

# Data Driven Coaching

Safely turning team data into coaching insights  
(Troy Magennis)

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Diamond Sponsors

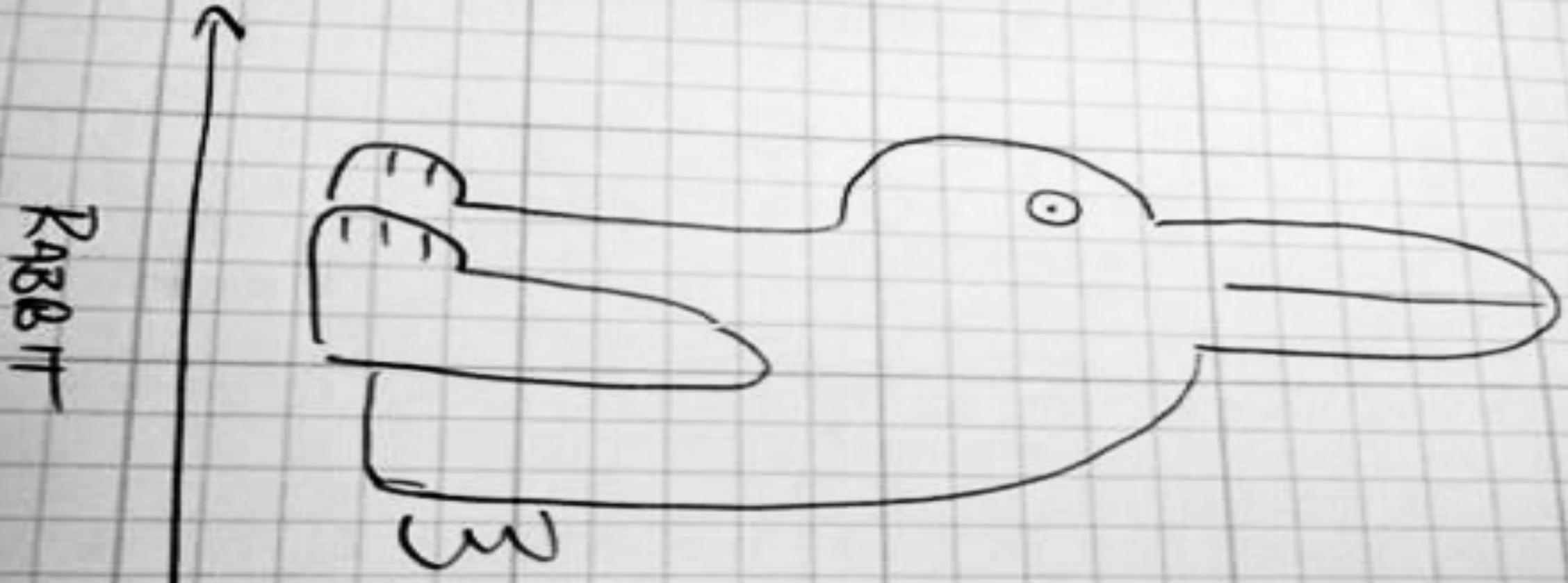


Gold Sponsors



Media Sponsor





If it walks like a duck, and quacks like a duck,  
it could still be a rabbit.

DUCK

Data is  
E V I L



**Being judged  
unfairly is  
un-bearable...**

**Never coerce  
Never embarrass**





Make a difference,  
not just make a point

# Use data to tell a story...



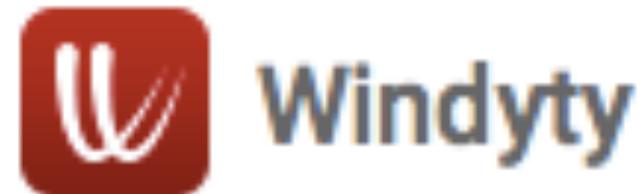
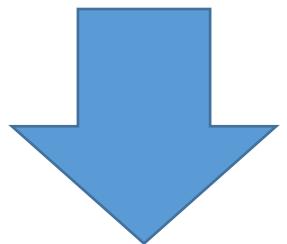
**Without a  
story, data  
is boring...**



STATION,STATION\_NAME,ELEVATION,LATITUDE,LONGITUDE,DATE,TMAX,TMIN,PRCP  
GHCND:USC00327027,PETERSBURG 2 N ND US,466.3,48.0355,-98.01,20100101,-178,-311,0  
GHCND:USC00327027,PETERSBURG 2 N ND US,466.3,48.0355,-98.01,20100102,-244,-322,0  
GHCND:USC00327027,PETERSBURG 2 N ND US,466.3,48.0355,-98.01,20100103,-194,-289,0  
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GHCND:USC00327027,PETERSBURG 2 N ND US,466.3,48.0355,-98.01,20100131,-150,-272,0



# NOAA



Ivo

Search location...

Windyty

TOOLS SETTINGS



animation info

GFS13km NAM5km

Wind

ALTITUDE

150hPa 13.5km FL450

200hPa 11.7km FL390

250hPa 10km FL340

300hPa 9000m FL300

350hPa 8000m FL260

450hPa 6000m FL200

550hPa 4800m FL160

700hPa 3000m FL100

750hPa 2400m 8000ft

850hPa 1500m 5000ft

900hPa 900m 3000ft

925hPa 750m 2500ft

950hPa 600m 2000ft

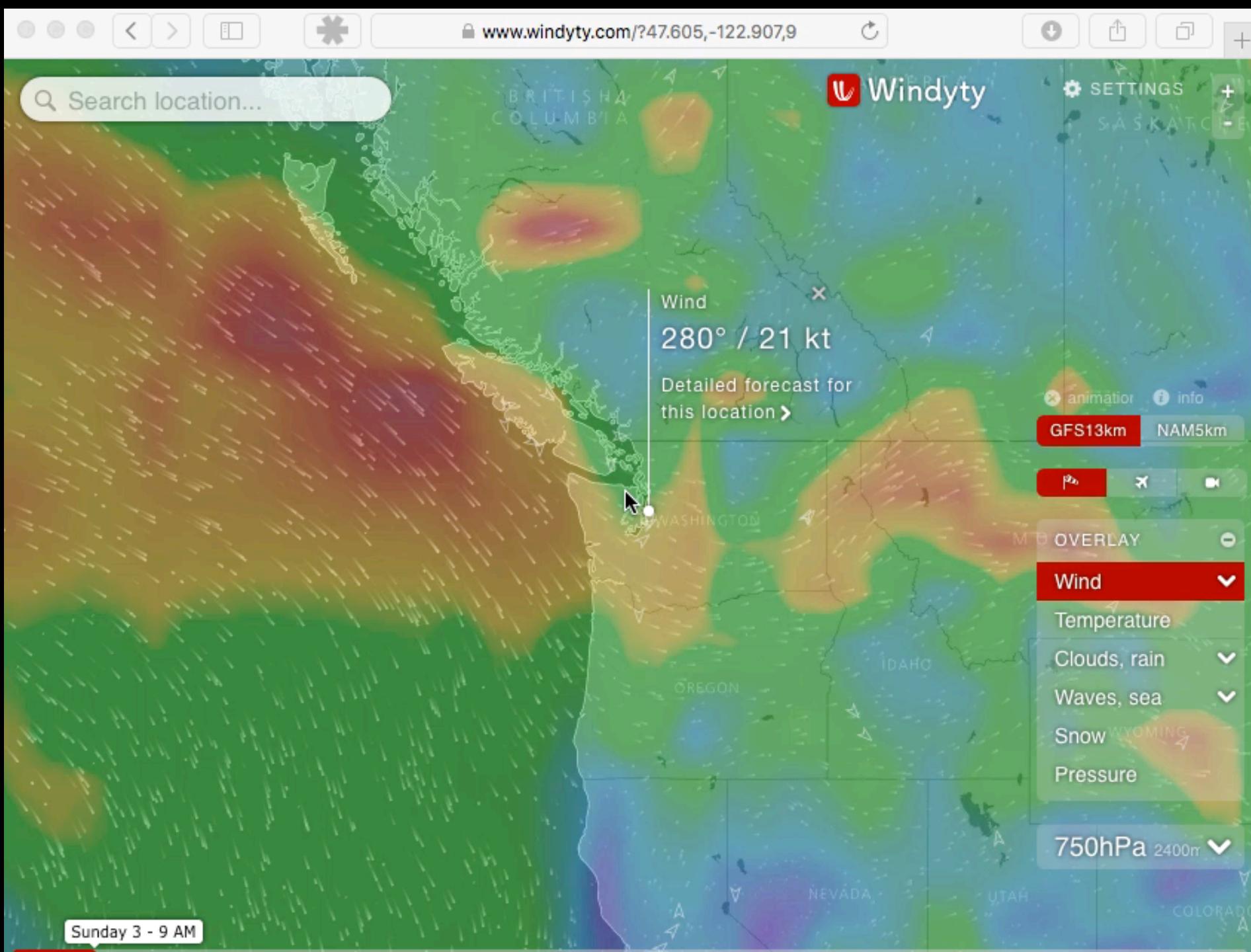
975hPa 300m 1000ft

Surface

Available for: Wind,  
Temperature, Humidity

WindyTy.com

Monday 27 - 12 PM

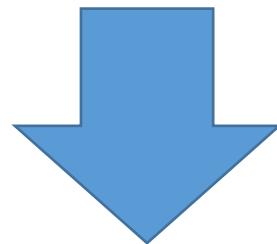


WindyTy.com

A	B	C	D	E	F	G
1	Weekly Poliomyelitis Case reports for Washington					
2	Data provided by Project Tycho, Data Version 1.0.0, released 28 November 2013.					
3	YEAR	WEEK	WASHINGTON			
855	1943	17	1			
856	1943	18	0			
857	1943	19	0			
858	1943	20	2			
859	1943	21	-			
860	1943	22	-			
861	1943	23	3			
862	1943	24	1			
863	1943	25	0			
864	1943	26	3			
865	1943	27	0			
866	1943	28	-			
867	1943	29	-			
868	1943	30	2			
869	1943	31	5			
870	1943	32	13			
871	1943	33	20			
872	1943	34	25			
873	1943	35	19			
874	1943	36	7			
875	1943	37	27			
876	1943	38	22			
877	1943	39	19			
878	1943	40	30			
879	1943	41	28			
880	1943	42	24			
881	1943	43	37			
882	1943	44	15			
883	1943	45	8			
884	1943	46	30			
885	1943	47	-			
886	1943	48	3			
887	1943	49	7			
888	1943	50	-			



University of Pittsburgh



## THE WALL STREET JOURNAL.



### Battling Infectious Diseases in the 20th Century: The Impact of Vaccines

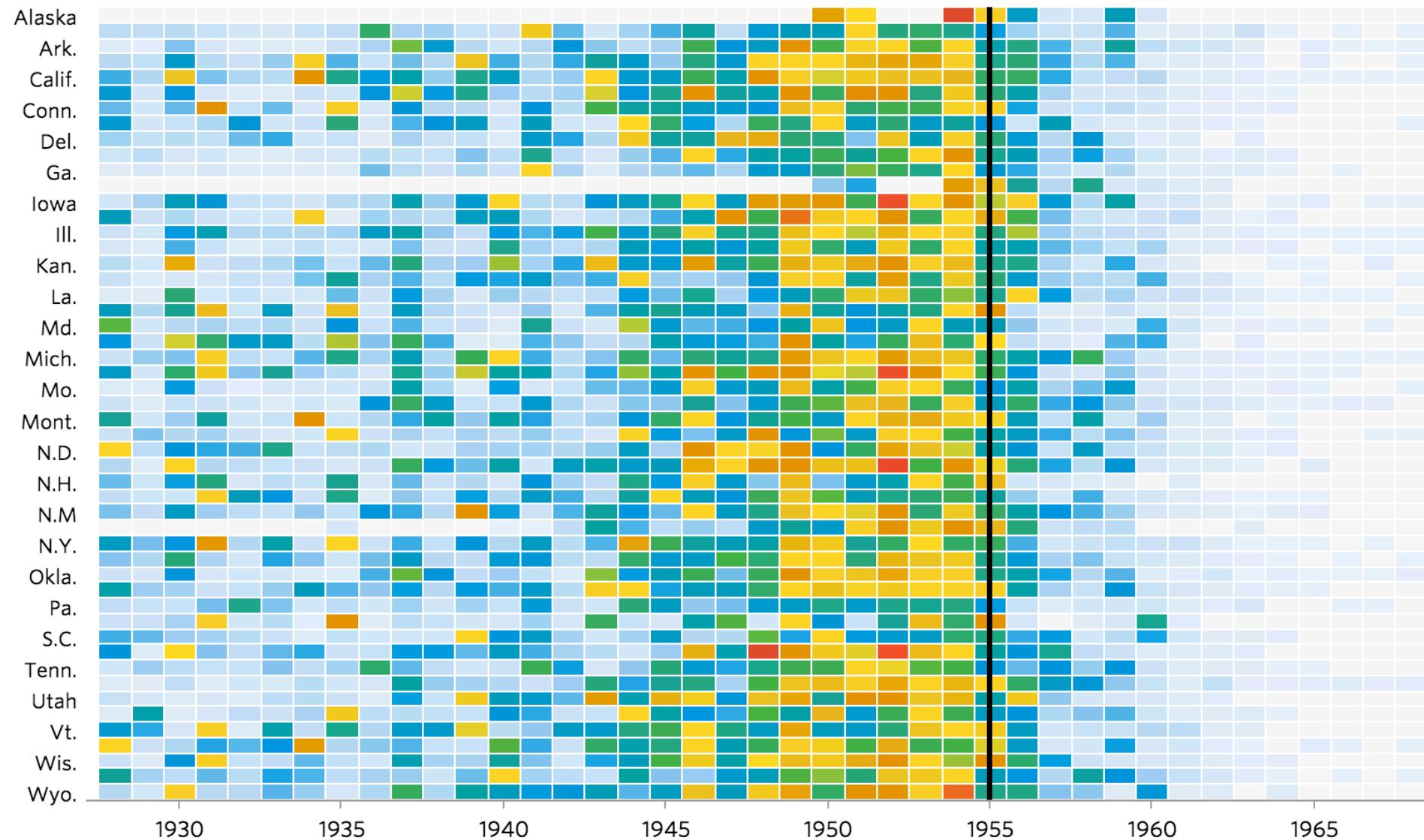
By [Tynan DeBold](#) and [Dov Friedman](#)

Published Feb. 11, 2015 at 3:45 p.m. ET

The number of infected people, measured over 70-some years and across all 50 states and the District of Columbia, generally declined after vaccines were introduced.

# Polio

Polio Vaccine Introduced



THE WALL STREET JOURNAL.

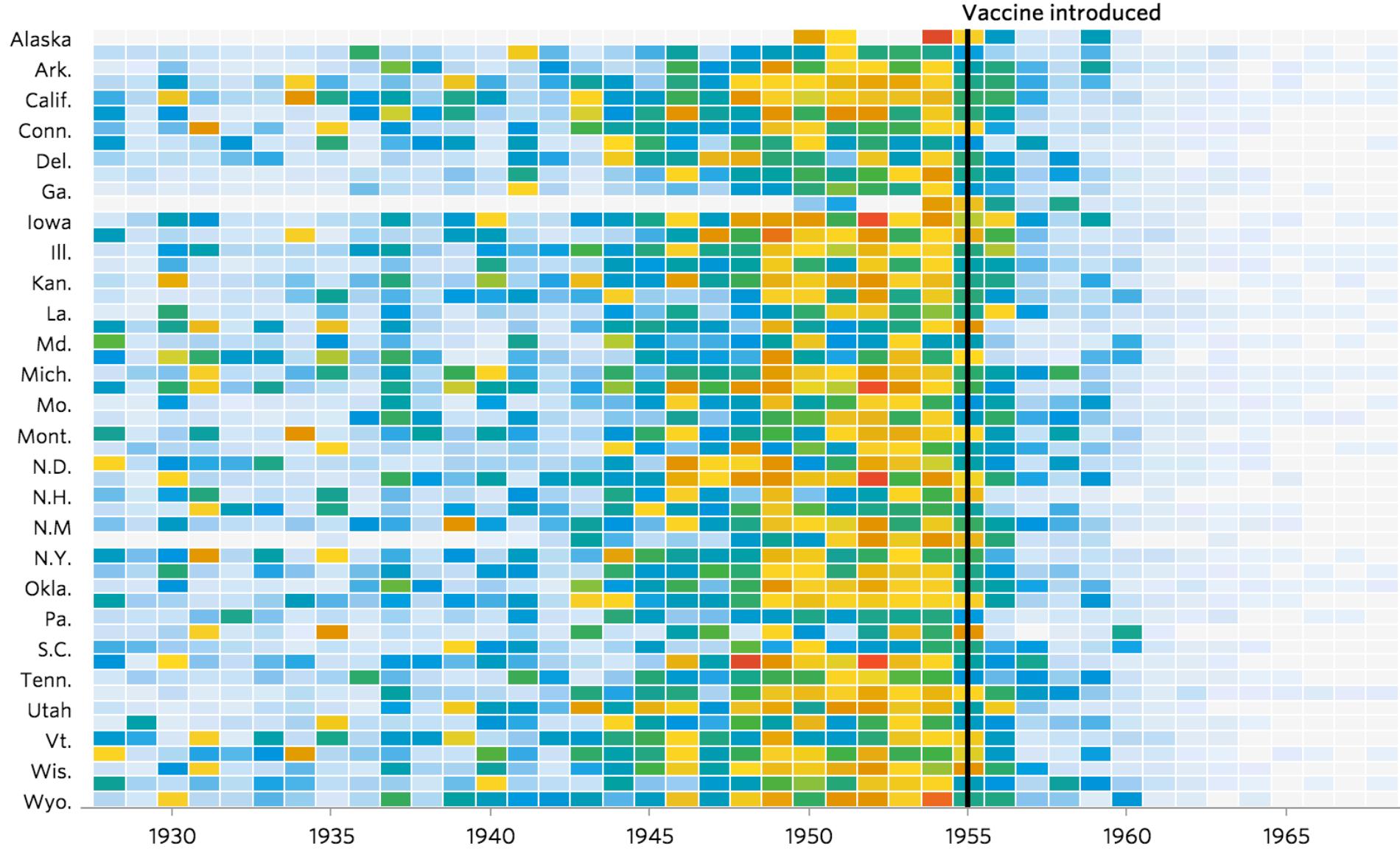
A black and white photograph of a man with short, wavy hair, wearing a dark suit jacket over a light-colored shirt. He is looking slightly to his left with a thoughtful expression. In his right hand, he holds a newspaper, which is partially visible. The background is a plain, light-colored wall.

