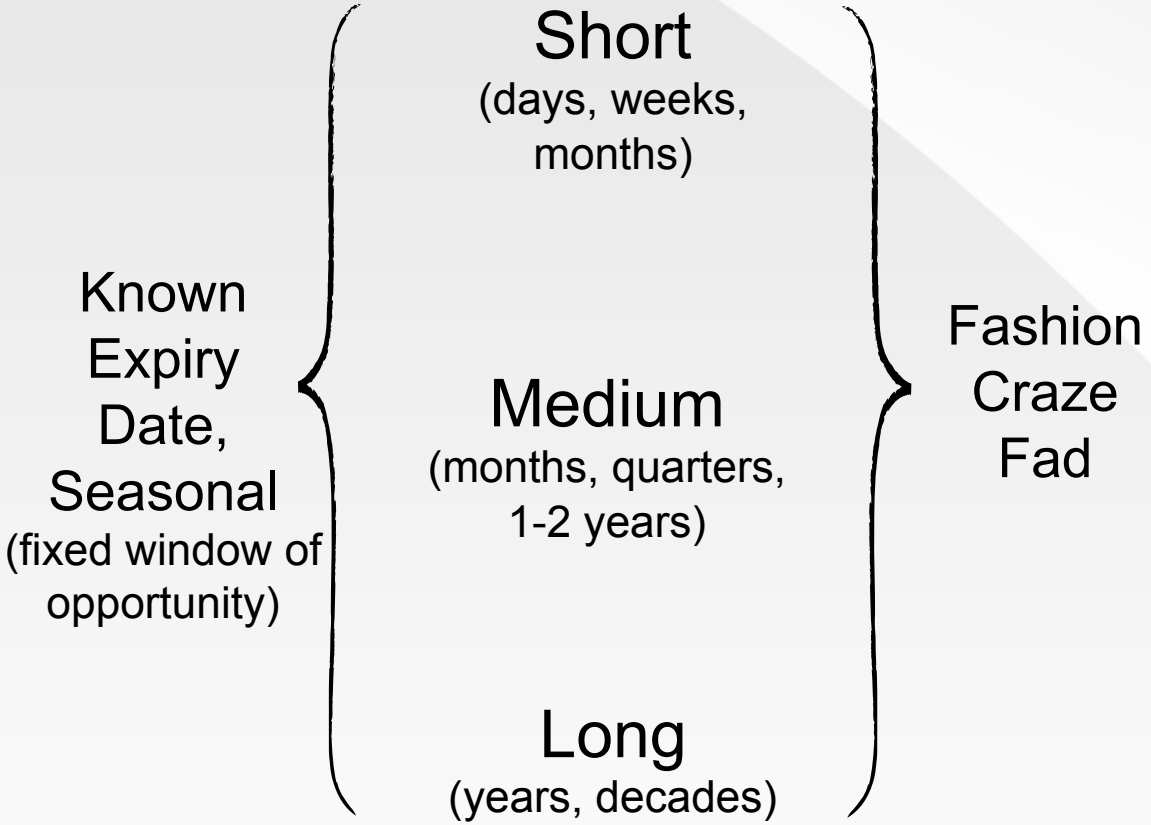
Shelf-Life Risk



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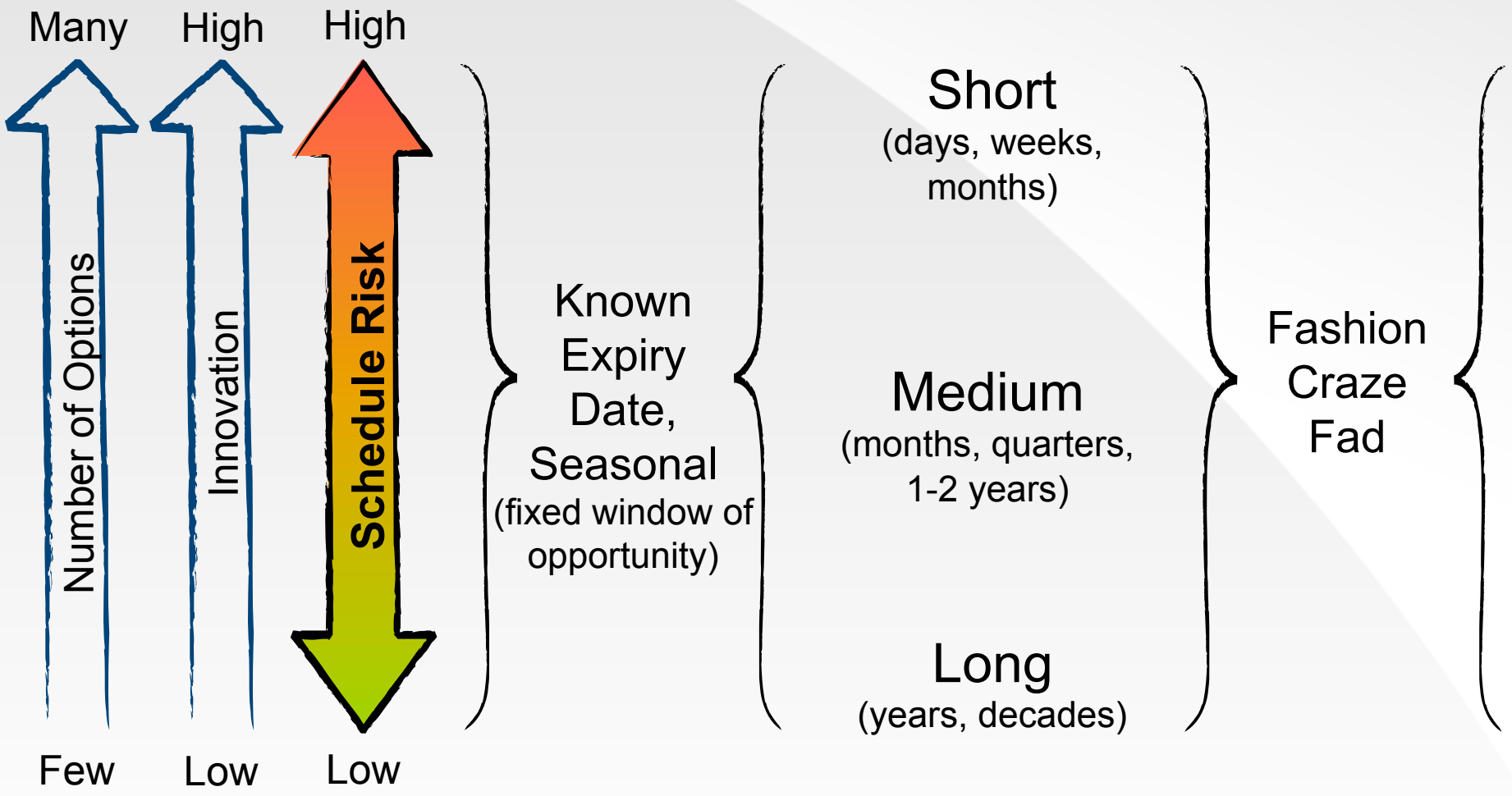
Shelf-Life Risk



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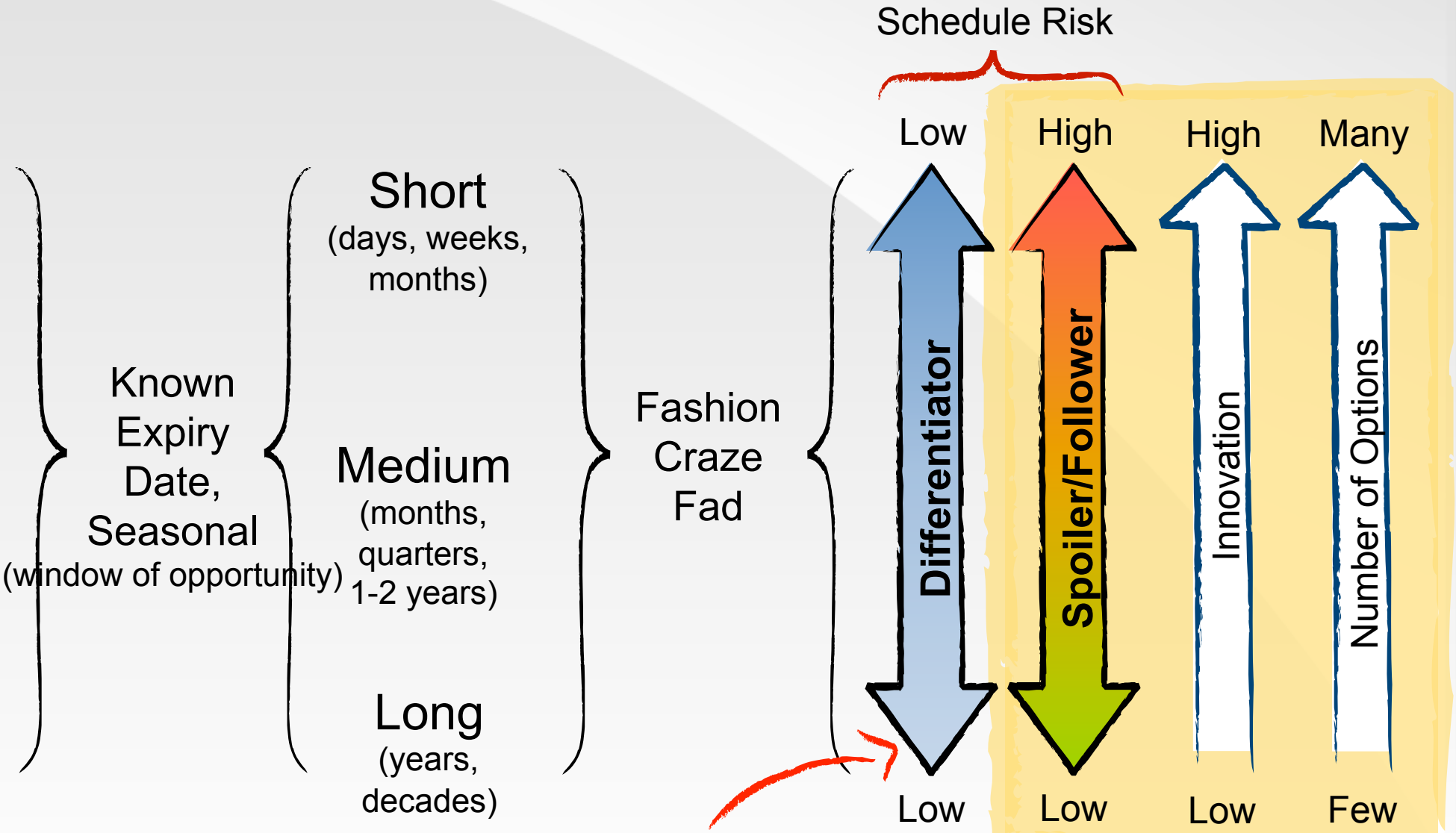
Shelf-Life Risk



If we are market leading our innovations are less time critical

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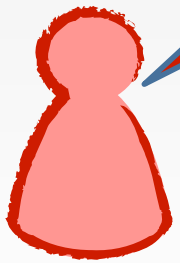
Risk is a multi-dimensional *contextual* problem

These are just useful examples!

for a

We can easily envisage other risk dimensions such as technical risk, vendor dependency risk, organizational maturity risk and so forth.

It may be necessary to run a workshop with stakeholders to explore and expose the real business risks requiring management



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(Just a taste of)

Risk Management with Kanban

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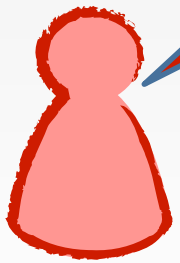
How much risk do you want to take?

Given our current capabilities, our
o-to-
do you

We only have capacity to do so much work. How we allocate that capacity across different risk dimensions will determine how aggressive we are being from a risk management perspective.