**Compared  
To What?**

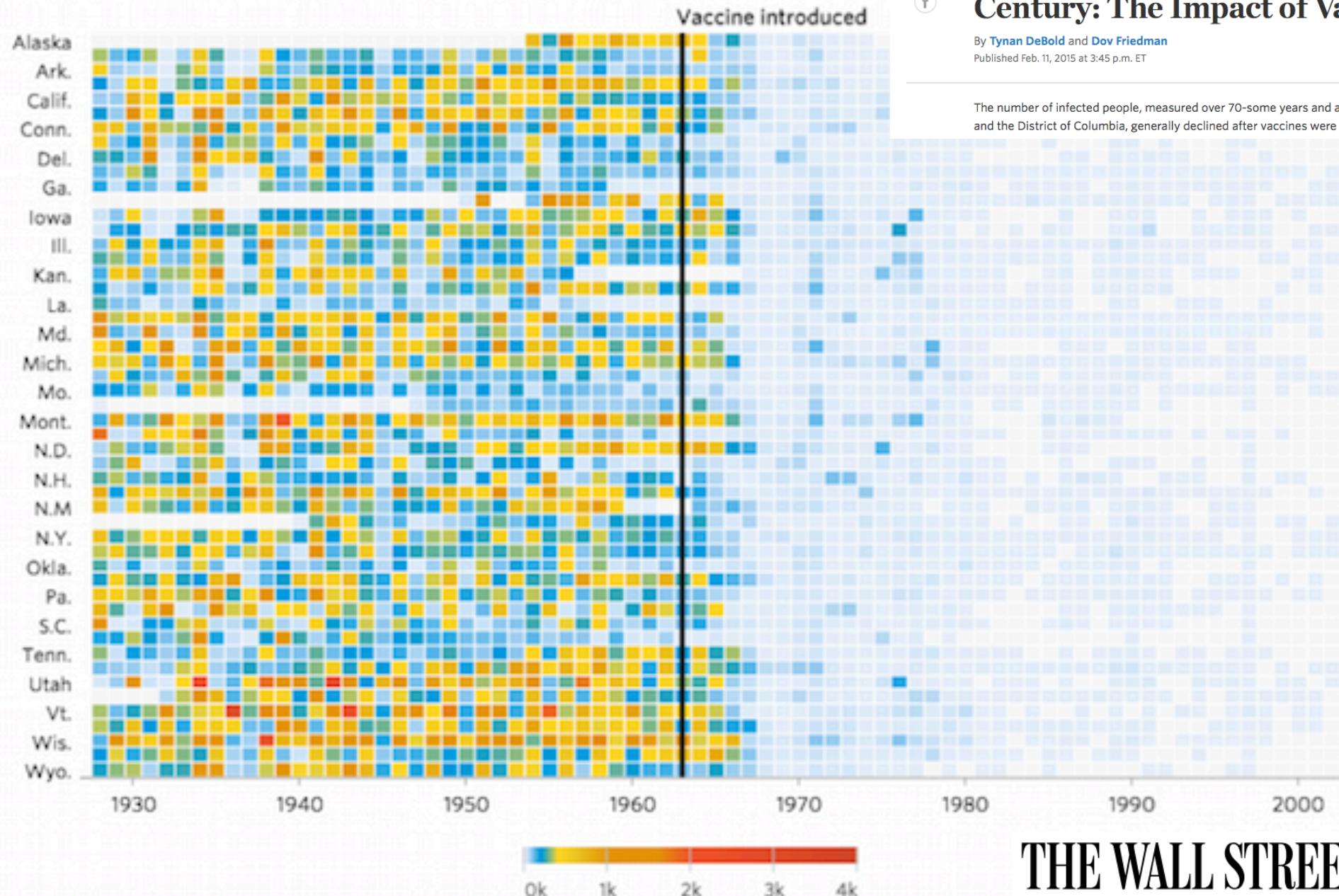
# States of the US

## Polio

## Events



# Measles



## Battling Infectious Diseases in the 20th Century: The Impact of Vaccines

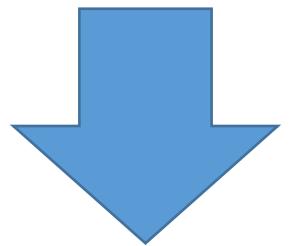
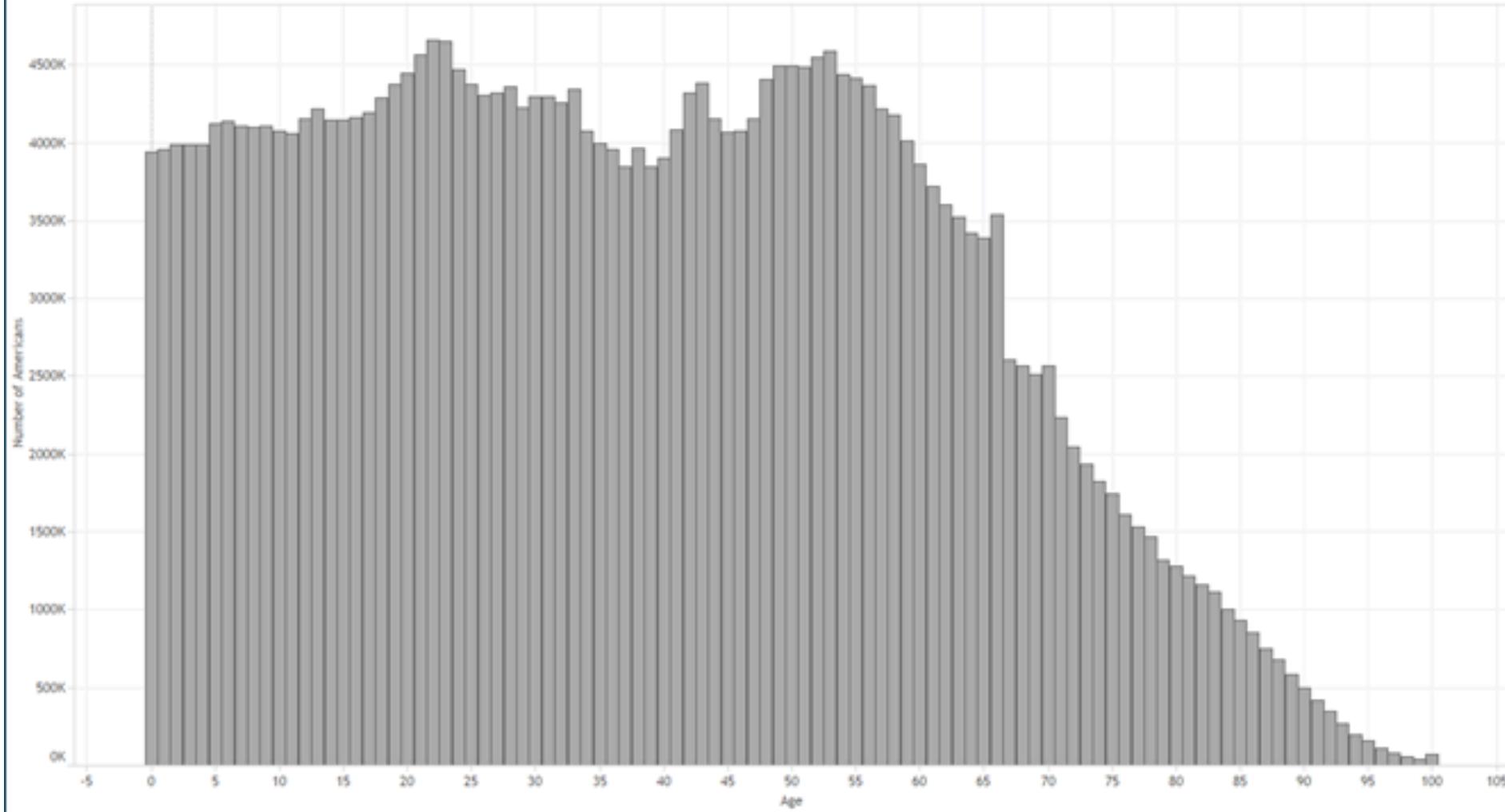
By Tynan DeBold and Dov Friedman

Published Feb. 11, 2015 at 3:45 p.m. ET

The number of infected people, measured over 70-some years and across all 50 states and the District of Columbia, generally declined after vaccines were introduced.

THE WALL STREET JOURNAL.

Population / Age Histogram



Not compared with anything meaningful (to me.) Boring.

# Are you over the hill?

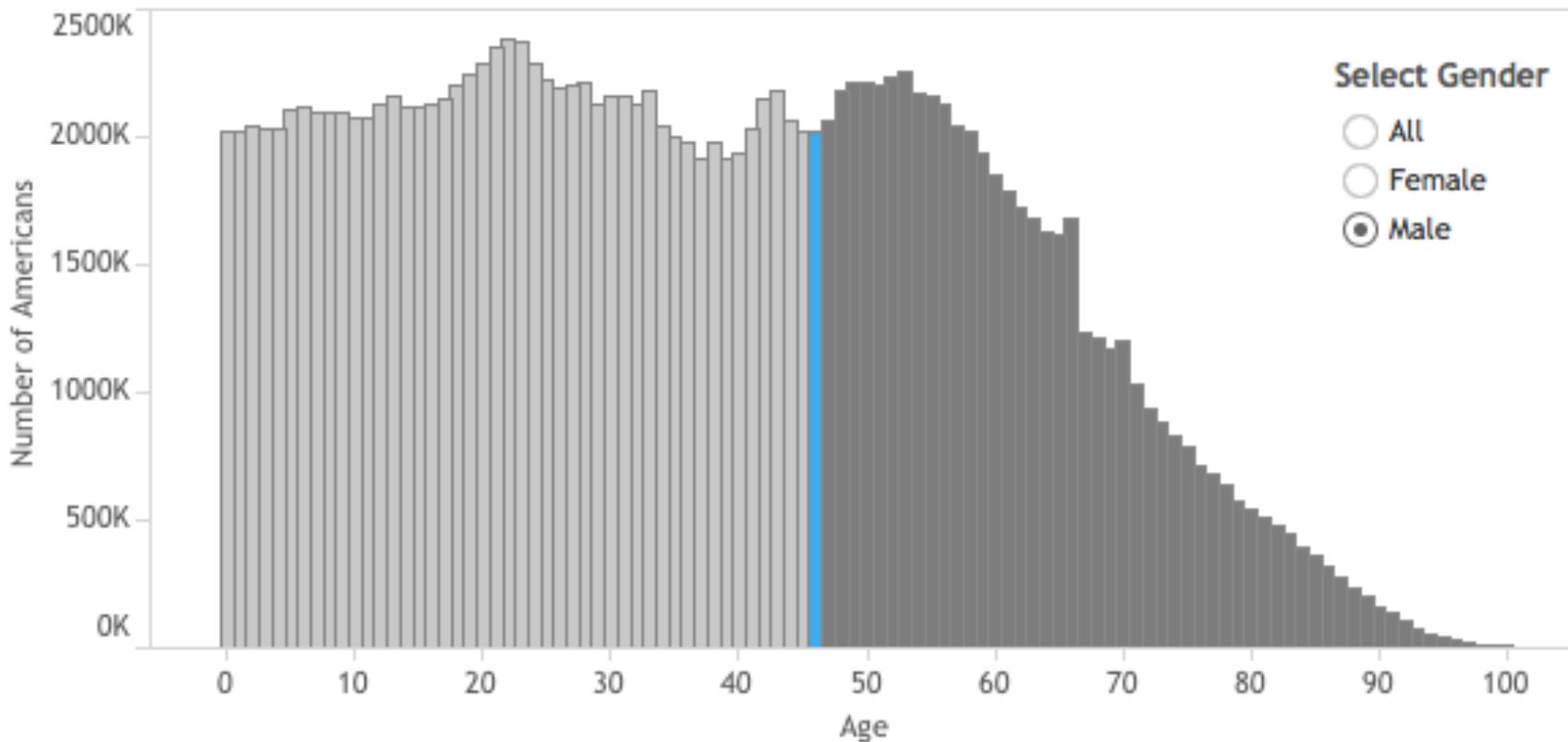
See how many Americans are older and younger than you

Move slider to select your age



46

You are **YOUNGER** than 37.3% of Male Americans

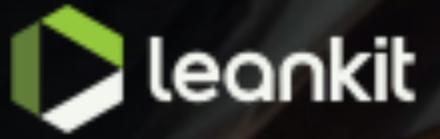


“Me”

On the 7<sup>th</sup> August

I WANT TO KNOW

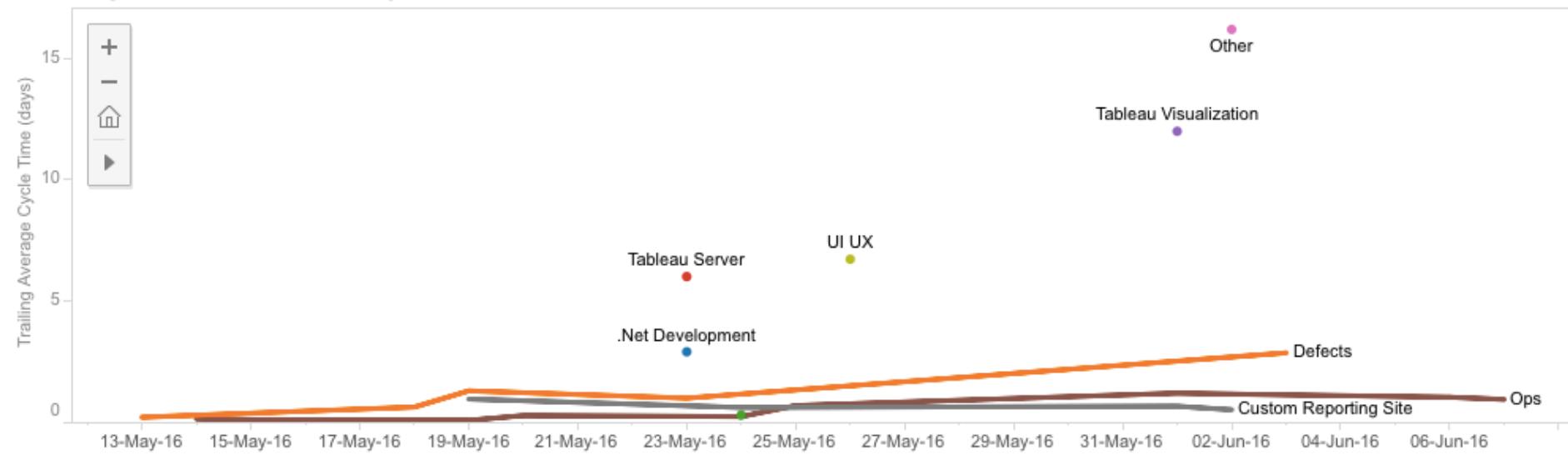
But, I may not want  
you to know.



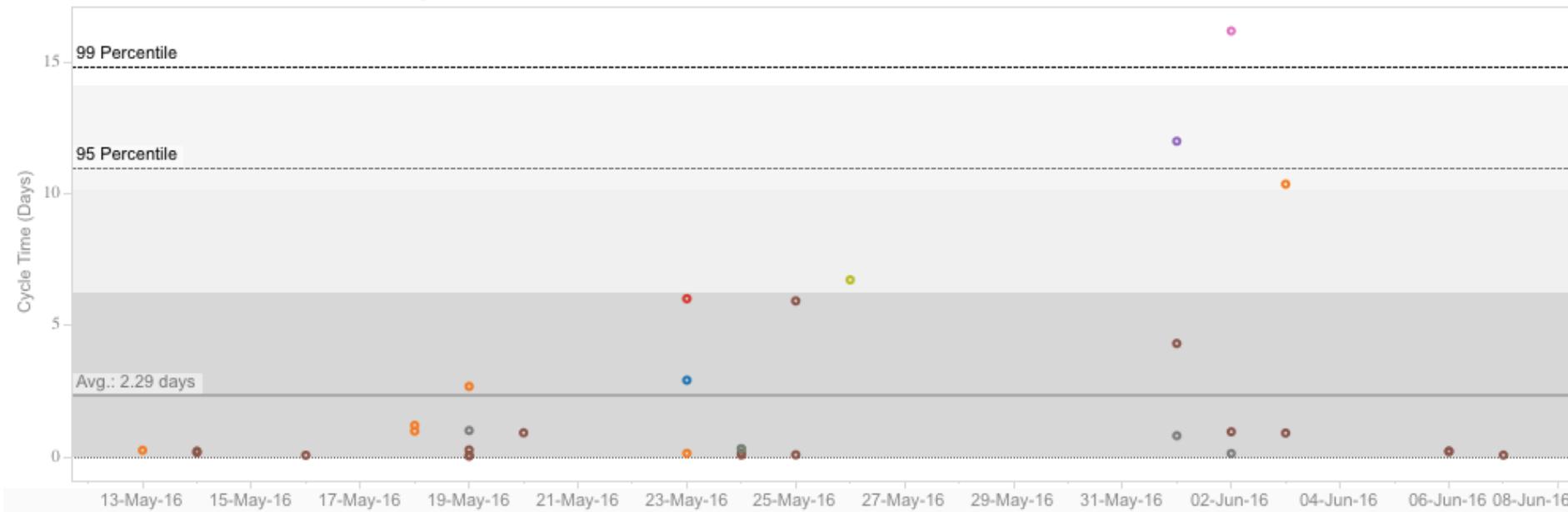
# Makeover



## How long does it take us to complete cards?



## Where do we need to focus our improvement efforts?



DATE RANGE

05/11/2016

TO

06/10/2016

Card Event Data for Last 365 Days



TAGS

Calculate based on Card Size  
(No card size = 1)

Reset Filters

### Card Type

.Net Development

Tableau Visualization

Node Development

QA

Tableau Server

SQL Server

Defects

Other

Class of Service

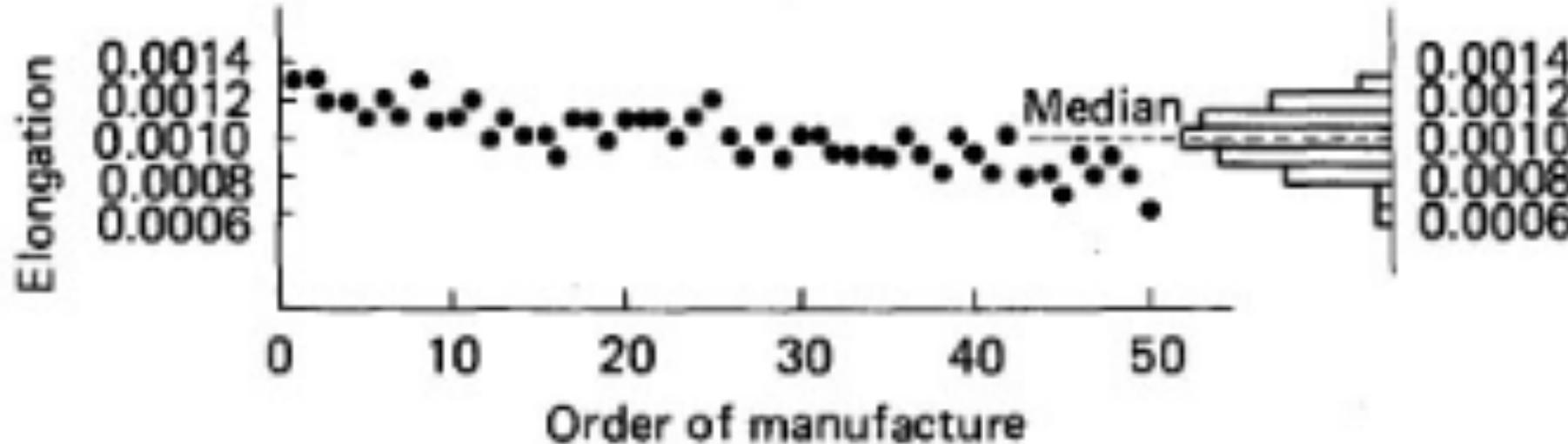
Calculate Average By



# Time and Pace related questions

1. Is it taking us longer to do the same type of work?
  2. What is a good commitment cycle time to others? (SLA)
  3. What is and how stable is our completed work rate?
  4. Where should we focus improvement efforts?
- 
- Compared to what?
    - Compared to the same type of work versus all work
    - Compared to the same time period last week/month/year
    - My work compares to others (only seen by me so I can improve)

# Q. Is the process stable? First, do no harm.



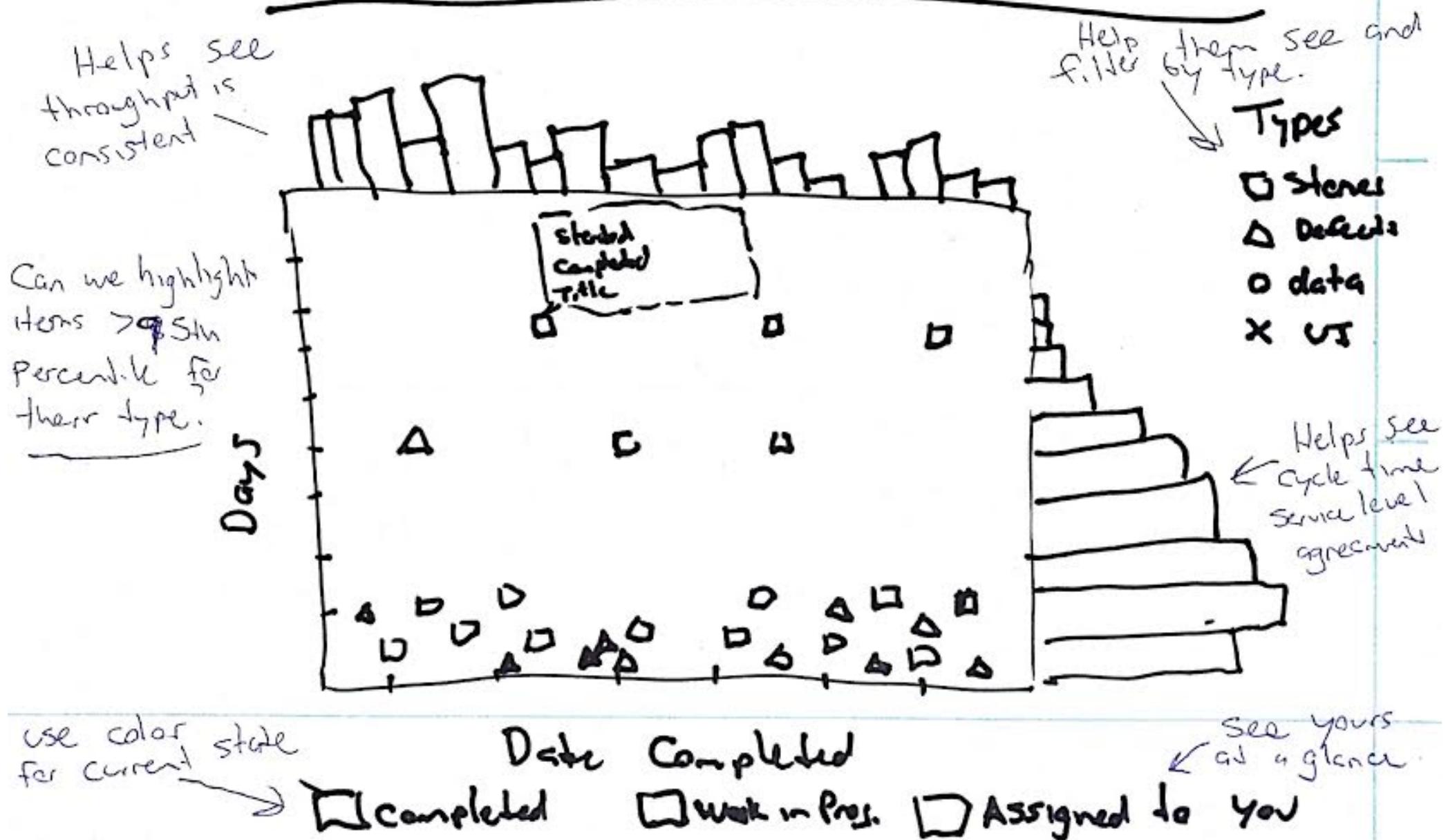
“If anyone adjusts a stable process, the output that follows will be worse than if (s)he had left the process alone”

Attributed to William J Latzko.