The more aggressive we are in allocating capacity to riskier work items the less likely it is that the outcome will match our expectations



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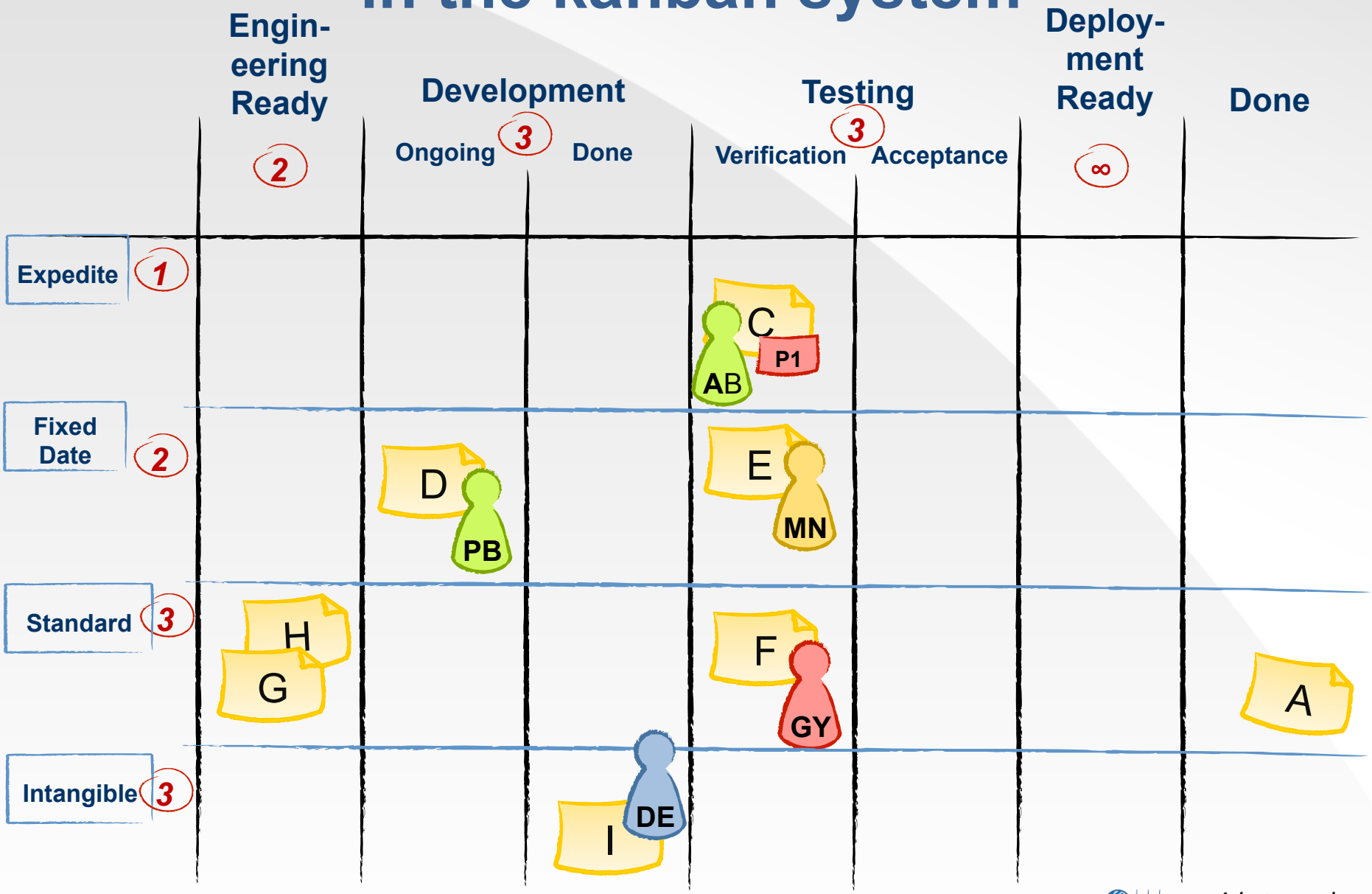
Hedge Delivery Risk by allocating capacity in the kanban system



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Aligning with Strategic Position or Go-to-Market Strategy

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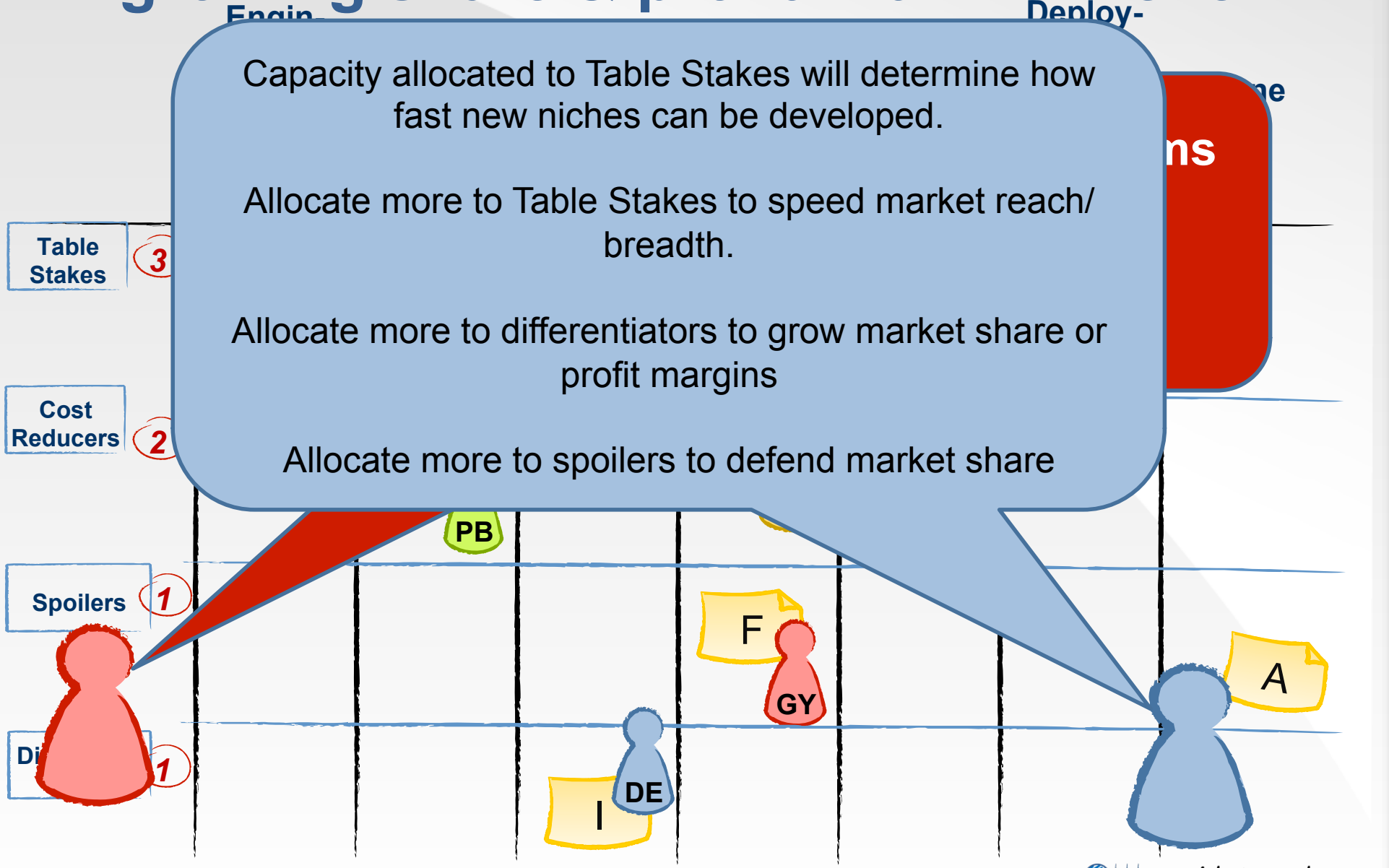
Trade off growing market reach against growing share & profit within a niche



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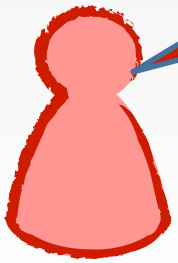
An underlying philosophy of pragmatism

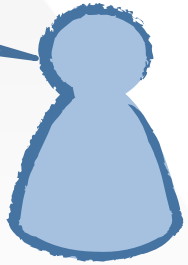
Some simple rules to improve delivery forecasting

1. Limit WIP
2
3
4

Assume that the past is a strong predictor of the future

In low flow efficiency systems, environmental conditions (system factors) outweigh technical performance factors by up to 20 times in determining the outcome. If the environment isn't changing neither should results.





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Prediction based on qualitative risk assessment

Stop Crystal Ball Gazing!

Do not speculate!

Do not "estimate" the size, weight, complexity of an item. Instead qualitatively assess the risks inherent in a work item

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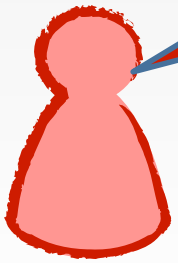
Some simple rules to improve risk management

1. **Establish a list of risks that are applicable in your business domain**
2.
3.
4.

Cost of delay, shelf-life, product adoption lifecycle, market risk of change

All can be established as (soft*) facts. Risks associated with different classifications within these risk dimensions are understood and the dynamics of how they might affect an outcome are predictable



* Where hard facts cannot be established by measurement or market research, a strong consensus opinion is achieved

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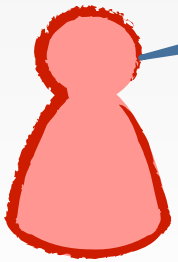
Prediction based on qualitative risk assessment

For example, if we load our entire capacity with fixed delivery date demand then it is highly likely that some items will be delivered late and we will incur a (significant) cost of delay

Allocate capacity to hedge risks

5. Our key strategy to manage risk is to allocate capacity in accordance with our capability, risk tolerance and business risks under management
6. Set kanban limits across risk categories
7. Allow the kanban to signal what type of risk item to pull next



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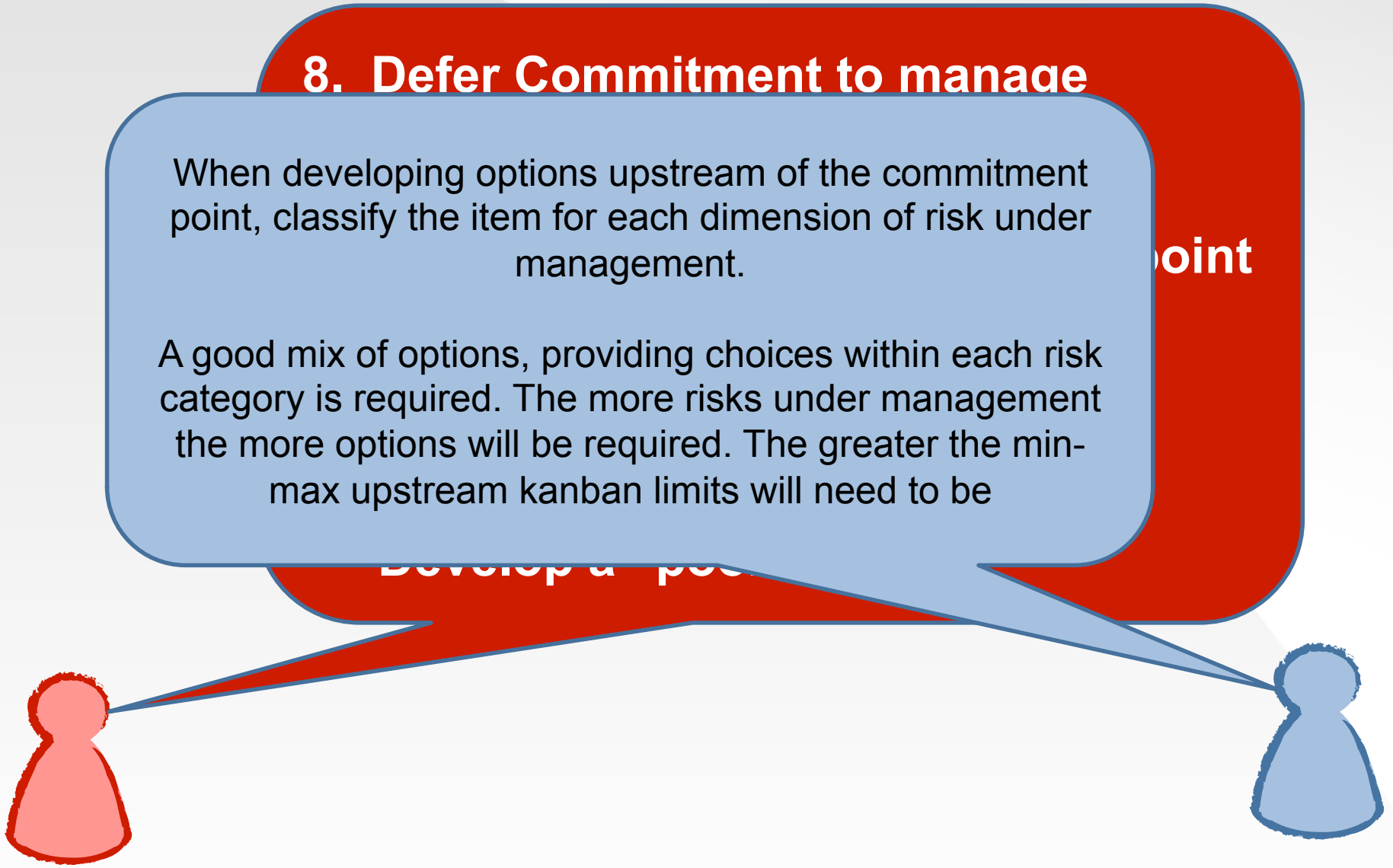
Defer Commitment. Banish Backlogs