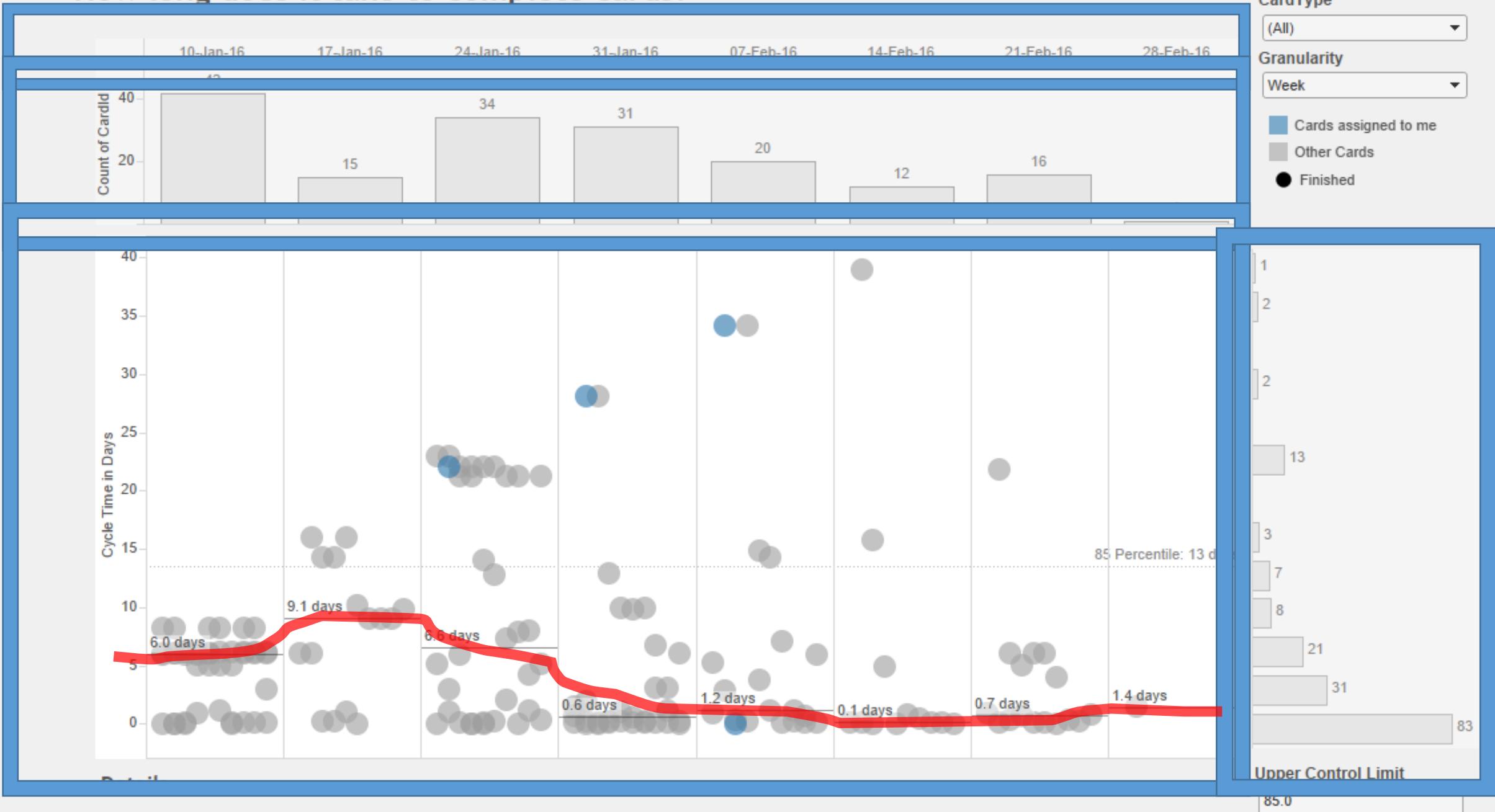
Source: Out of the Crisis. Deming.



# Cycle time / Lead time Scatter plot -

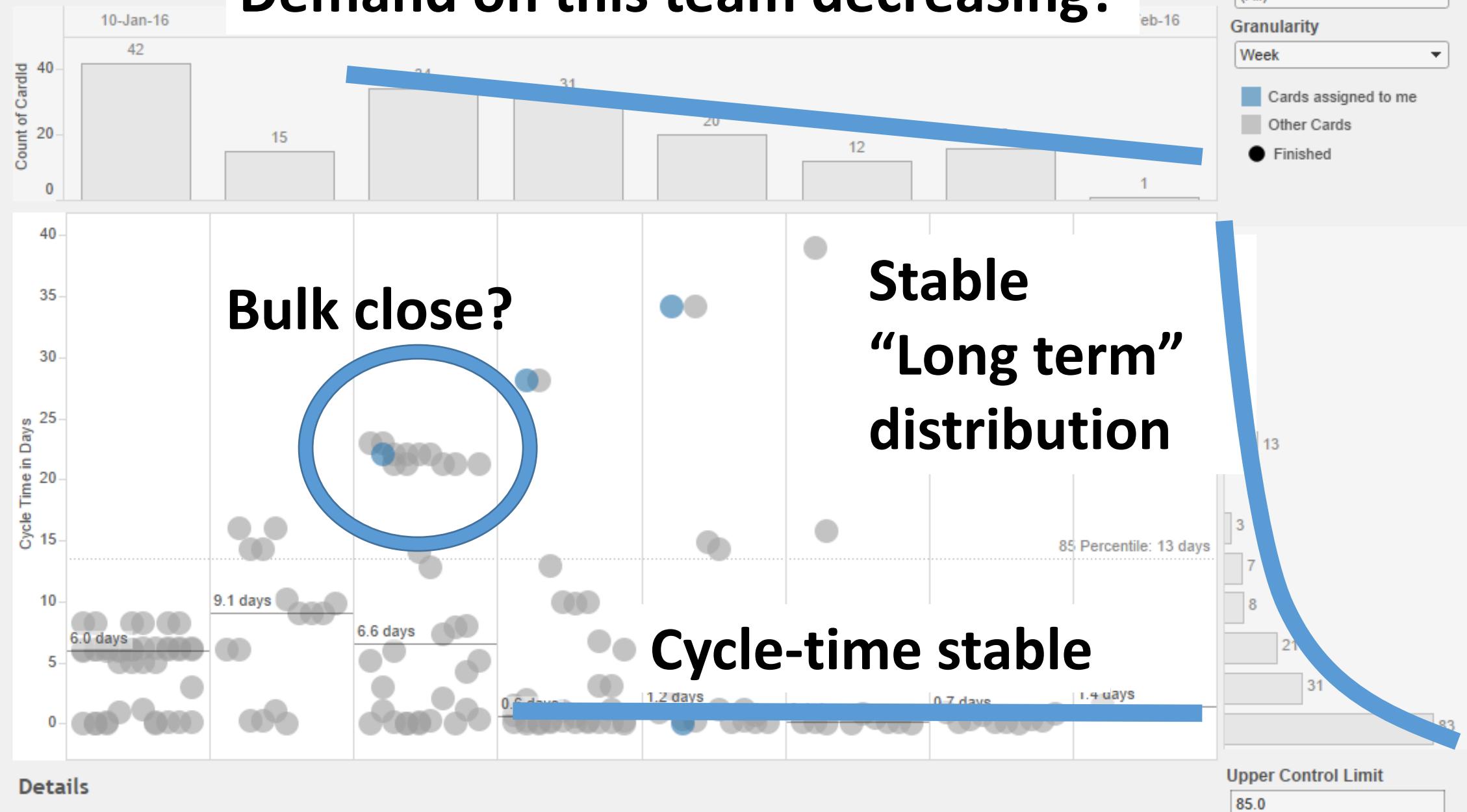


# How long does it take to complete cards?

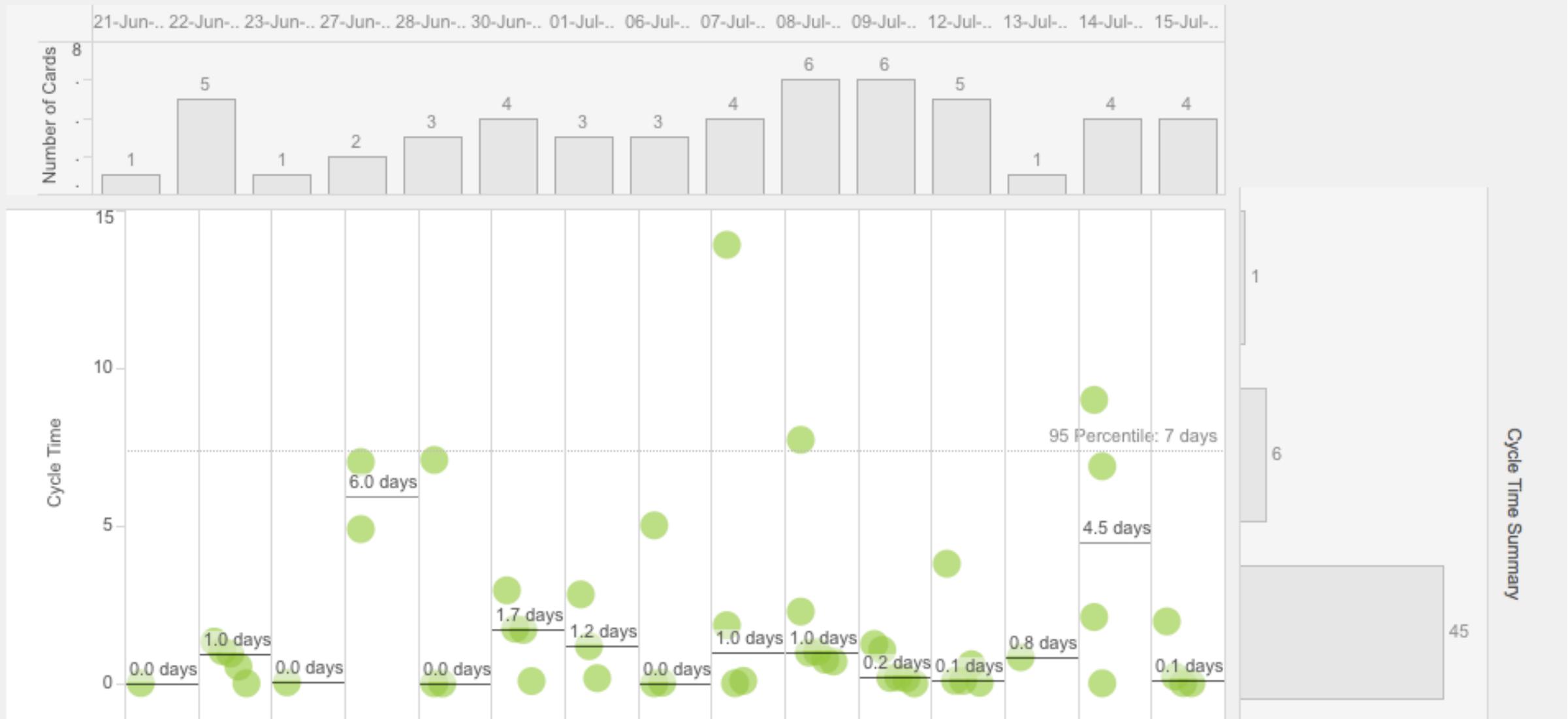


How long does

# Demand on this team decreasing?



## How long does it take us to complete cards?



To view card details, click on top bar chart area or scatter plot data points.

## How long does it take us to complete cards?



DATE RANGE

06/18/2016

TO

07/18/2016

Card Event Data for Last 365 Days



TIME PERIOD

Daily

**Weekly**

Monthly

REFERENCE LINE PERCENTAGE

95

TAGS

Calculate based on Card Size  
 (No card size = 1)

Reset Filters

### Card Type

.Net Development

Tableau Visualization

Node Development

QA

Tableau Server

SQL Server

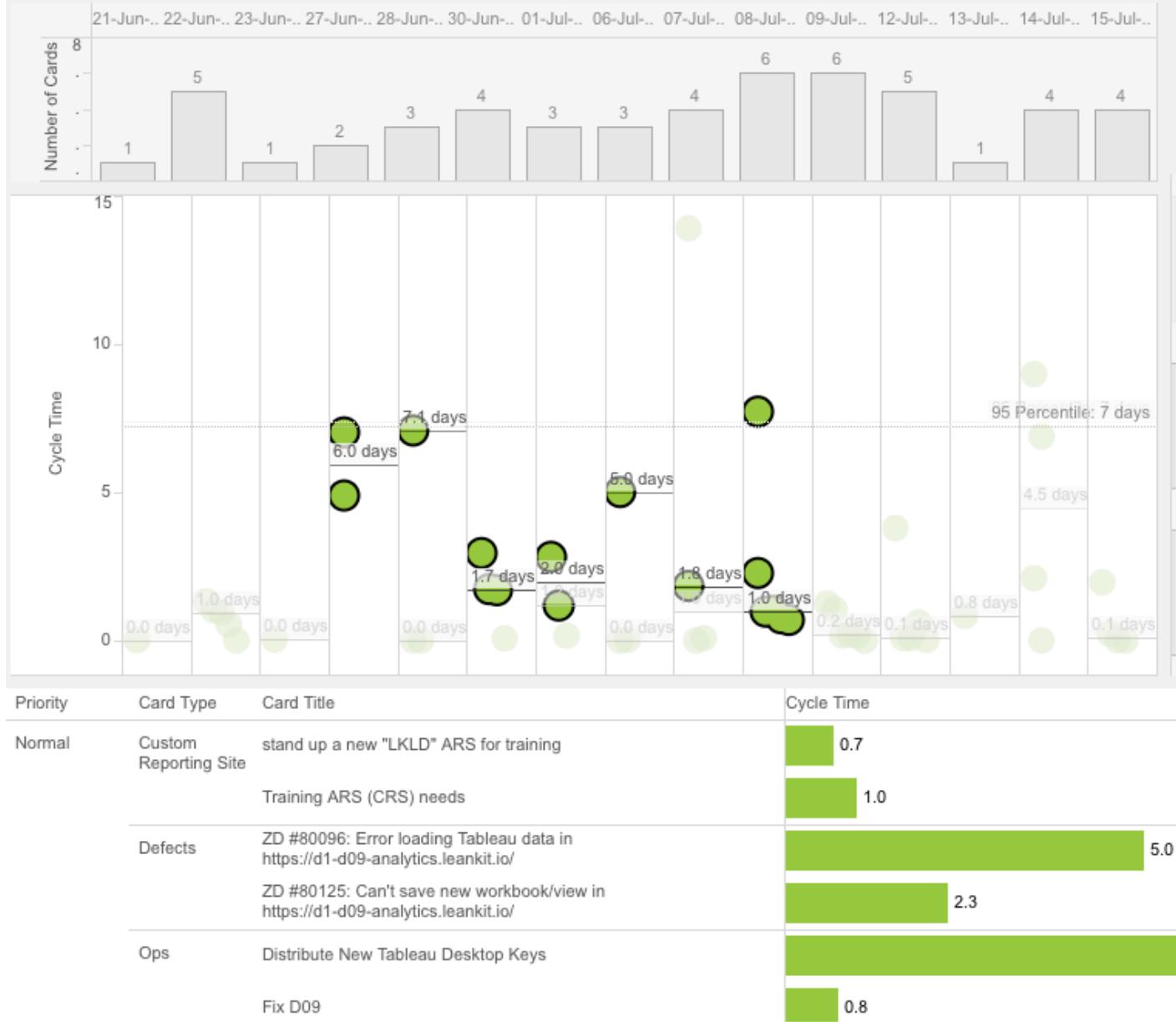
Defects

Other

Class of Service



## How long does it take us to complete cards?

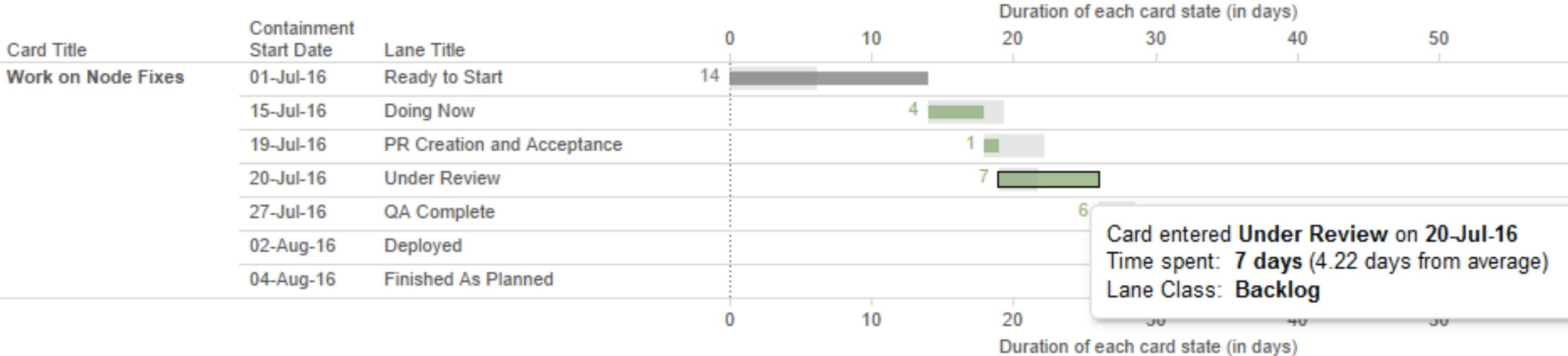


## Leankit'ers instrumental –

Eddie Detvongsa  
Katie St. Francis  
Keo Ros  
Bob Saulsbury  
Libby Padgett  
Chris Gundersen  
Scott Walters  
Chris Mobley  
Daniel Lesnansky  
Danny McClain  
Carl Nightingale  
Alex Glabman  
Florent de Gantes  
Jon Terry

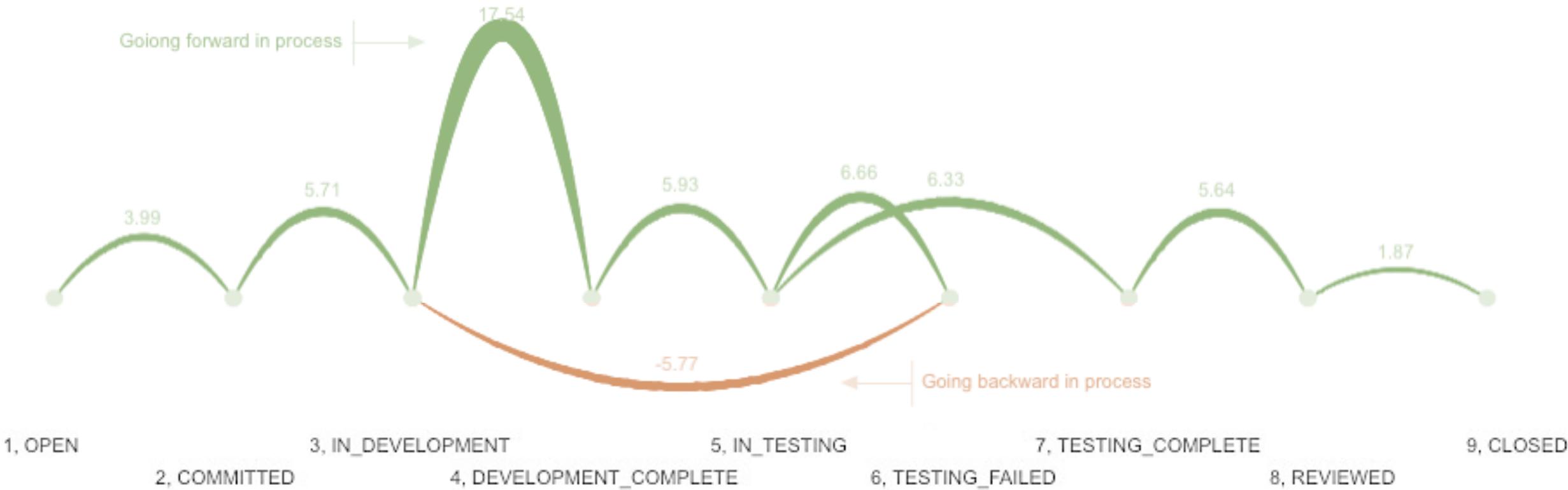


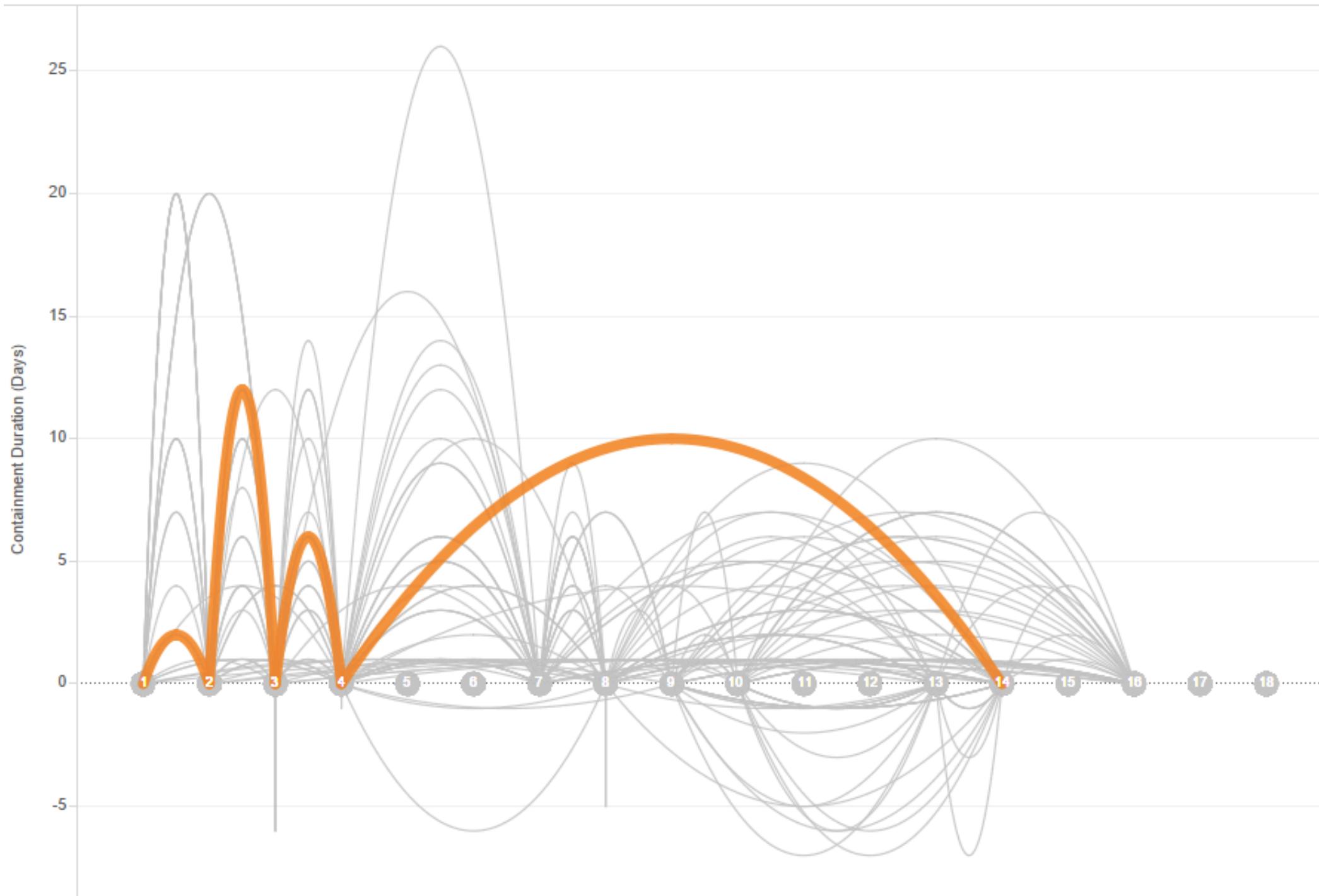
## Card play-by-play progress



Average for lane

This cards cycle  
time in lane





## What is the status and progress of cards?

Board ID

10112914971

### In-Progress Cards (normal / interesting) (click to select)

Card Priority	Card Title
Normal	.NET Defect
	.net fixes
	A few more methods to test
	C# needs tuning
	Create Dev Server
	Create DF Prod Server
	Create Production Server
	Deploy New Burndown Viz
	DenInv New Distribution Viz

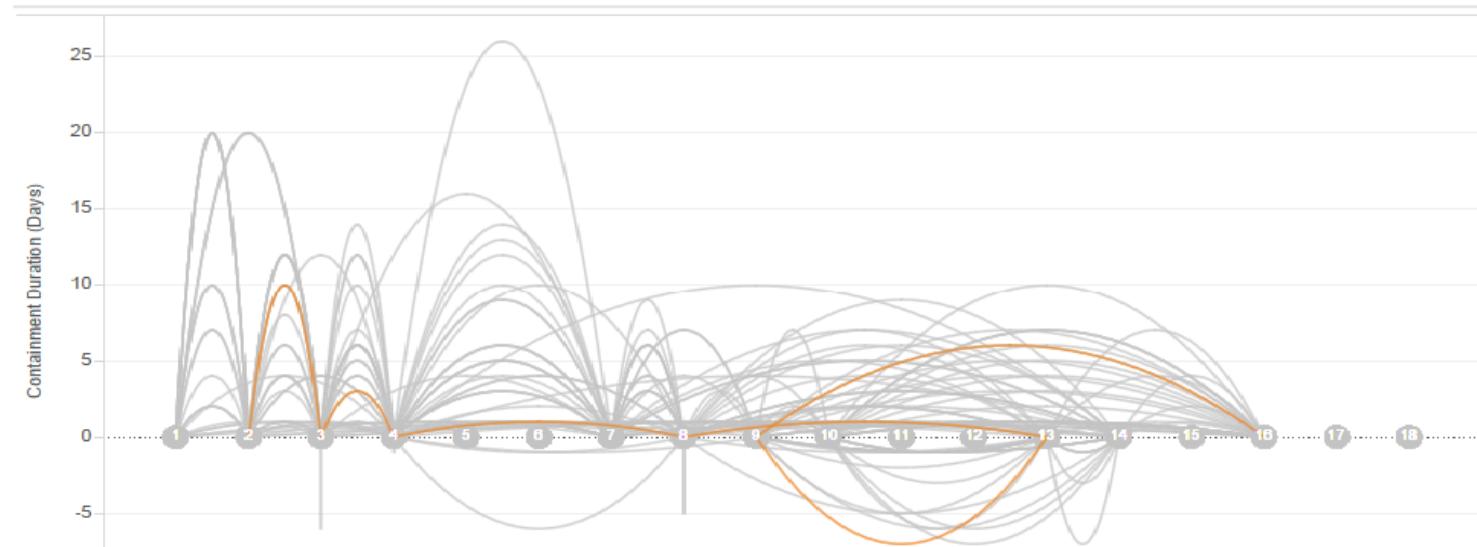
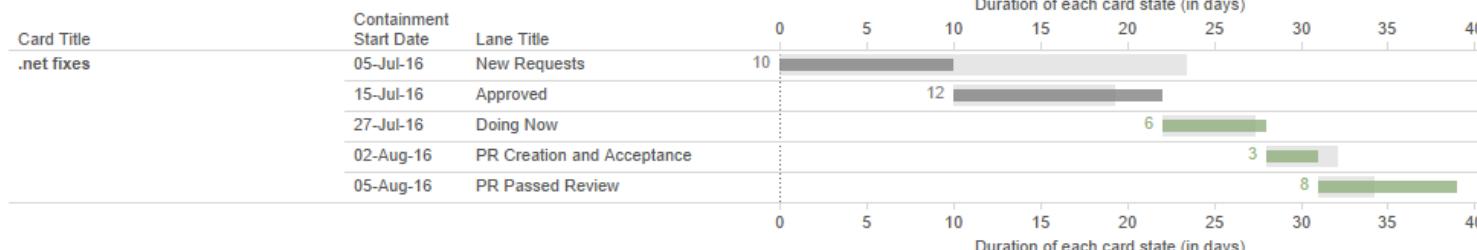
### Recently Completed Cards (click to select)

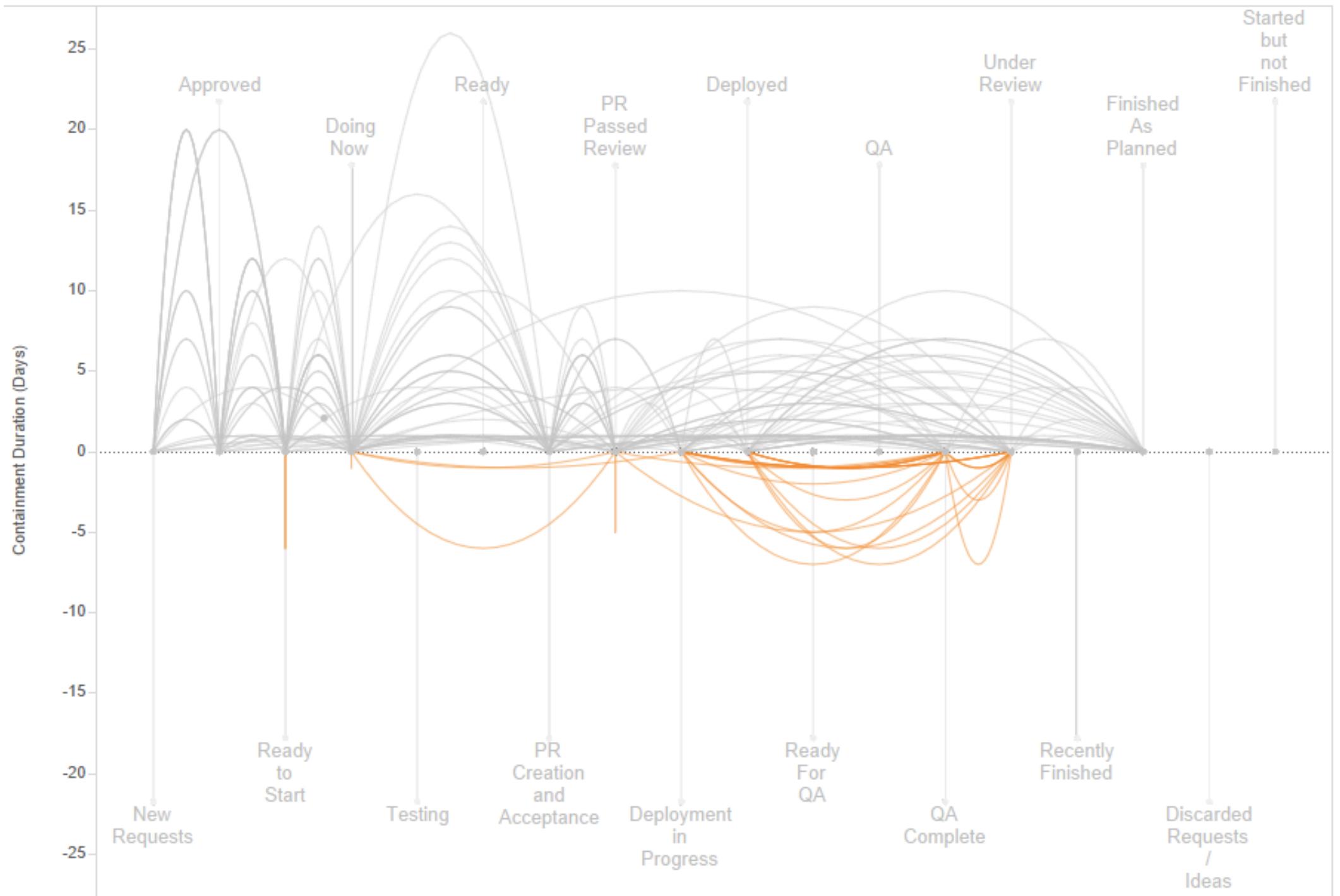
Card Title
.Net changes and hotfixes
Architecture decision Meeting
Audit Table Update
Build 2 new Node Boxes
Check changed against core-leankit-api
Container changes/Modifications
Create function for Automation
Discuss Code changes
Dr. jim

### Exceptions (click to select)

Card Priority	Card Title
Critical	Check changed against core-lean..
	Update DataBass
High	Existing Framework Changes
	Fact Table Update
	GitKraken Upgrade
	Hire new .Net Developer
	New Stored Procedure for burndo..
Low	Architecture decision Meeting
	Discuss Code changes

### Card play-by-play progress



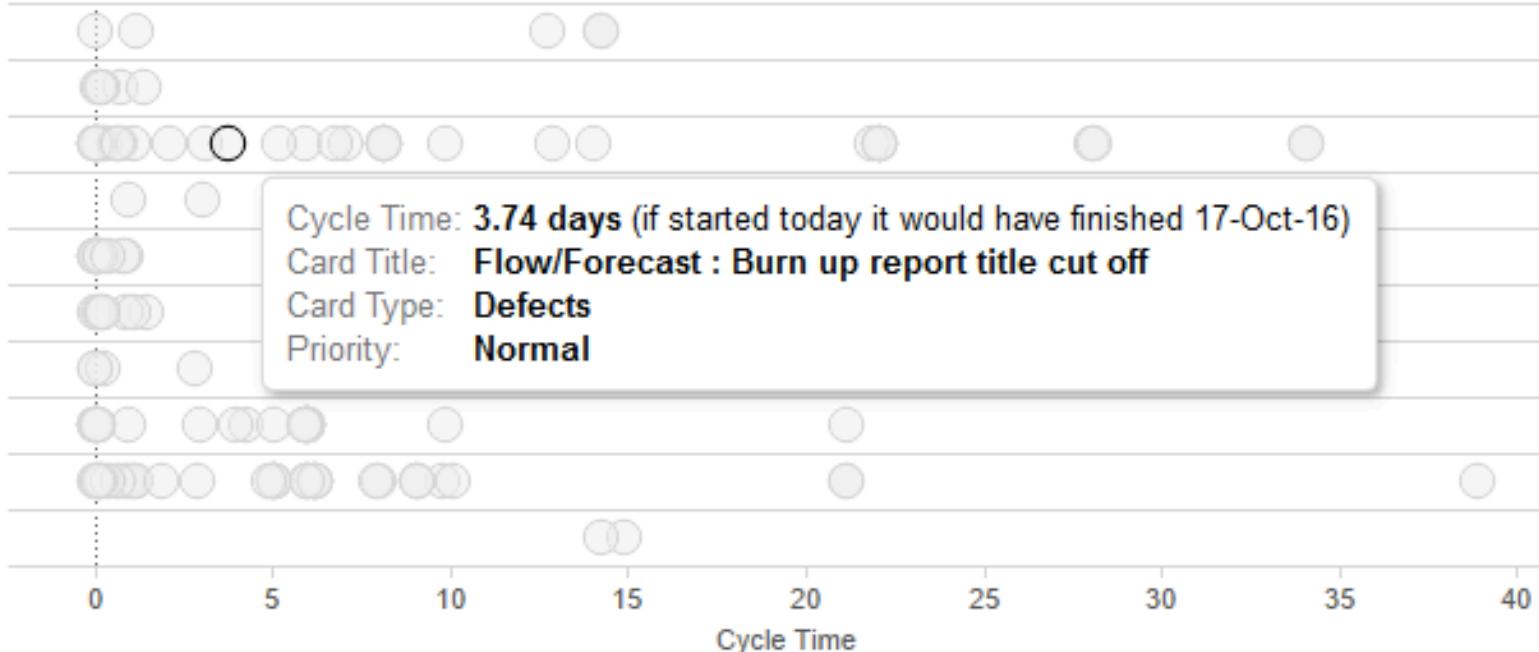


**Given past history, what is the expected finish date by card type that I can tell others?**

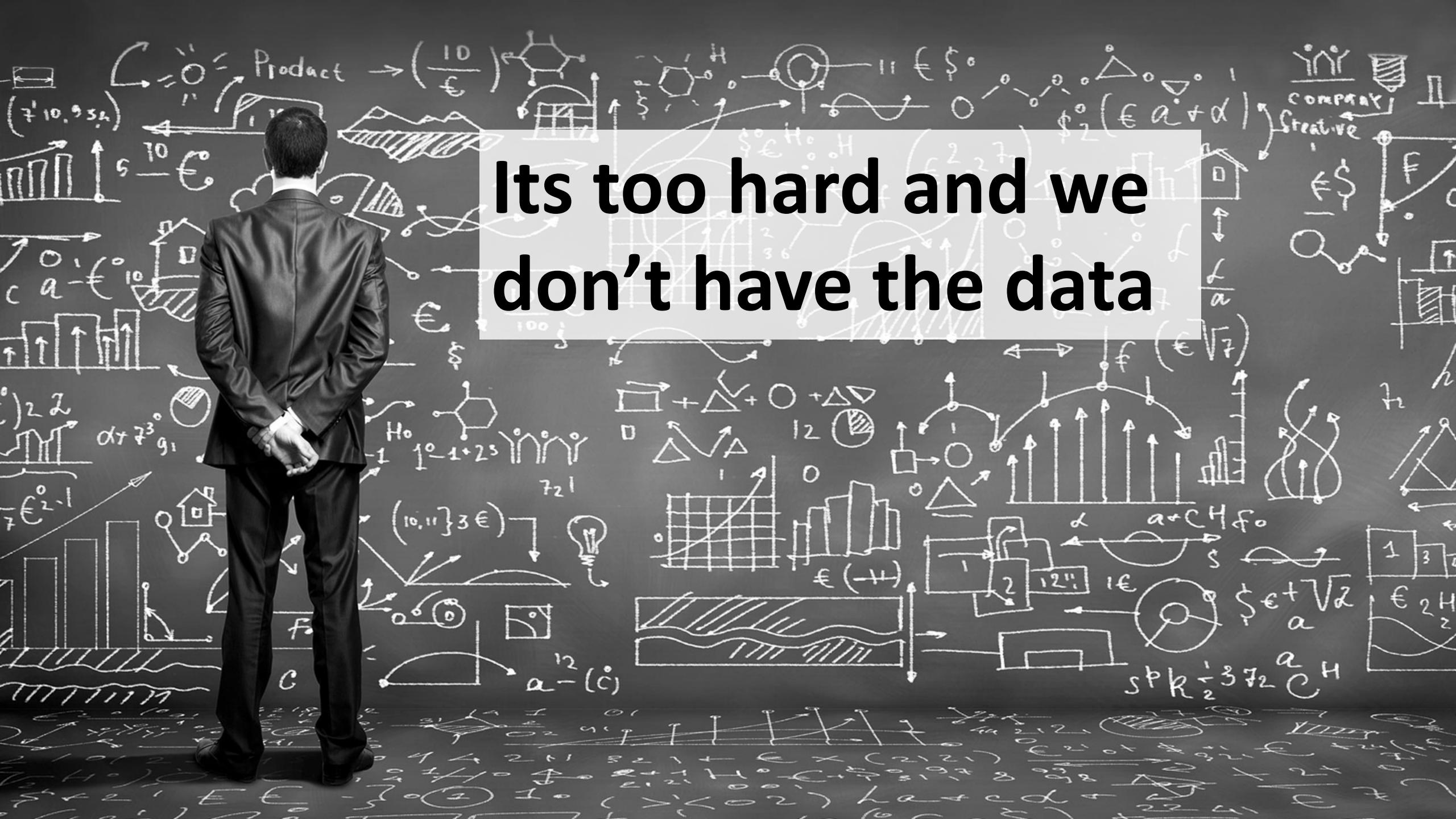
## Forecast completion of one card by card type

.Net Development		too little data
Custom Reporting Site		too little data
Defects		10-Nov-16
Node Development		too little data
Ops		13-Oct-16
Other		23-Oct-16
SQL Server		05-Nov-16
Tableau Server		21-Oct-16
Tableau Visualization		01-Nov-16
UI UX		too little data

### Historical cycle times for cards of this type



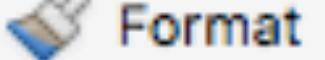
**Its too hard and we  
don't have the data**



**Q. What could I do with just  
start and completed date?**

**<http://bit.ly/Throughput>**

**Or follow @t\_magennis**



Format

A2

# http://bit.ly/Throughput

	Completed Date	Start Date (optional)	Type (optional)	Id
1	Completed Date	Start Date (optional)	Type (optional)	Id
2	1/21/15	1/14/15		
3	1/26/15	1/14/15	Story	
4	1/26/15	1/14/15	Defect	
5	1/26/15	1/21/15	Story	
6	1/26/15	1/22/15	Story	
7	1/29/15	1/23/15	Story	
8	2/2/15	1/23/15	Story	
9	2/2/15	1/20/15	Defect	
10	2/2/15	1/20/15	Defect	
11	2/4/15	1/20/15		
12	2/4/15	1/26/15		
13	2/4/15	1/23/15		
14	2/4/15	1/22/15		