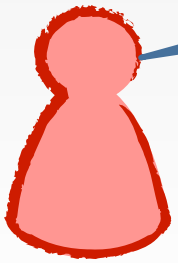


Abandon Prioritization. Banish Priority

11.Prioritization is waste!

Priority is a proxy variable for real business risk information.

Do not mask risk behind a proxy. Enable better governance and better decision making by exposing the business risks under management throughout the workflow



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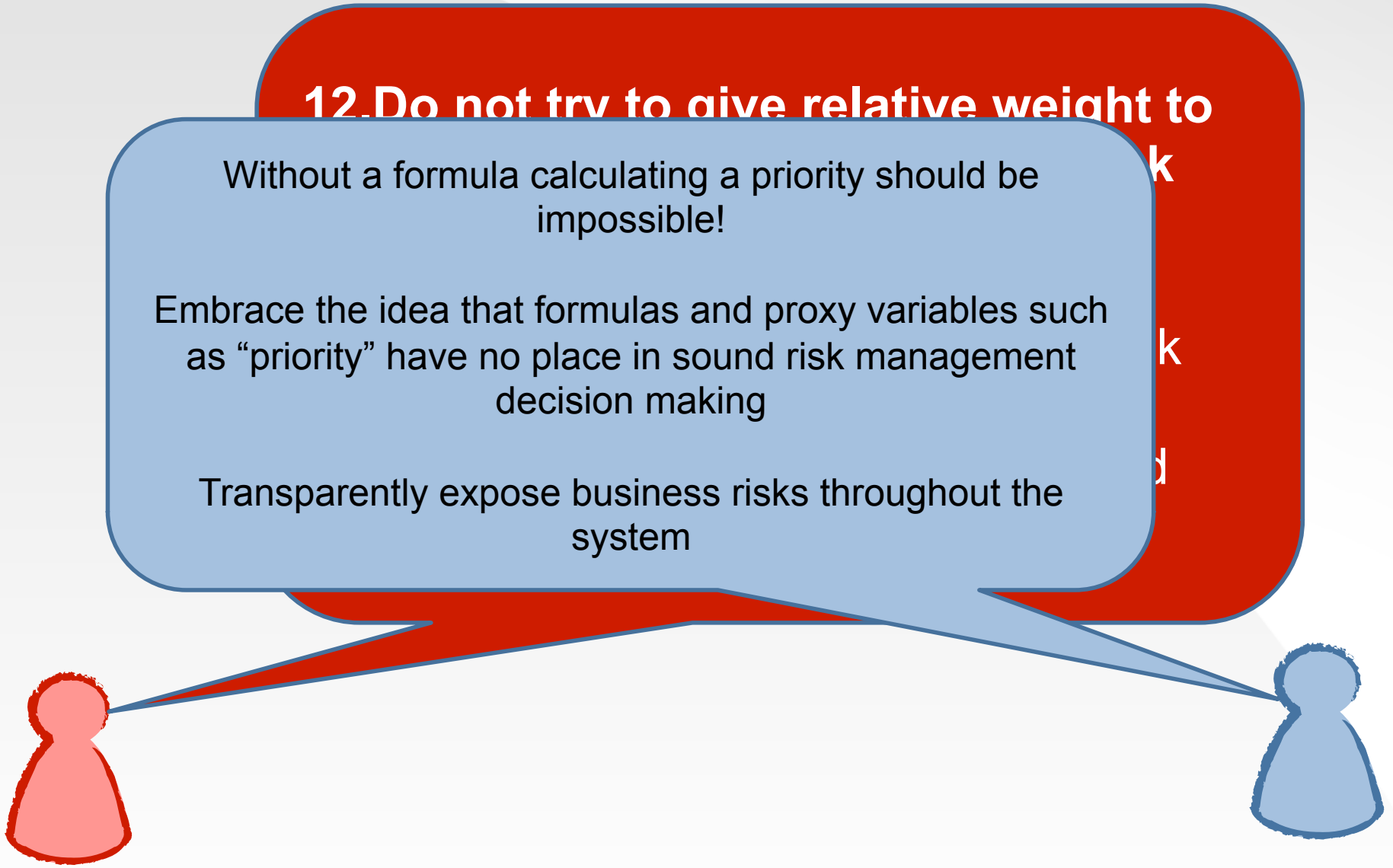
Abandon Formulas & Calculations