# 17 charts so far...

## Throughput (planned & un-planned)

### Throughput Histogram(s)

## Cycle Time (planned & un-planed)

### Cycle Time Histogram(s)

### Work In Process

### Cumulative Flow

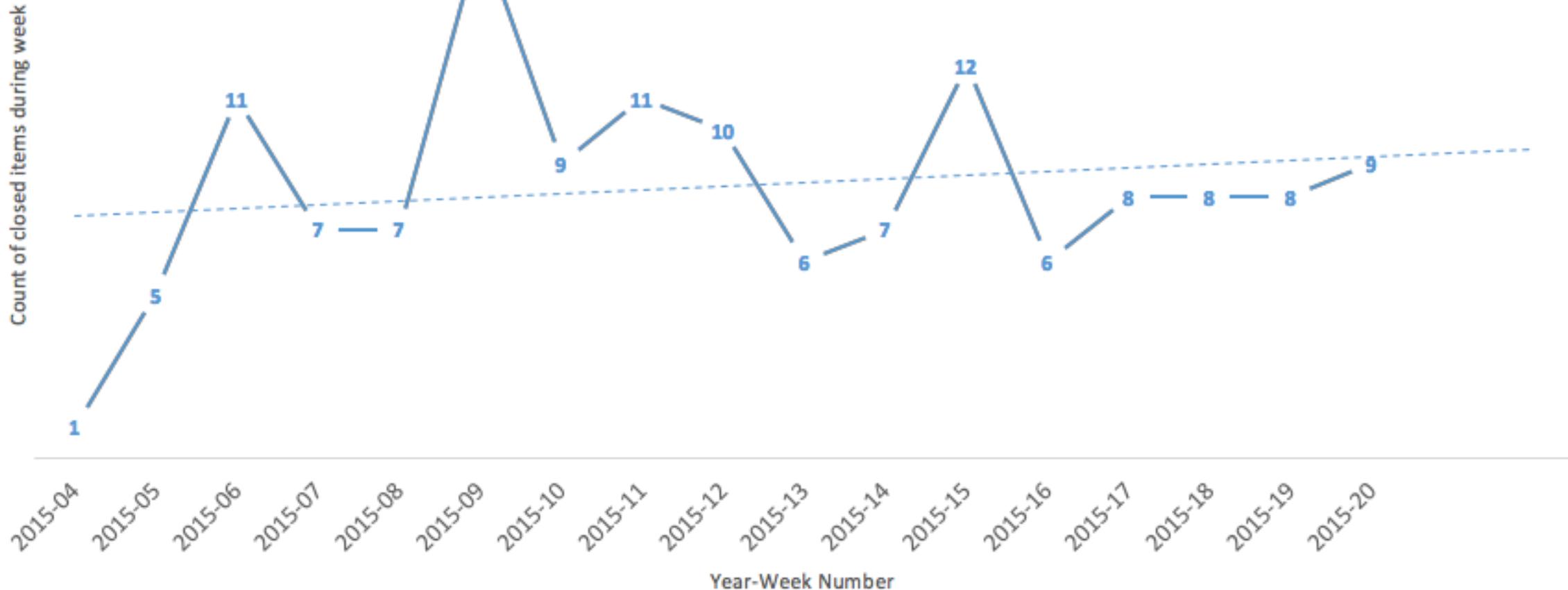
### Arrival vs Departure Rate

### Un-planned work Percentage

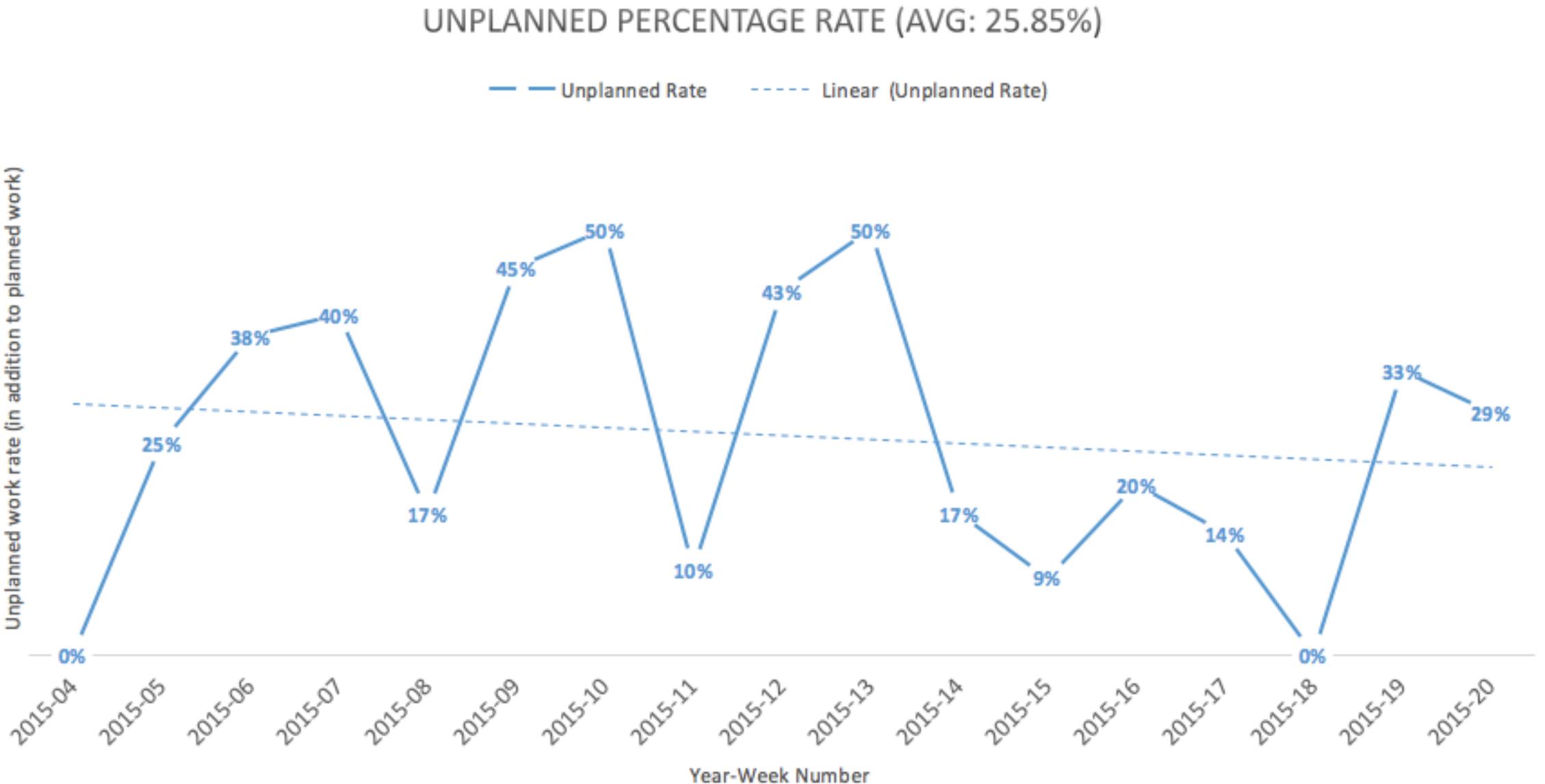
### Cycle Time Distribution Fitting

# <http://bit.ly/Throughput>

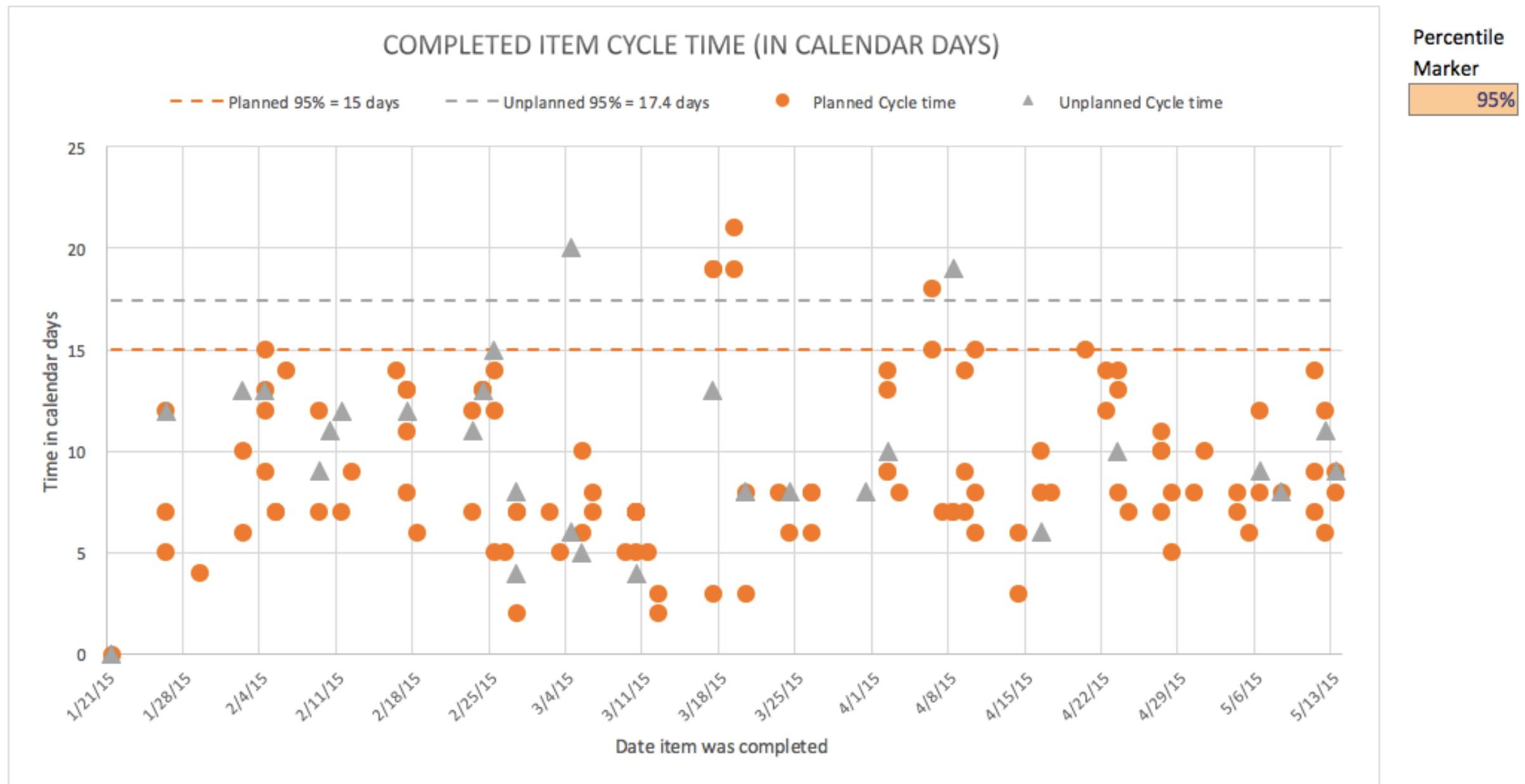
THROUGHPUT HISTORY TREND (COMPLETED ITEMS PER WEEK)



# <http://bit.ly/Throughput>



# <http://bit.ly/Throughput>



# <http://bit.ly/Throughput>

NET FLOW PER WEEK (ITEMS COMPLETED - ITEMS STARTED)

More completed than started



More started than completed





## Hart Memorial AND Stanley Cup



1927 to 2016  
Hart Memorial  
 $16..8\% = 15 \text{ out of } 89$   
(last time 2004, Martin St Louis  
Tampa Bay Lightning)

Source: Wikipedia, excluded 2005 season.

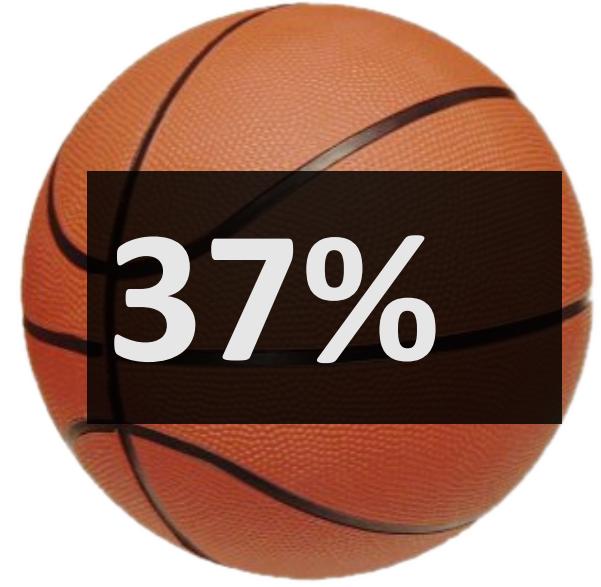
[https://en.wikipedia.org/wiki/Hart\\_Memorial\\_Trophy](https://en.wikipedia.org/wiki/Hart_Memorial_Trophy) and  
[https://en.wikipedia.org/wiki/List\\_of\\_Stanley\\_Cup\\_champions](https://en.wikipedia.org/wiki/List_of_Stanley_Cup_champions)



1930 to 2012  
National League MVP  
 $23\% = 19 \text{ out of } 82$  (last time 1988)

1930 to 2013  
All-American League MVP  
 $23\% = 19 \text{ out of } 82$  (last time 1984)

Source: ESPN Playbook - SportsData  
(infographic at end of this deck)



1955-56 to 2015-16  
NBA MVP  
 $37\% = 23 \text{ out of } 62$  (last time 2014 )

Source: NBA Most Valuable Player Award. (2016, June 24). In *Wikipedia, The Free Encyclopedia*. Retrieved 18:28, July 3, 2016, from [https://en.wikipedia.org/w/index.php?title=NBA\\_Most\\_Valuable\\_Player\\_Award&oldid=726766319](https://en.wikipedia.org/w/index.php?title=NBA_Most_Valuable_Player_Award&oldid=726766319)





XXII OLYMPIC WINTER GAMES

# Team versus individual improvement

- As professionals, we are expected to know our jobs
  - Just like in sports, NBA Kobe Bryant is expected to already know core skills.
  - We are expected to know our strengths and weaknesses
- Coaches and managers for professional teams deal more with
  - Balancing the skills available versus needed
  - Helping individuals work as a team in an effective way
  - Help the team focus on improvements based on recent performance

**<http://bit.ly/CapabilityMatrix>**

**Team Name:**

**Your Name:** \_\_\_\_\_

**For each capability choose from the list of CURRENT skill level values. If in doubt, err low (left)!**

# <http://bit.ly/CapabilityMatrix>

For each skill, choose from the list of DESIREABLE values. If in doubt, err high (right)!

	I'd quit rather than do this...	Actively Avoid, unless coerced...	Willing to learn	Strongly Interested	Please, Please, Please...	
Create Video Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Create Written Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Using Tableau	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Penopto Admin	No		Maybe		Yes	
Penopto Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Review & Consolidate Feedback	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
My Search	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sharepoint Admin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sharepoint Content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Camtasia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Scrum-master'ing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
My Company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Using TFS to track work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Publishing content	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
SEO / Discoverability Tuning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Content Strategy Planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Integrating with SFA/Teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

# http://bit.ly/CapabilityMatrix

Captains: Ability	5	11	5	3	5	9	4	2	8	3	4
Players: Ability to	9	11	9	6	8	9	8	6	8	5	6
Bench: Ready to	1	0	2	0	0	1	1	1	2	3	2
Create Video Content	2	4	2	0	2	4	2	3	4	3	3
Person 1 - red	2	3	3	2	2	3	2	2	3	1	2
Person 2 - blue	3	3	4	3	3	4	4	4	4	2	3
Person 3	4	4	2	2	4	4	3	2	4	4	1
Person 4	2	3	2	0	0	3	1	0	3	0	0
Person 5 - blue	4	4	4	2	4	0	2	2	3	0	0
Person 6	4	3	4	4	4	3	3	1	1	4	4
Person 7 - red	1	4	3	0	0	3	3	0	1	1	2
Person 8	4	4	2	4	4	4	2	2	3	1	3
Person 9	2	3	1	0	2	3	0	0	3	2	1
Person 10	0	4	1	0	0	1	0	0	0	0	0
Person 11 - blue	0	0	0	0	0	0	0	0	0	0	0
Person 12	28	39	28	17	25	32	22	16	29	18	19

Urgency (Redder = more urgent)

Teachers			
Doers	0	1	2+
0	9	7	3
1	8	5	2
2+	6	4	1

If skill is growing in demand, prepare the bench strength -

Teachers			
Novices	0	1	2+
0	9	7	3
1	8	5	2
2+	6	4	1

Goals -

Have 2+ people who are Doer's for each skill on the team. If creating new innovations, have at least 1 teacher for each skill.

If a skill is in demand, have at least 1 (preferably 2) teachers on the team (or available), and know who is willing (or able) to be a novice in training to doer.

Know what skills might be needed elsewhere in the company, as your team members might be pulled off at short notice.

Know what skills might be needed to fix incoming defects or production issues when rolling to customer usage.

Know how long (and plan to reduce) the onboarding time from novice to doer levels, prioritized by the skills most anticipated in need for the future.

Its \*not\* a goal to have everyone at Teacher level for every skill: Your goal is to have a resilient team given un-planned disruptions and the next feature demands.

A silhouette of a person walking on a tightrope over water at sunset. The person is in a dynamic pose, arms outstretched for balance. In the foreground, the dark silhouette of a tall, cylindrical structure, possibly a lighthouse or chimney, stands on the left. A large, stylized letter 'I' is visible on the left side of the frame. On the right side, there is a smaller, darker silhouette of another tower or chimney. The background shows a gradient sky from blue to orange and yellow, with the sun setting on the horizon.

Find balance...

In changing  
conditions

And  
competing forces

# Balanced competing metrics

- If you show just one metric, it will be hit...
  - At the expense of everything else
- Coaching is about seeing the bigger picture
- Coaching is about getting the team to recognize competing forces
- Coaching is about teach the team to make smart trades
- Coaching is about little adjustments
- Coaching is teaching how to adapt to changing conditions/pressures

# 1. Quality (how well)

- Escaped defect counts
- Forecast to complete defects
- Measure of release “readiness”
- Test count (passing)

# 2. Productivity (how much, delivery pace)

- Throughput ( / team size?)
- Velocity ( / team size?)
- Releases per day

# 3. Responsiveness (how fast)

- Lead time
- Cycle time
- Defect resolution time

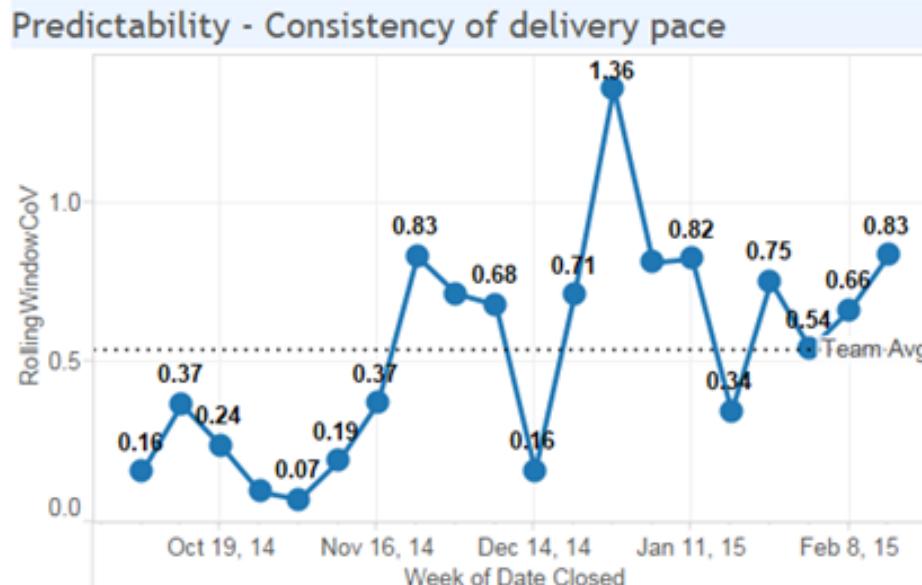
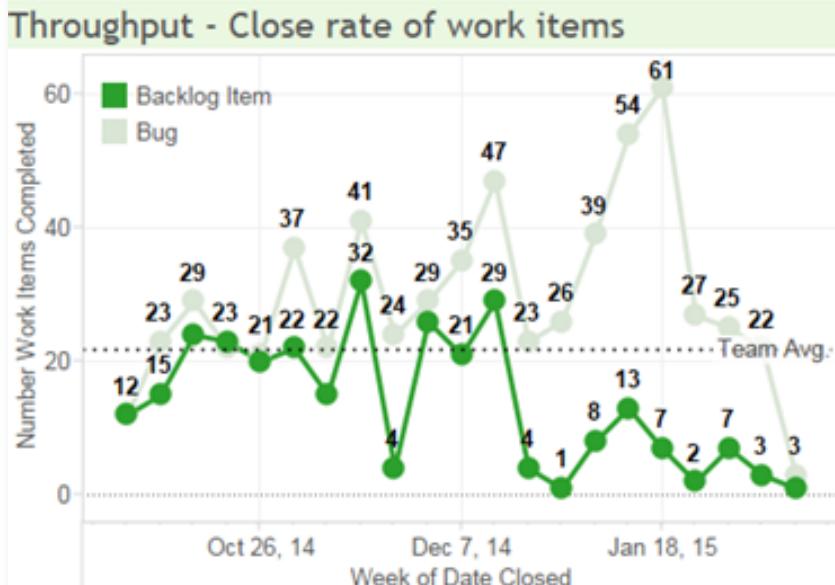
# 4. Predictability (how repeatable)

- Coefficient of variation (SD/Mean)
- Standard deviation of the SD
- “Stability” of team & process



# Team Historical Agile Diagnostic Dashboard

## Productivity (how much)



Quality (how well)  
Responsiveness (how fast)

# **It's about the TEAM**

**Divide by team size**

**Divide by average**

# Quality

**“If OUR entire TEAM did nothing else but fix bugs this sprint, at OUR historical rate, we would have x days of work”**

- Goal is to keep the TEAMS within 10 days of releasable
- Forecast has to be personal for the team
- Days = Open Bugs x Avg(recent cycle time samples)  
Number of Devs on team



# Compare “my” team

# Coaching Advice

## All Teams Agile Dashboard - Your Trend vs Others

Select your team...

Other Teams  
 Selected Team

Other Teams  
 Selected Team

Show lines  
True

Date range to display...  
10/1/2014 12:00:00 AM to 3/31/2015 11:59:59 PM

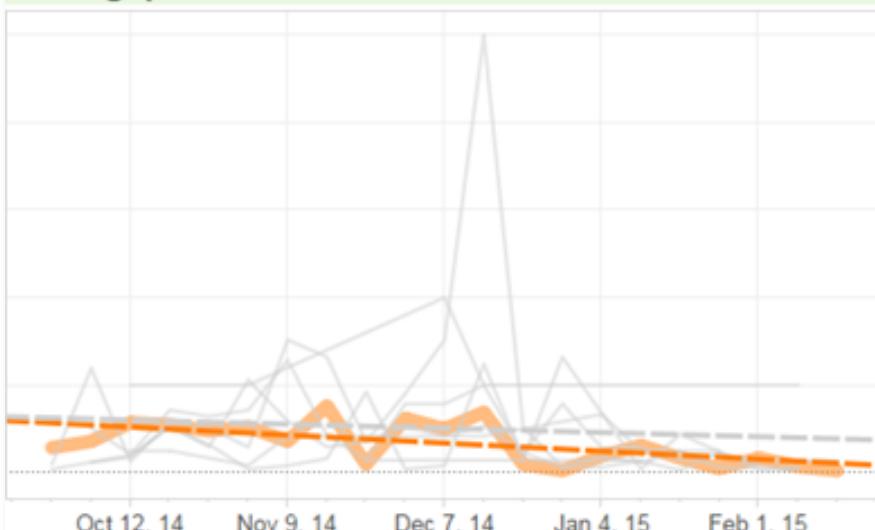
### Three ways to decrease bug counts and cycle time -

1. Triage bugs quickly. Set them to P1 (fix immediately), P2 (fix as soon as possible), or defer them.
2. Share expert knowledge. Consider having the “expert” who would normally be assigned a defect in a code area lightly assist someone else – now you have an expert in training.
3. Before calling code complete, demo the software to the product owner and testers. This helps obvious defects being found later (and means you don’t get disturbed six months from now).

### Three ways to increase and stabilize work item throughput -

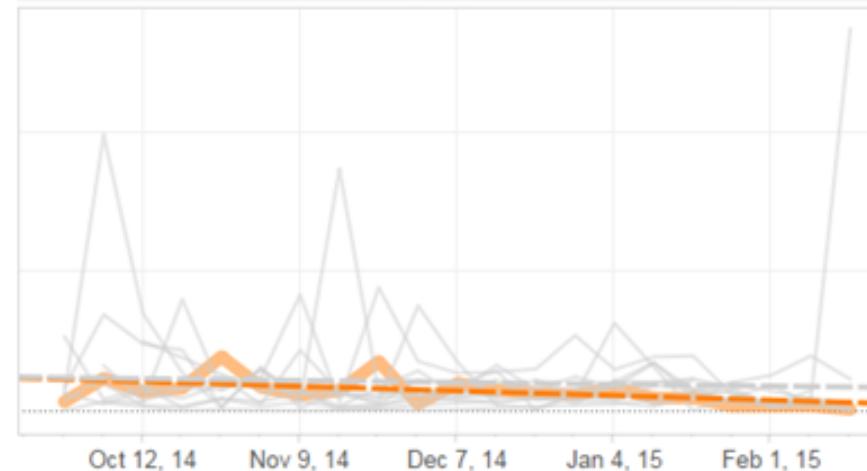
1. Stop starting, start finishing, stop starting. Avoid starting every story on day one of the sprint only to have everything ALMOST done at the end of the sprint.
2. Get early feedback on your work from the product owner and testers. This early feedback will avoid bugs and mis-understandings that inhibit “Complete”. ..

### Throughput All - Close rate of work items / Devs



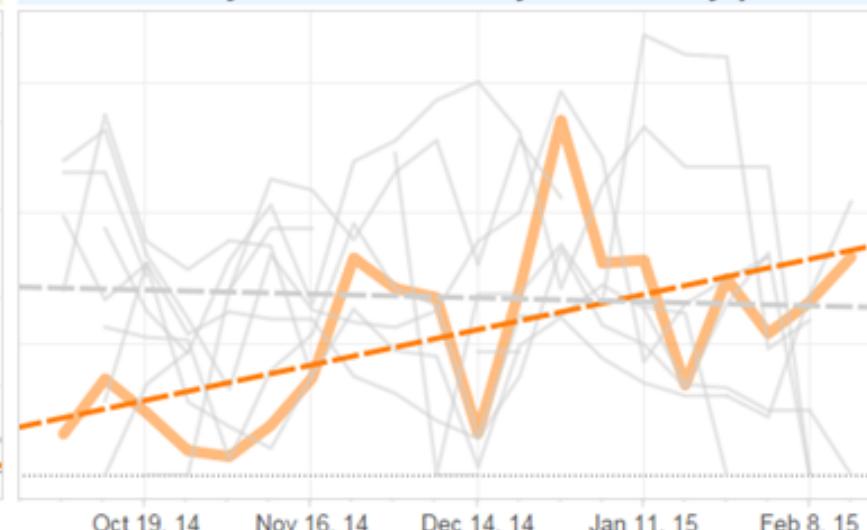
How many work items have been closed. Higher is better.

### Responsiveness All - Bug cycle-time average



How long it takes from opened to resolved for bugs. Lower is better.

### Predictability All - Consistency of delivery pace



How variable is work throughput. Lower is better.

# All Teams Agile Dashboard - Your Trend vs Others

Select your team...

Other Teams  
 Selected Team

Other Teams  
 Selected Team

Show lines  
False

Date range to display...  
10/1/2014 12:00:00 AM to 3/31/2015 11:59:59 PM

## Three ways to decrease bug counts and cycle time -

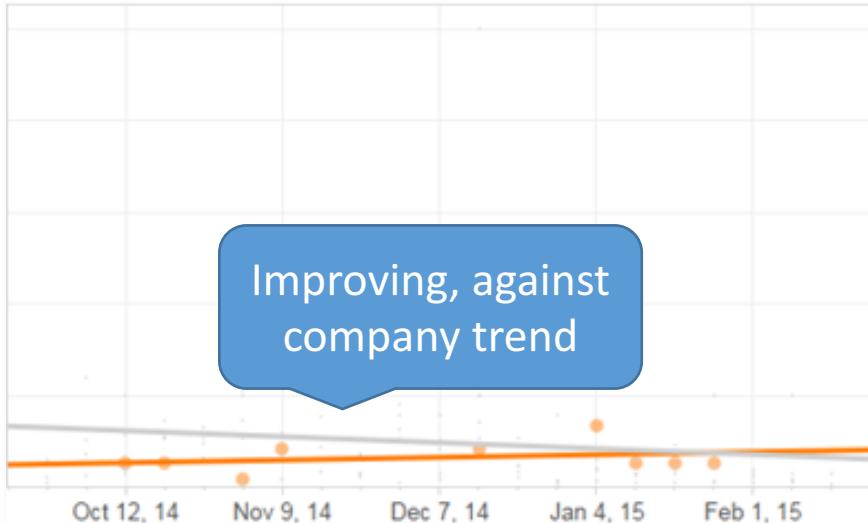
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## Throughput All - Close rate of work items / Devs

Improving, against company trend



How many work items have been closed. Higher is better.

## Responsiveness All - Bug cycle-time average

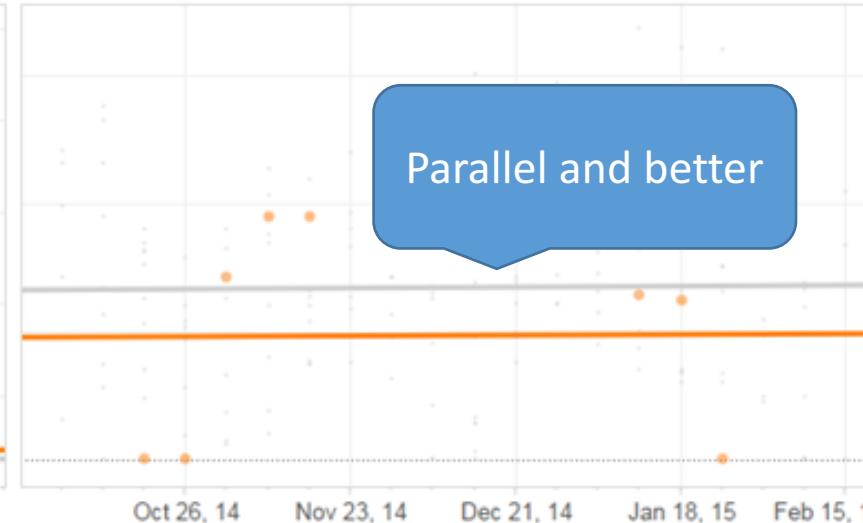
Started worse, but corrected



How long it takes from opened to resolved for bugs. Lower is better.

## Predictability All - Consistency of delivery pace

Parallel and better



How variable is work throughput. Lower is better.

# All Teams Agile Dashboard - Your Trend vs Others

Select your team...

Other Teams  
 Selected Team

Other Teams  
 Selected Team

Show lines  
False

Date range to display...  
10/1/2014 12:00:00 AM to 3/31/2015 11:59:59 PM

## Three ways to decrease bug counts and cycle time -

1. Triage bugs quickly. Set them to P1 (fix immediately), P2 (fix as soon as possible), or defer them.
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3. Before calling code complete, demo the software to the product owner and testers. This helps obvious defects being found later (and means you don't get disturbed six months from now).

## Three ways to increase and stabilize work item throughput -

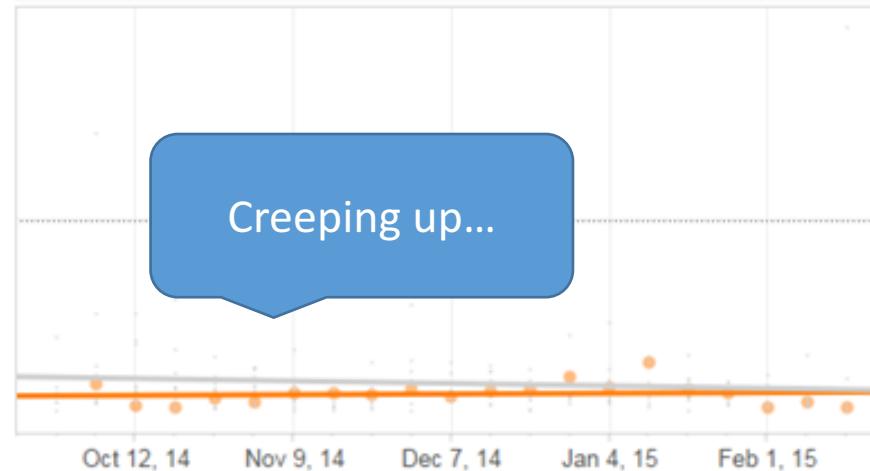
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2. Get early feedback on your work from the product owner and testers. This early feedback will avoid bugs and mis-understandings that inhibit "Complete". ..

## Throughput All - Close rate of work items / Devs



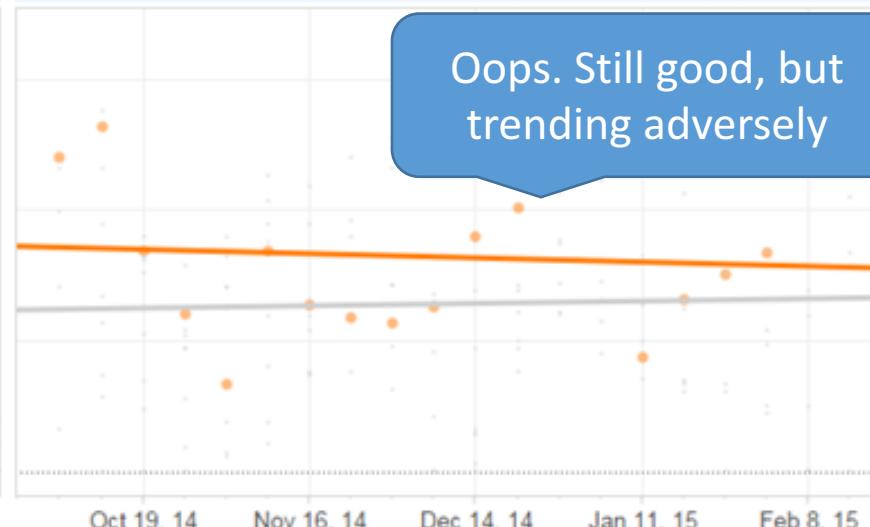
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## Predictability All - Consistency of delivery pace



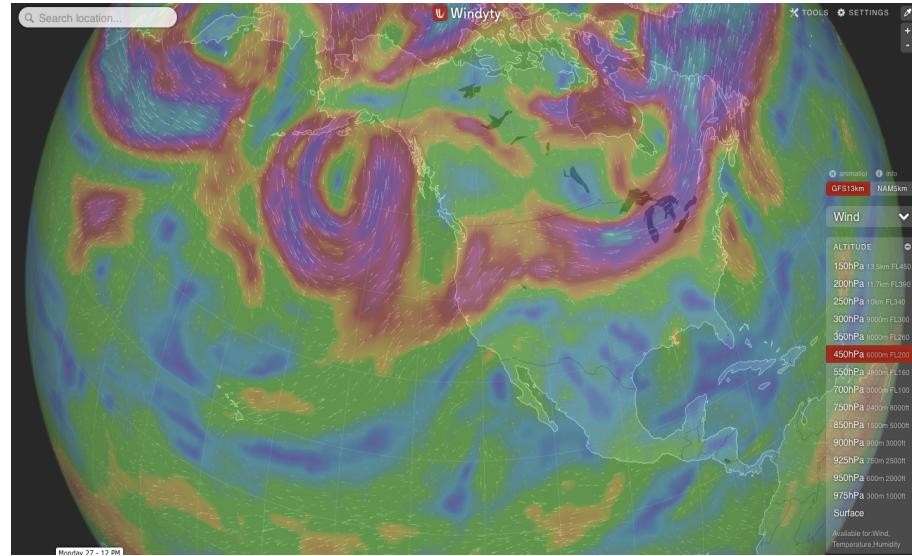
How variable is work throughput. Lower is better.

## Don't Make it Personal



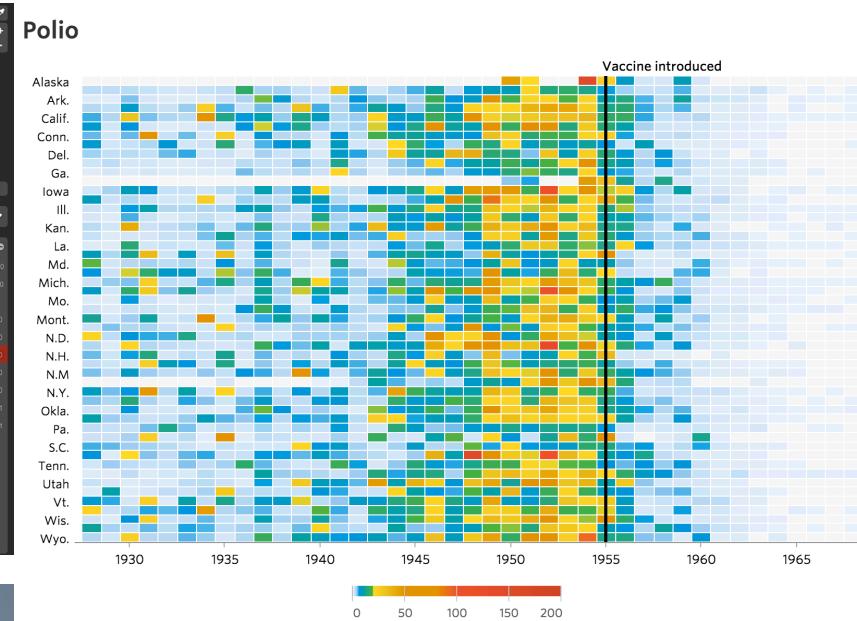
Compared to What

## Beautiful + Engaging



Keep it Simple

## Tell a Story



### 1. Quality (how well)

- Escaped defect counts
- Forecast to complete defects
- Measure of release "readiness"
- Test count (passing)

### 2. Productivity (how much, delivery pace)

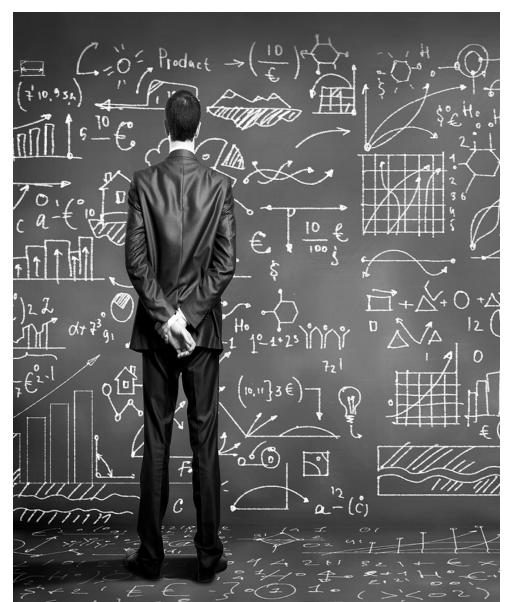
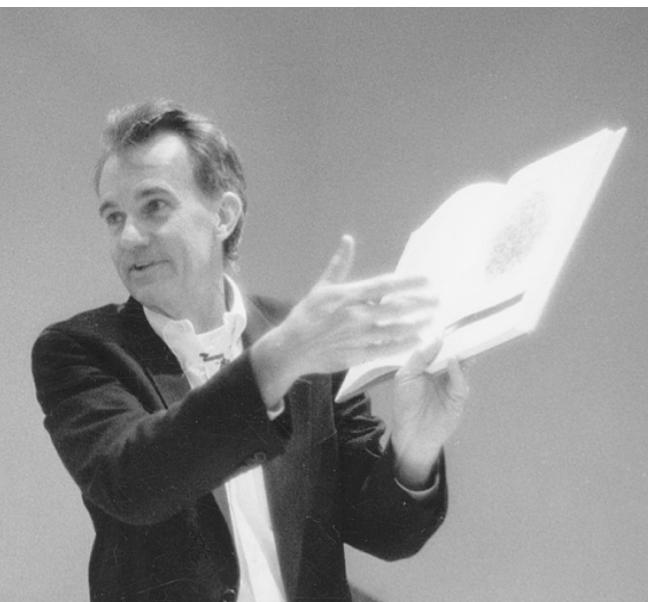
- Throughput
- Velocity
- Releases per day

### 3. Responsiveness (how fast)

- Lead time
- Cycle time
- Defect resolution time

### 4. Predictability (how repeatable)

- Coefficient of variation (SD/Mean)
- Standard deviation of the SD
- "Stability" of team & process



Balanced Metrics

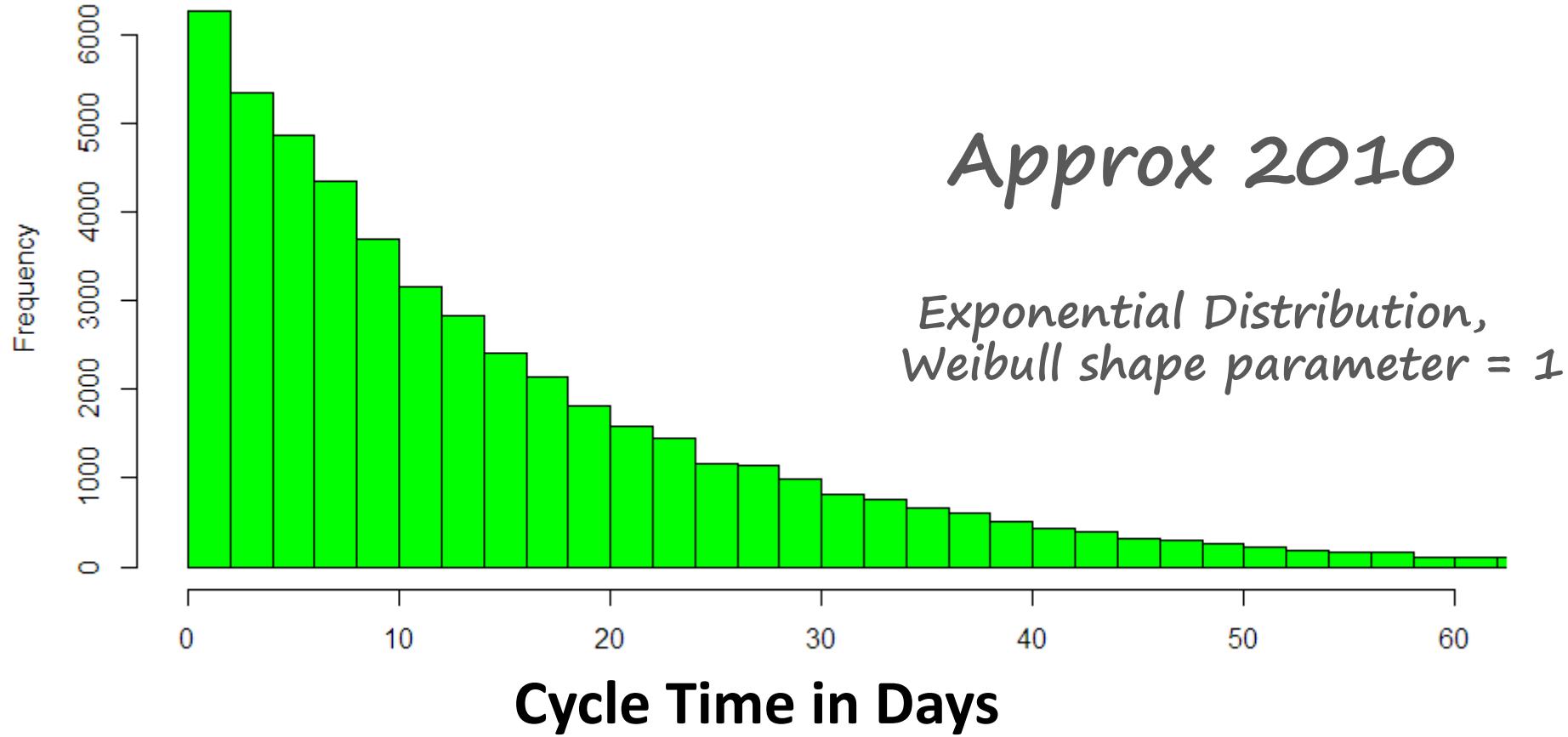
Make GREAT tradeoff Decisions

@t\_magennis

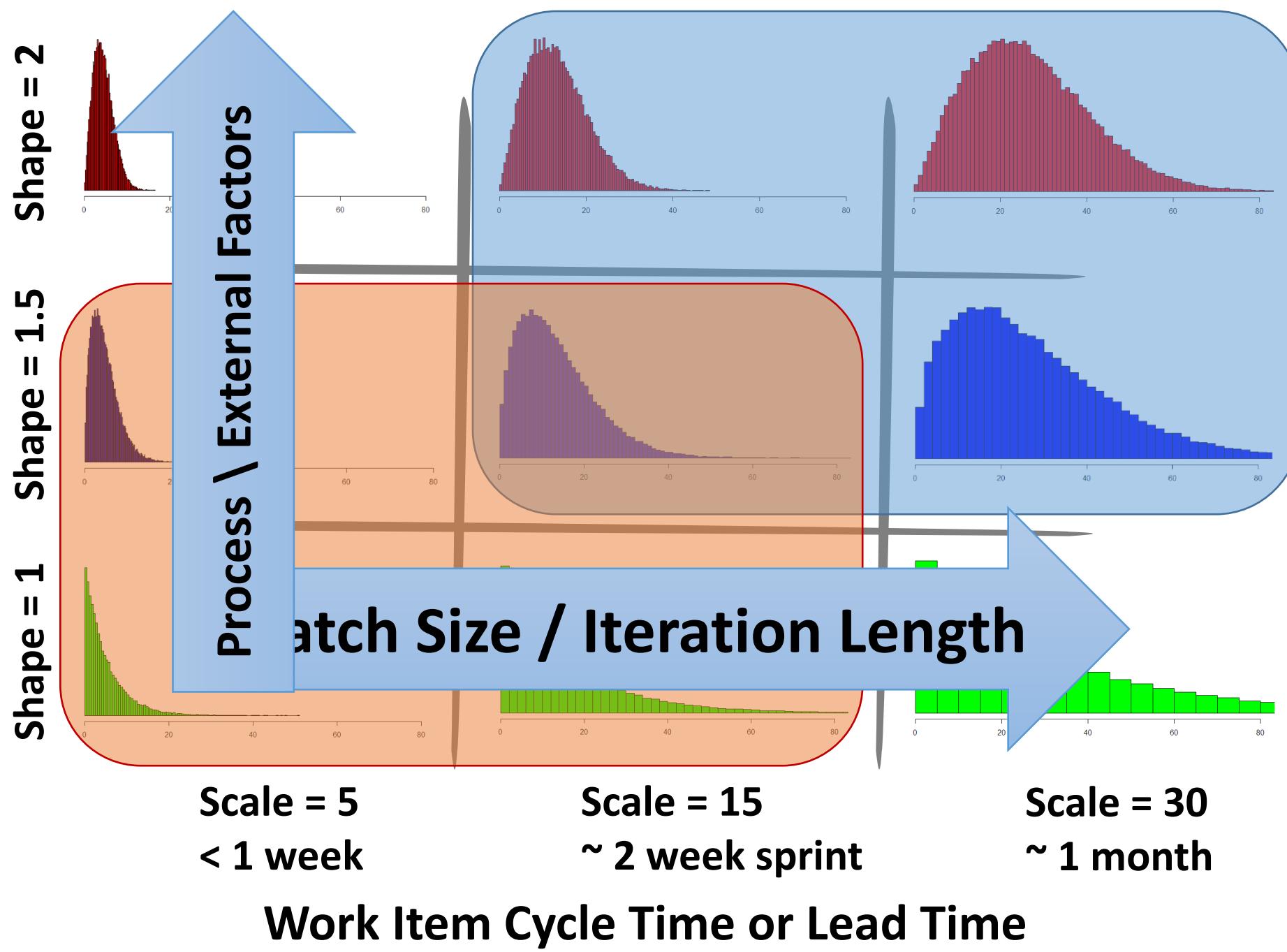
Troy.Magennis@FocusedObjective.com

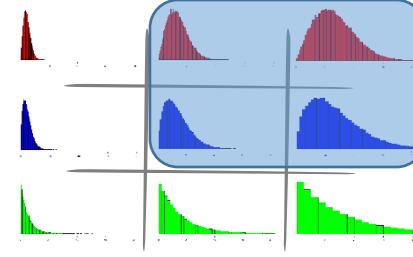
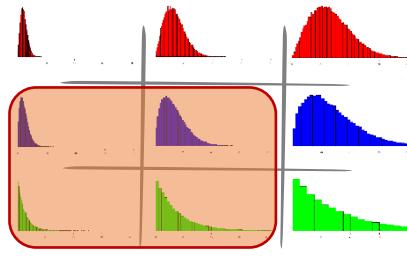


Please consider  
doing the review



**Work Item Cycle Time or Lead Time Distribution  
Through the Ages**





## Lean, Few dependencies

- Higher work item count
- More granular work items
- Lower WIP
- Team Self Sufficient
- Internal Impediments
- Do: Automation
- Do: Task Efficiency

## Sprint, Many dependencies

- Lower work item count
- Chunkier work items
- Higher WIP
- External Dependencies
- External Impediments
- Do: Collapse Teams
- Do: Impediment analysis



## Focused Objective software risk solutions

FocusedObjective.com  
@AgileSimulation

# Troy Magennis

troy.magennis@focusedobjective.com  
phone: 425 223 8097 skype: troy.magennis twitter: @t\_magennis

Conference Special:  
Download the session slides,  
a free copy of our simulation  
software and a copy of this  
book in PDF format from  
<http://bit.ly/agilesim>

**Forecasting and  
Simulating Software  
Development Projects**

Effective Modeling of Kanban & Scrum  
Projects using Monte-carlo Simulation

The book cover features a blue header with the title and subtitle. Below the title is a small image of a bar chart. The author's name, 'Troy Magennis', is at the bottom right, along with the website 'FocusedObjective.com'. A small note at the bottom left says 'Includes Risk Assessments for Iterated Objectives, Stories, and Activities'.