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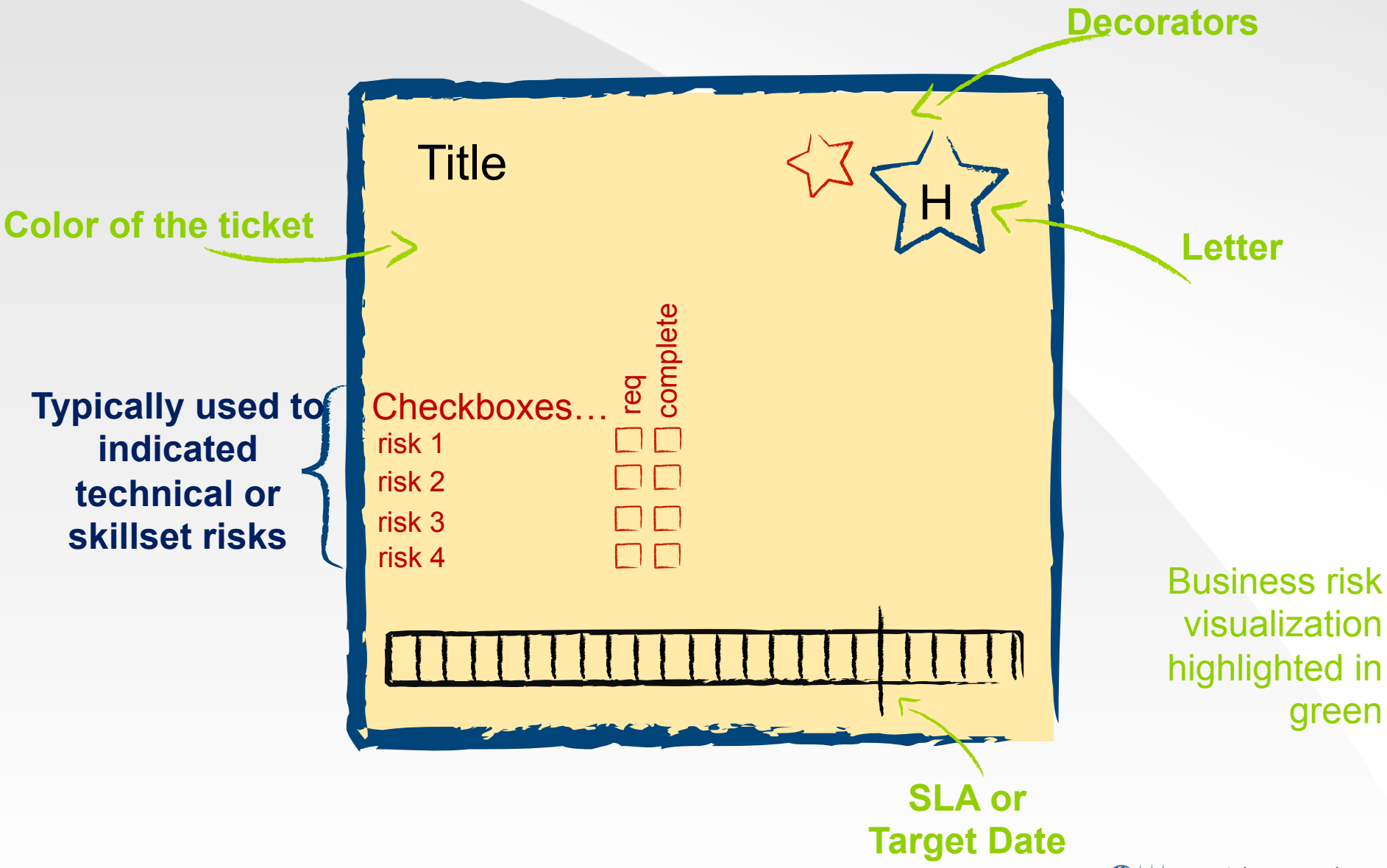
Visualize Risks on the Ticket



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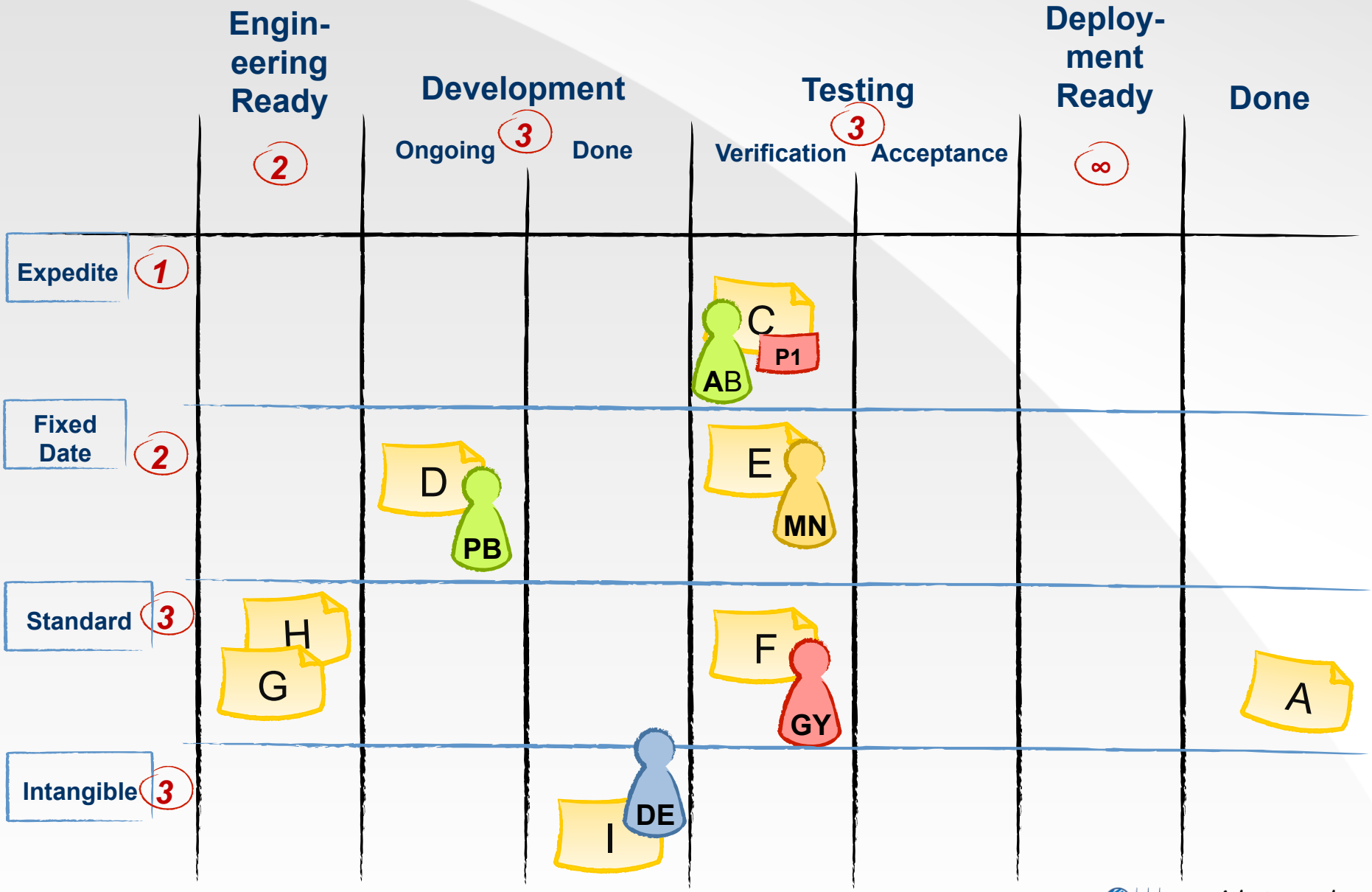
Visualize Risks on the Board