# Cycle time analysis

How to interpret cycle time distributions in coaching

# Q. Can historical cycle-time be used for coaching advice?

2015 48th Hawaii International Conference on System Sciences

**The Economic Impact of Software Development Process Choice -  
Cycle-time Analysis and Monte Carlo Simulation Results**

Troy Magennis  
[troy.magennis@focusedobjective.com](mailto:troy.magennis@focusedobjective.com)

**Abstract**  
*IT executives initiate software development process methodology change with faith that it will lower development cost, decrease time-to-market and increase quality. Anecdotes and success stories from agile practitioners and vendors provide evidence that other companies have succeeded following a newly chosen doctrine. Quantitative evidence is scarcer than these stories, and when available, often unverifiable.*

*This paper introduces a quantitative approach to assess software process methodology change. It proposes working from the perspective of impact on cycle-time performance (the time from the start of individual pieces of work until their completion), before and after a process change.*

*This paper introduces the history and theoretical basis of this analysis, and then presents a commercial case study. The case study demonstrates how the economic value of a process change initiative was quantified to understand success and payoff.*

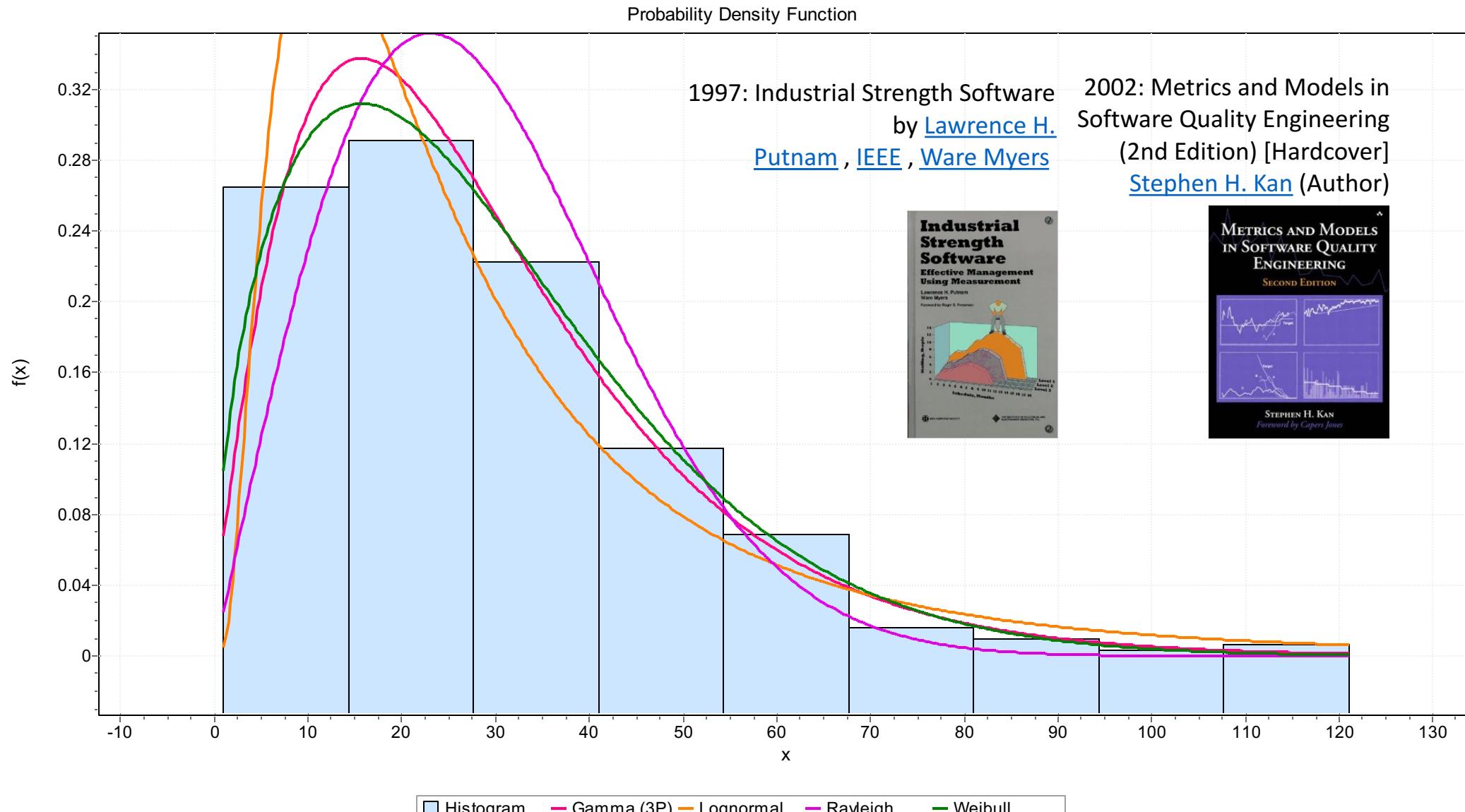
*Cycle-time is a convenient metric for comparing proposed and ongoing process improvement due to its easy capture and applicability to all processes. Poor cycle-time analysis can lead to teams being held to erroneous service level expectations. Properly comparing the impact of proposed process change scenarios, modeled using historical or estimated cycle-time performance helps isolate the bottom line impact of process changes with quantitative rigor.*

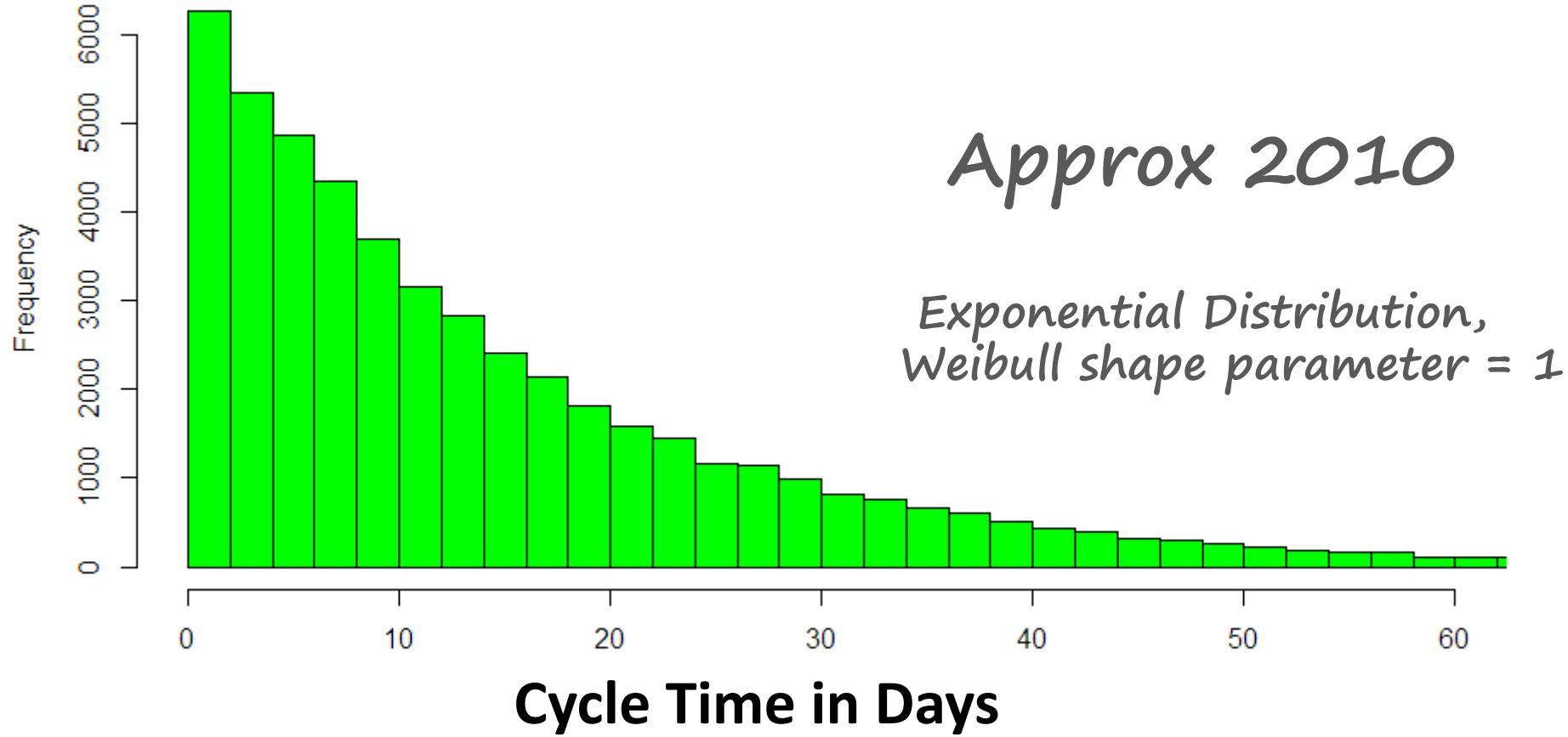
Scrum, and Kanban are some of the well-known processes that have risen to the top of the popularity charts, each with case studies (often just one) showing great impact when applied correctly by the inventors. The final choice appears to fall on faith based lines, with many organizations moving from one process to the next in search of nirvana. A quantitative framework for estimating and assessing true impact is needed for informed decisions.

Measuring the quantitative impact of a software development process change is hard. Measurable change takes weeks or months to evolve, and there is little in the way of control group – change is implemented and the outcome if that change wasn't performed isn't an interesting or easily discernable metric. This paper presents one technique for quantitatively estimating the potential economic outcomes both before and after a change has been implemented.

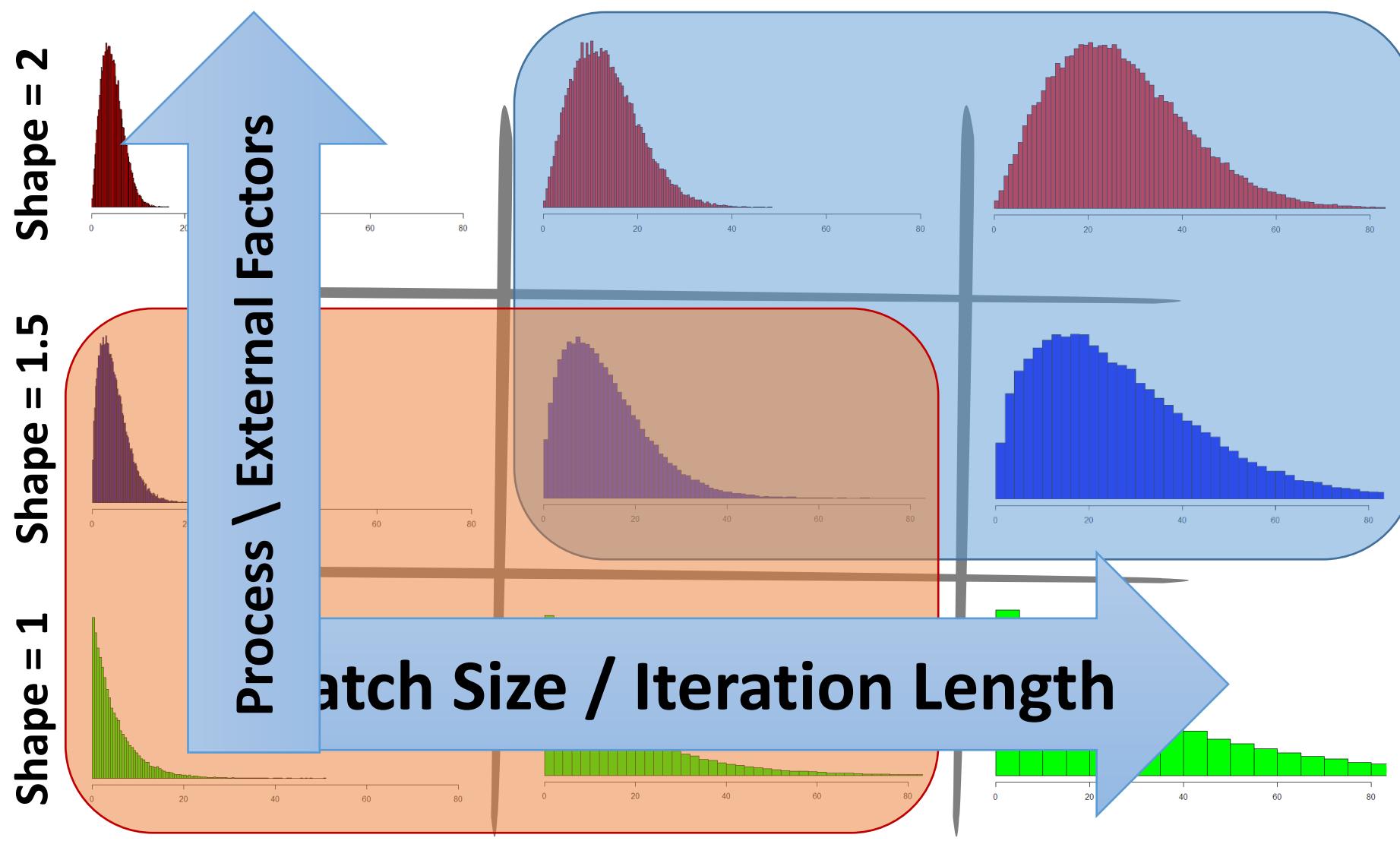
The basis for the method described here is probabilistically simulating the impact of changes in cycle-time samples from a prior project to a completed project using new methodology. To estimate the potential payoff for a new process, existing cycle-time samples can be discounted by fixed percentage amount to simulate the financial return for hypothetical reductions (10%, 25%, for example). Once change has occurred, actual results can be compared to the predicted data to validate the difference and improve modeling efforts on future initiatives.

<http://conferences.computer.org/hicss/2015/papers/7367f055.pdf>





## Work Item Cycle Time or Lead Time Distribution Through the Ages

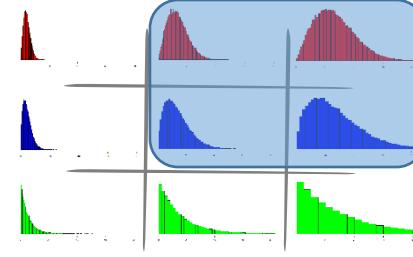
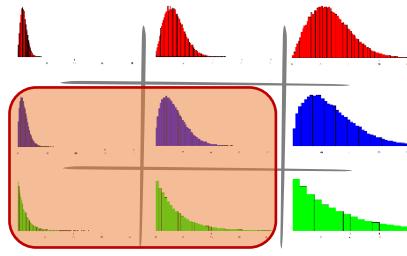


**Scale = 5**  
**< 1 week**

**Scale = 15**  
**~ 2 week sprint**

**Scale = 30**  
**~ 1 month**

**Work Item Cycle Time or Lead Time**

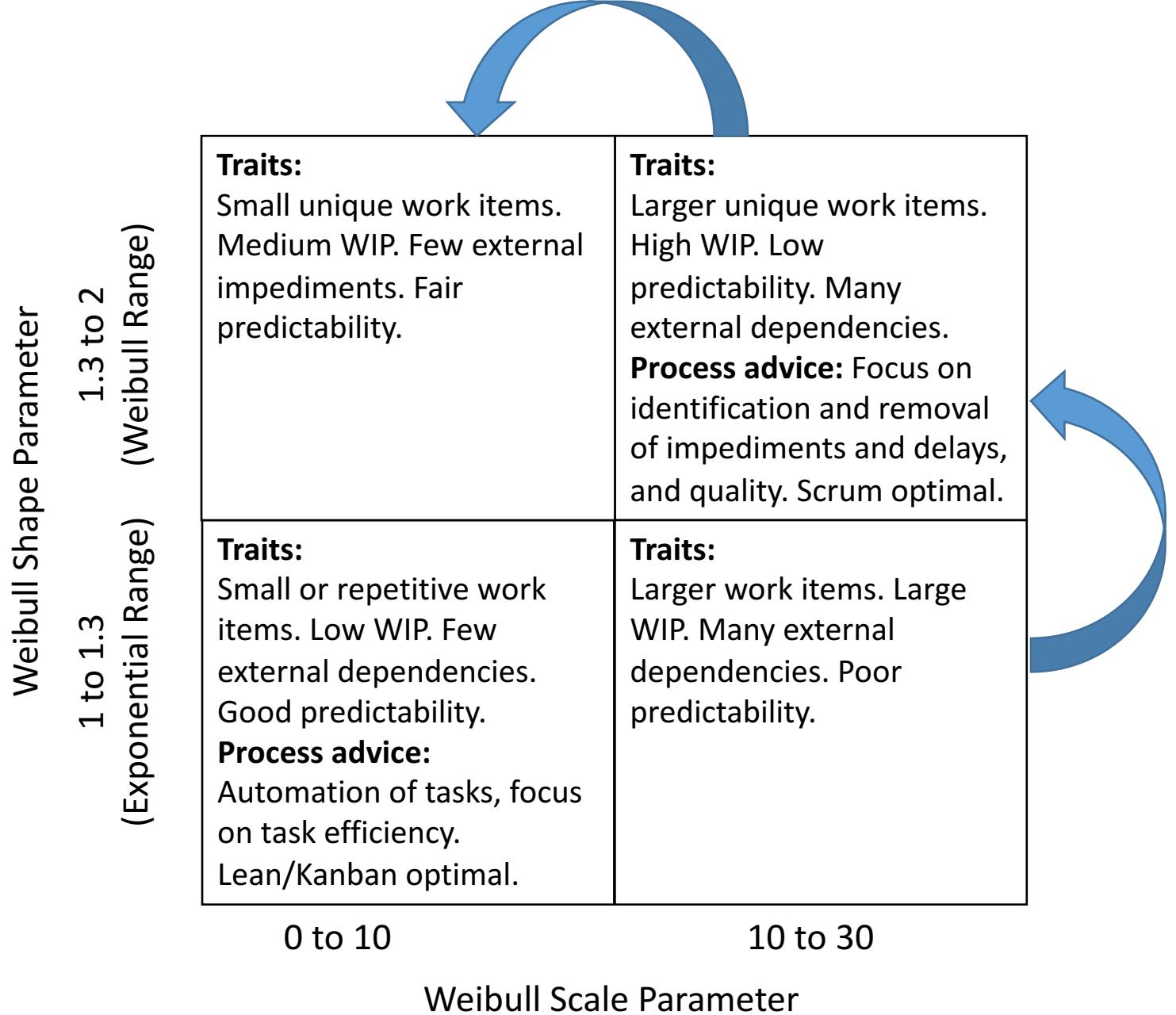


## Lean, Few dependencies

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- Higher WIP
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- Do: Collapse Teams
- Do: Impediment analysis



# Forecasting and Risk

Helping teams see and understand risk impacts

# **Q. Could I make a simple forecast tool that worked?**

**Without macros or add-ins!**

**<http://bit.ly/ThroughputForecast>**

**Or follow @t\_magenisis**

# <http://bit.ly/ThroughputForecast>

## Forecast Completion Date

1. Start Date

4/1/15

2. How many stories are remaining to be completed?

(enter the range estimate of stories. Tip: start wide and narrow as certainty increases)

Low guess

20

Highest guess

30

3. Stories are often split before and whilst being worked on. Estimate the split rate low and high bounds.

(often the throughput in the backlog is pre-split, but captured throughput post-split. Adjust for this here)

Low guess

1.00

Highest guess

1.00

4. Throughput. How many completed stories per week or sprint do you estimate low and high bounds?

Throughput estimate/samples are per

Week

7 days

Use historical throughput data OR enter a low and high estimate below. Use:

[Estimate](#)

Low guess

1

Highest guess

5

Can I use velocity rather than throughput?

Yes. If you do have estimates in story points, then you can sum all of the estimates and use that for input 2 and estimate or use historical team velocity for input 4. The benefit of using throughput (count of completed stories) is that it's much more difficult to manipulate than velocity (count of story points).

# <http://bit.ly/ThroughputForecast>

## Results

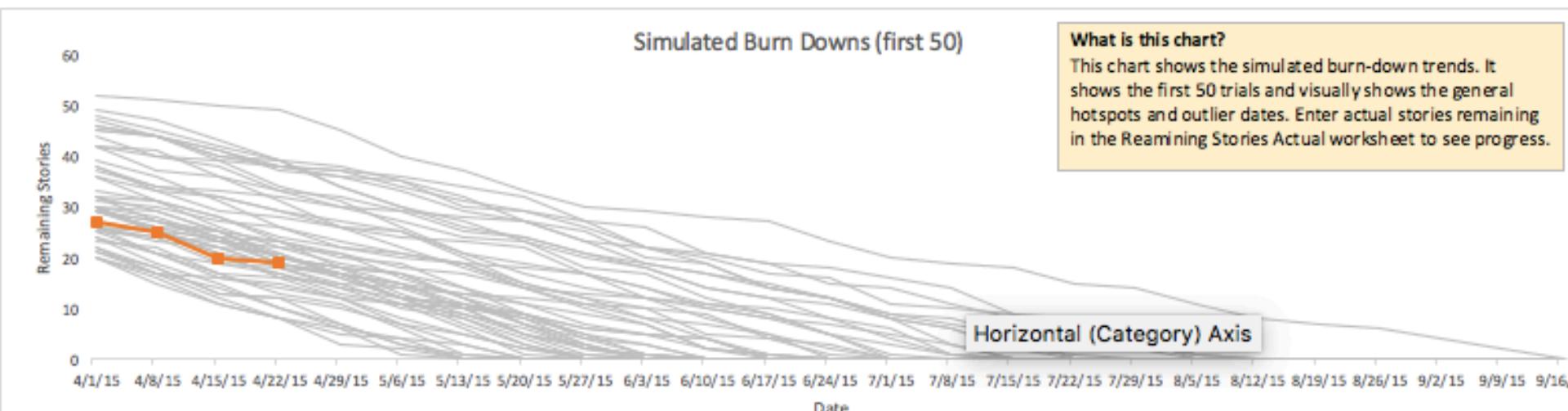
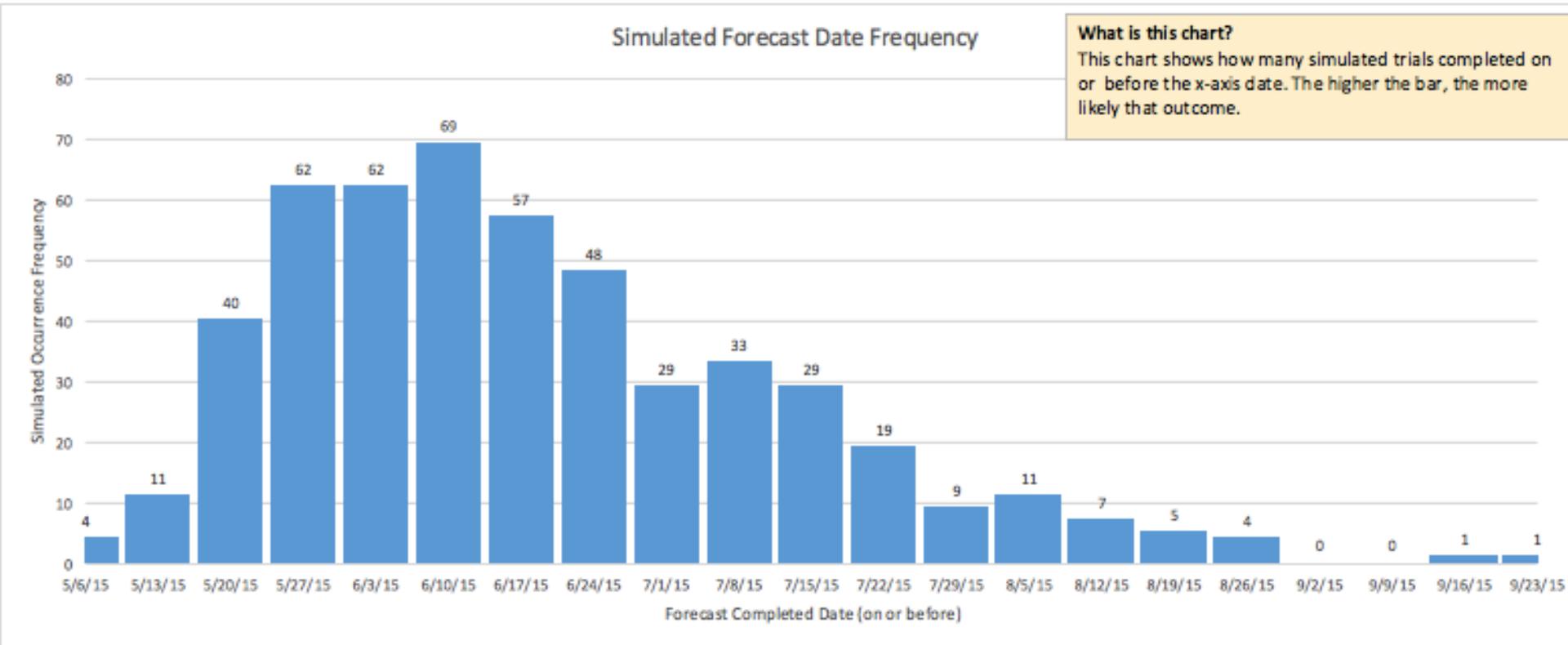
Likelihood	Duration in	
	Week's	Date
100%	25	9/23/15
95%	18	8/5/15
90%	16	7/22/15
85%	15	7/15/15
80%	14	7/8/15
75%	13	7/1/15
70%	12	6/24/15
65%	12	6/24/15
60%	11	6/17/15
55%	11	6/17/15
50%	11	6/17/15
45%	10	6/10/15
40%	10	6/10/15
35%	9	6/3/15
30%	9	6/3/15
25%	9	6/3/15
20%	8	5/27/15
15%	8	5/27/15
10%	7	5/20/15
5%	7	5/20/15

Almost certain

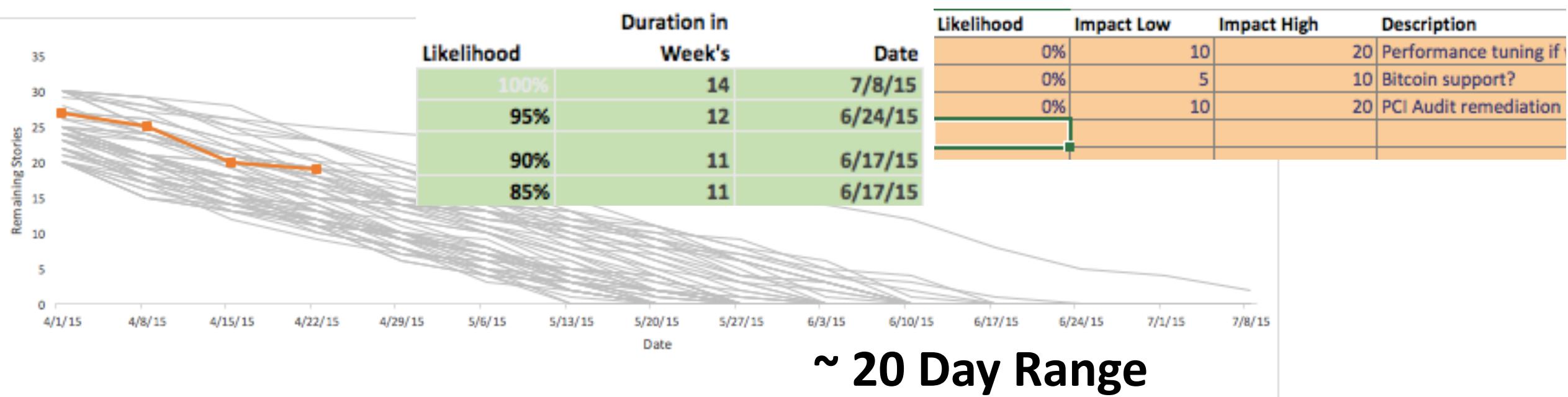
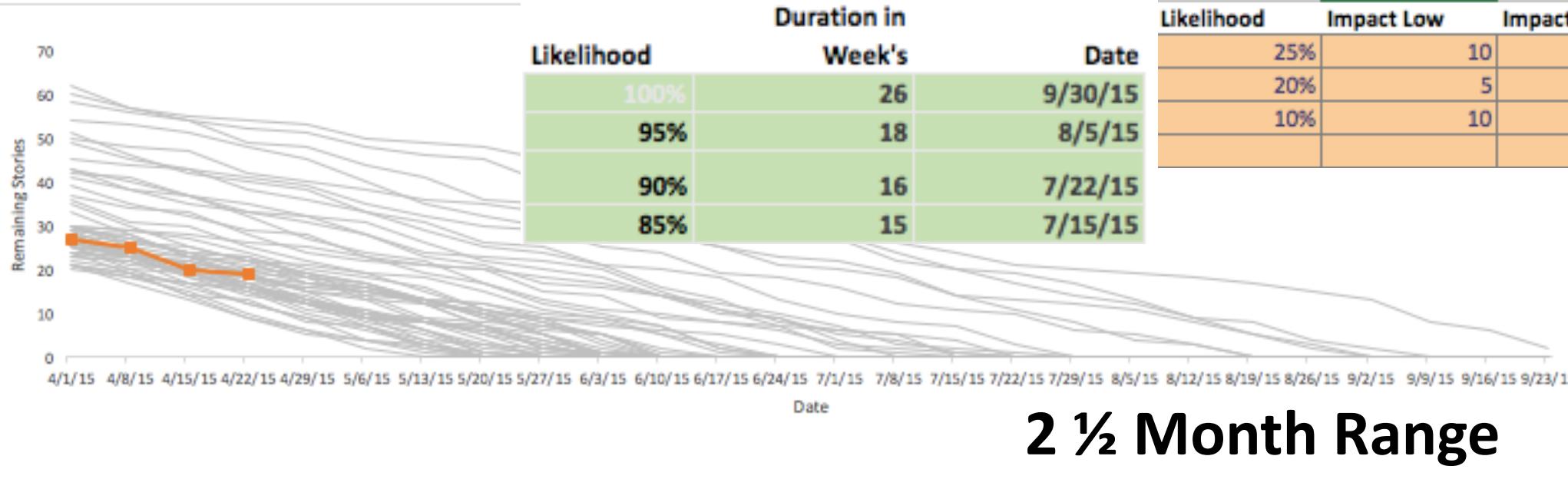
Somewhat certain

Less than coin-toss odds. But if you are game?

# <http://bit.ly/ThroughputForecast>



# <http://bit.ly/ThroughputForecast>



# References, Sources and Links

# Tools

- Excel or Google Sheets Spreadsheets (all free)
  - General metrics spreadsheet (17 charts) –
  - Team Capability Matrix –
  - Forecasting –
  - 10+ other spreadsheets tools all free –
- Visualization Tools
  - Tableau (\$995-\$1995) – [Tableau.com](http://Tableau.com)
  - PowerBI (free) –
  - Plotly (free) –
- Online Lean/Kanban Tool
  - [Leankit.com](http://Leankit.com)

# Cool Visualization Resources and Websites

- My blog – FocusedObject.com/blog
- WindyTy.com – weather
- NY Times
- Tableau Public
- Books
  - Tufty
  - Few

# FALL CLASSICS

MVPs whose teams won the World Series the same year

ESPN PLAYBOOK

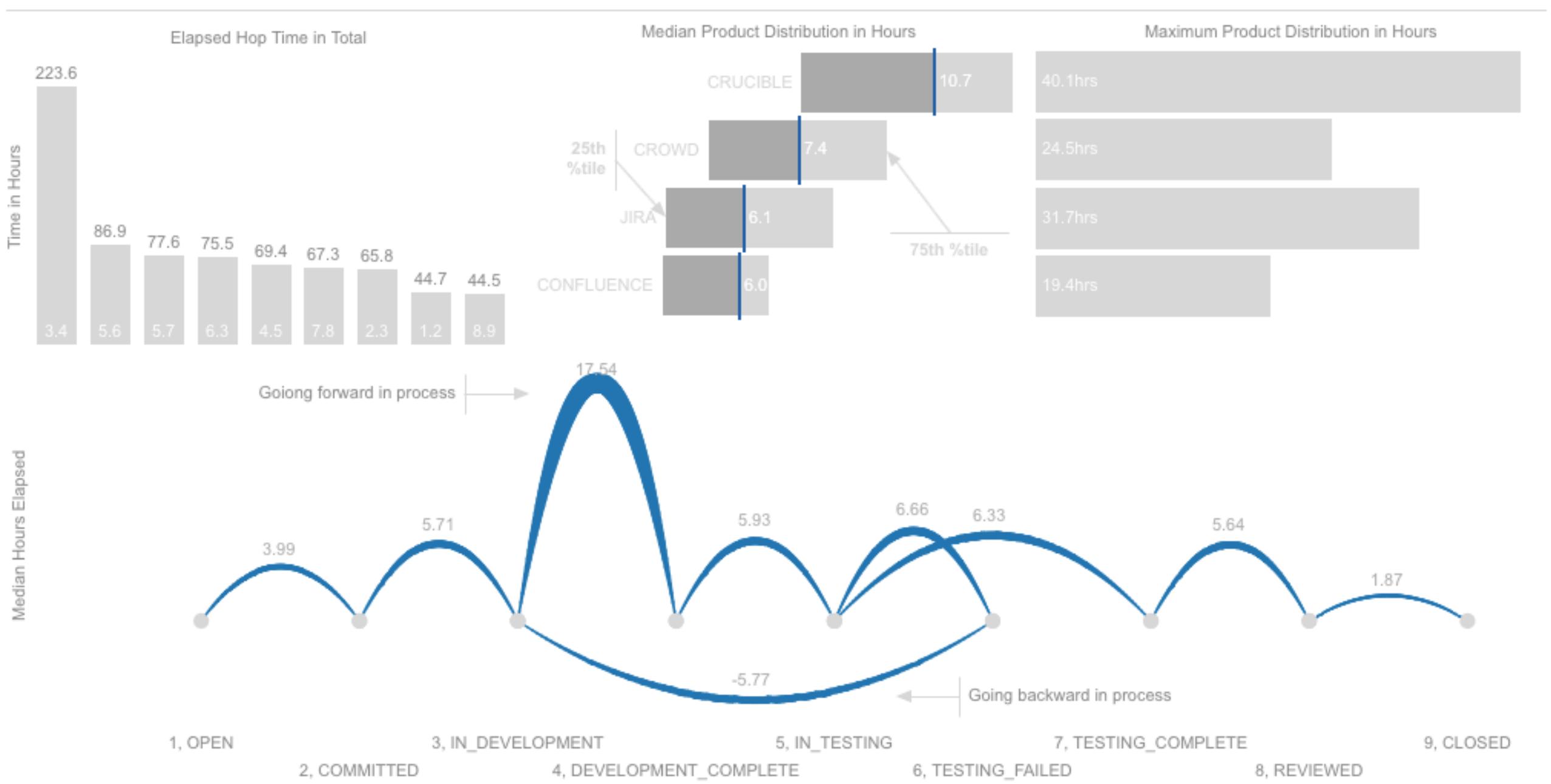
## NATIONAL LEAGUE MVPs



## AMERICAN LEAGUE MVPs



SD SPORTS DATA  
© 2014 Sports Data Corporation. All rights reserved.



Source: JumpPlot.com (total kudos to Tom VanBuskirk and Chris DeMartini )

# Coaching professional teams

- Is about team performance, not individual
  - If they don't know it by now, they self improve it
- [http://www.landofbasketball.com/awards/nba\\_season\\_mvps\\_year.htm](http://www.landofbasketball.com/awards/nba_season_mvps_year.htm)
- 23 championships + MVP / 60 = ~ 1/3
- <http://www.nba.com/2011/news/features/04/08/race-to-the-mvp-final-rankings/index.html>
- <http://national.suntimes.com/nba/7/72/1237030/lebron-james-stephen-curry-nba-finals-mvp>



# SDPI Dimensions

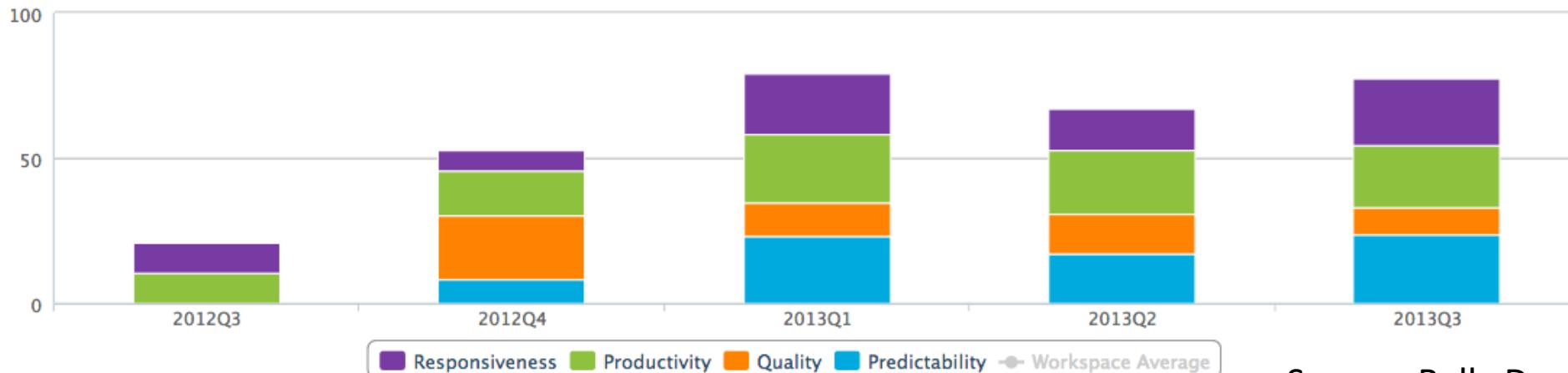
■ Responsiveness ■ Productivity ■ Quality ■ Predictability

- Productivity = throughput avg / team size
- Predictability = variability of throughput / size
- Responsiveness = time in process average
- Quality = released defect density / throughput

The Software Development Performance Index  
The SDPI framework includes a balanced set of outcome measures. These fall along the dimensions of Responsiveness, Quality, Productivity, Predictability, ...

Example, team over time -

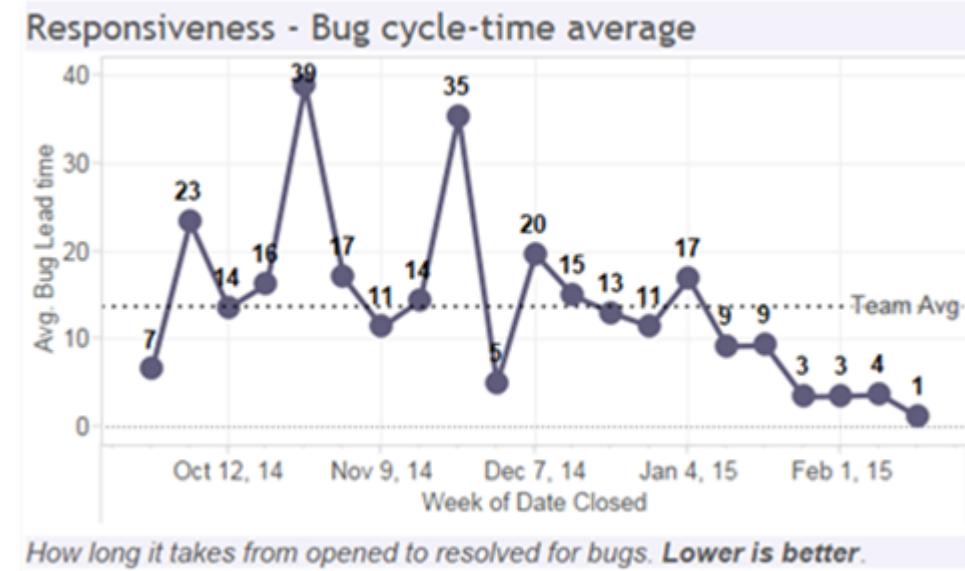
Software Development Performance Index  
*(Higher is better)*



Source: Rally Dev.

# Responsiveness

**“If something urgent comes along, how fast can we turn that around”**



- Average or median of the number of days between two dates for items closed within a period
- Cycle time or Lead time of ???
  - If reliable first touch date, use that
  - If just created date, then use P1 and P2 bug

# Completion Rate

**“What is holding us back on completing more. Lets discuss dependencies and blockers in the retrospective”**



- Team goal is to maximize number of COMPLETED items, not started items
- Count of items completed each period
- Don't celebrate bug throughput (as much)

# Predictability

**“How consistently do we deliver value?”**



- How much variation there is each week in throughput, normalized by “team size” in a rough way
- Coefficient of Variation = Mean/SD

# Data is evil, but it doesn't have to be

- Manipulate behavior by
  - Embarrass
  - Coerce
- Make a point rather than make a difference
  - No action,
  - just data to classify someone is good and someone is bad
- They can tell a story that helps balance and improve where time and energy is best spent
  - Metrics tell a story
  - We learn from the story and make actions
  - Through these actions we improve

# Purpose of coaching dashboards

- **Improvement – what to change**
  - To help teams identify their weakest area comparable to other teams in similar circumstances
  - To confirm improvement has been achieved after a process change experiment
  - To identify what was traded to achieve that improvement
- **Avoidance – what to watch (sense)**
  - To identify what internal team factors most disrupt team momentum
  - To identify what external factors most disrupt team momentum

# Data is un-necessary...

- When there is unlimited time and money, or the journey to a destination is well known, perhaps.
  - But this isn't the most common case
  - And even when data isn't captured on paper, its assumed in peoples heads
- There is always more demand than supply
- There are always insights that are missed
- There is always room for improvement
- You can try and guess. You may be often right, but how do you know?

# What makes a good metric?

- **Is relevant to the team or individual** - personalized
  - To compare against others, and to see progress
- **Is within the teams ability to move** (or get moved)
  - Has value in being diagnostic
- **Passively captured** (low cost and effort)
  - Look for cheapest correlated metric to a more costly metric where possible
- **Balances another metric** – demonstrates tradeoff and impacts – trends adversely to another metric
  - Look for cheapest metric that will likely be negatively impacted by movement of another metric