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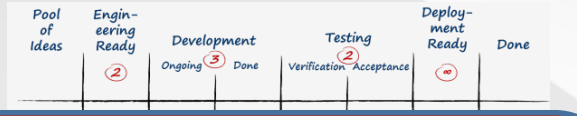
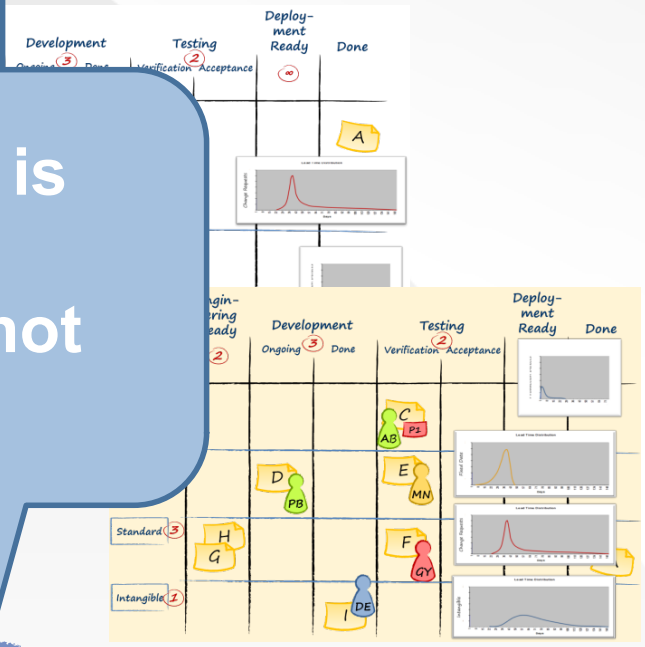
Conclusions

Focus on Sources of Delay



In low flow efficiency systems, focusing on sources of delay – queues, blocking issues, rework

Lead time performance is strongly biased to environmental factors, not technical capabilities



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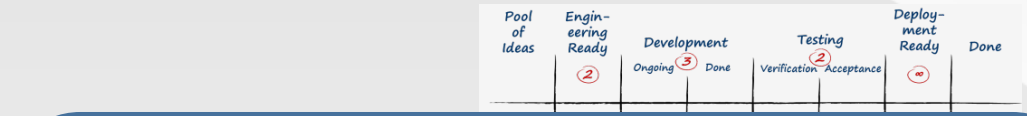
Forecast Probabilistically



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Abandon Cartesian decomposition and speculative attempts to deterministically estimate size, complexity or level of effort

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Qualitative Approaches are Lean

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Stop speculating about business value and ROI. Instead assess real risks and design kanban systems to manage them!

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Kanban enables more predictable delivery and better risk management

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Exploit predictability in delivery with qualitative risk management.

Stop Crystal Ball Gazing!

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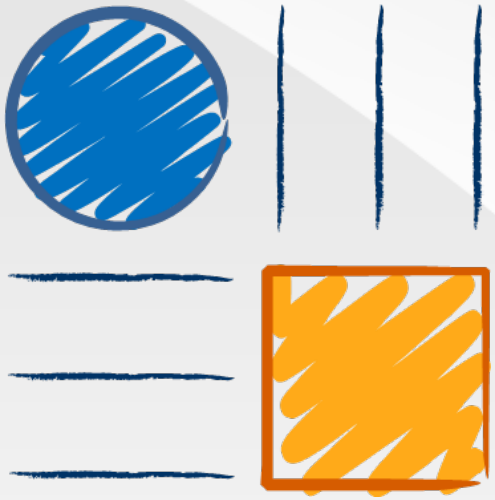

Thank you!

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About

David Anderson is a thought leader in managing effective software teams. He leads a consulting, training and publishing and event planning business dedicated to developing, promoting and implementing sustainable evolutionary approaches for management of knowledge workers.

He has 30 years experience in the high technology industry starting with computer games in the early 1980's. He has led software teams delivering superior productivity and quality using innovative agile methods at large companies such as Sprint and Motorola.

David is the pioneer of the **Kanban Method** an agile and evolutionary approach to change. His latest book is published in June 2012, **Lessons in Agile Management** – *On the Road to Kanban.*

David is a founder of the **Lean Kanban University**, a business dedicated to assuring quality of training in Lean and Kanban for knowledge workers throughout the world.

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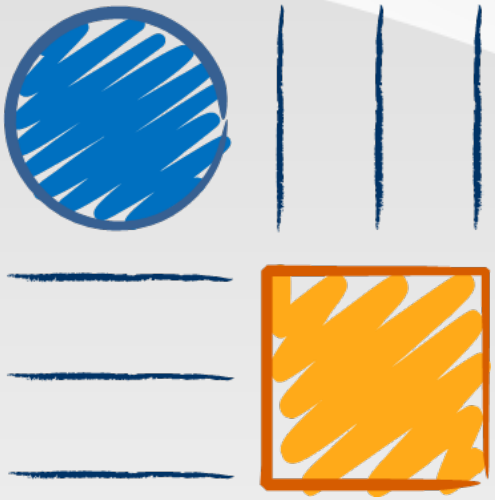
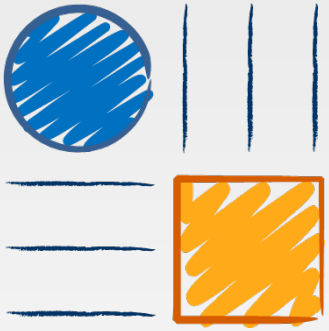


Acknowledgements

Donald Reinertsen directly influenced the adoption of virtual kanban systems and the assessment of cost of delay & shelf-life as criteria for scheduling work into a kanban system.

Daniel Vacanti helped with a deeper understanding of Little's Law and the long term planning approach. **Troy Magennis** has been inspiring with his work on probabilistic planning, risk management and Monte Carlo simulation.

I borrowed the term "Stop Crystal Ball Gazing" from **Chris Matts**.



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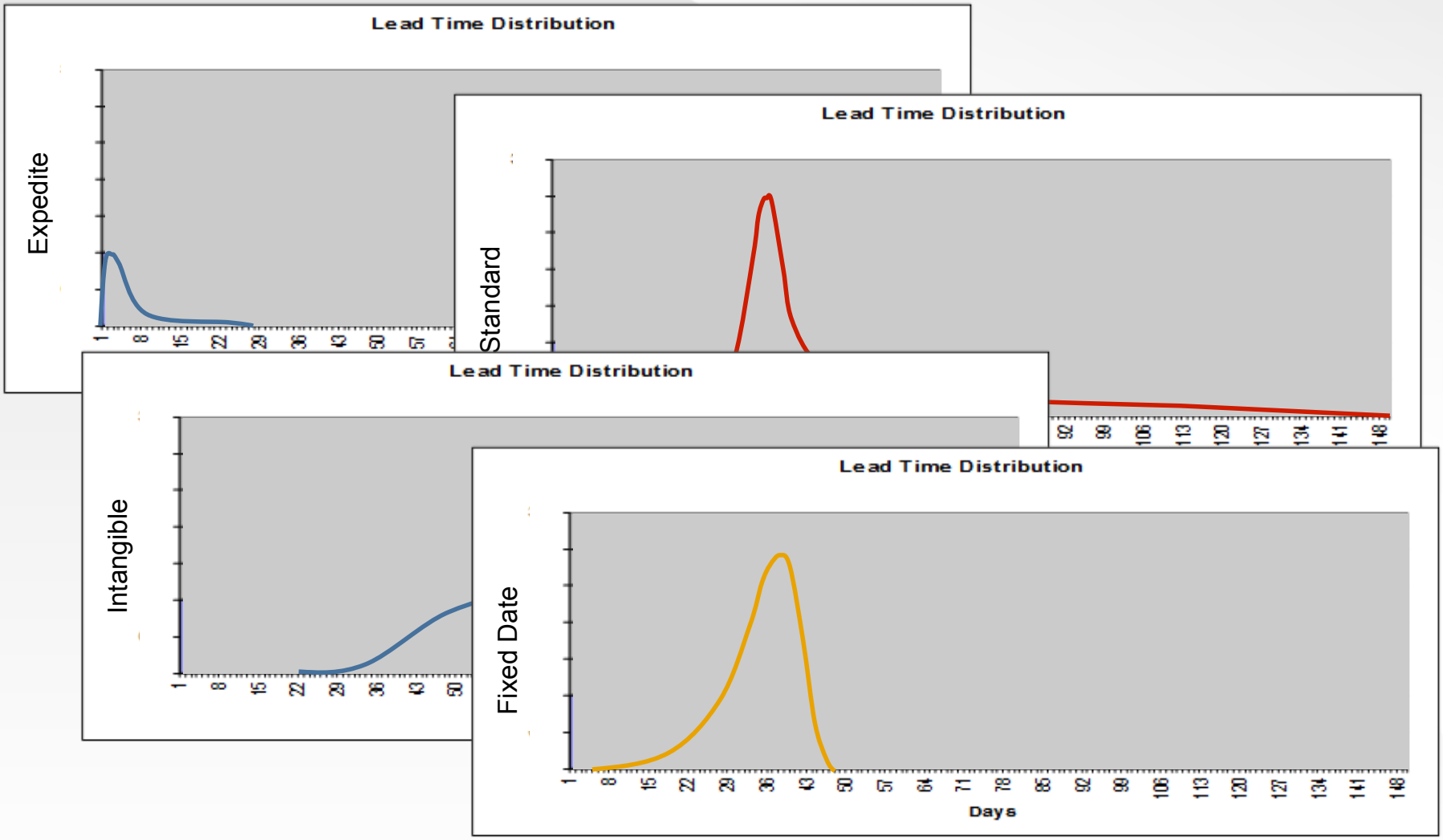
Appendix

Example Distributions



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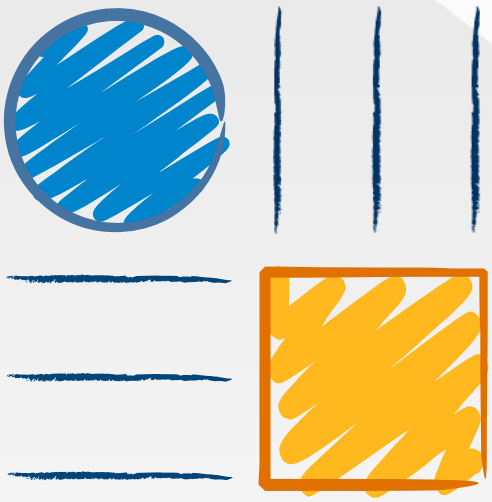
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