



DevOps at Microsoft

<https://aka.ms/devops-at-microsoft>

Rory Preddy
@RoryPreddy

First a History lesson about Microsoft's Devops Journey...

THE AGILE MANIFESTO



Manifesto for Agile Software Development

We are uncovering better ways of developing software by doing it and helping others do it.
Through this work we have come to value:

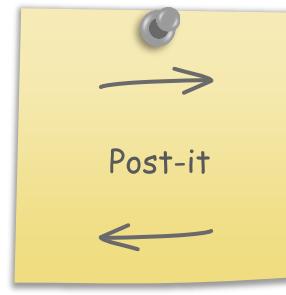
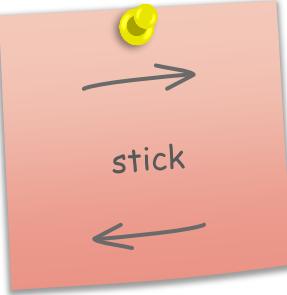
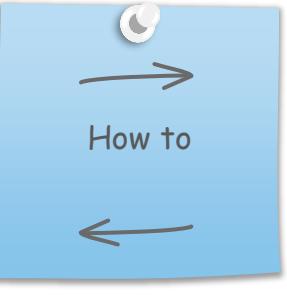
Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

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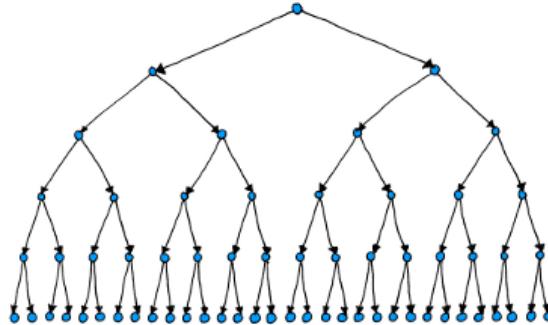
OPEN OFFICE



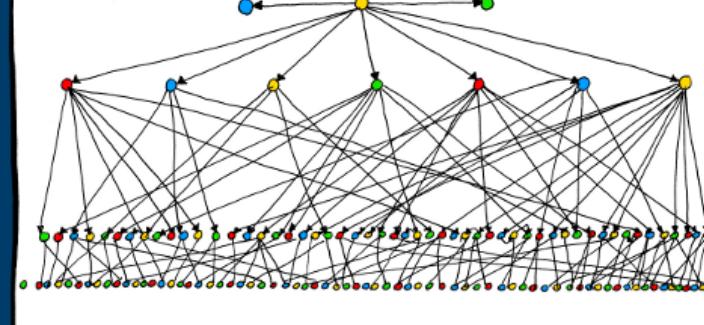


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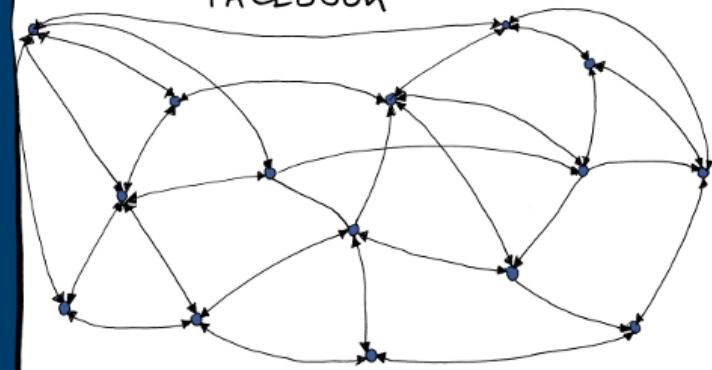
AMAZON



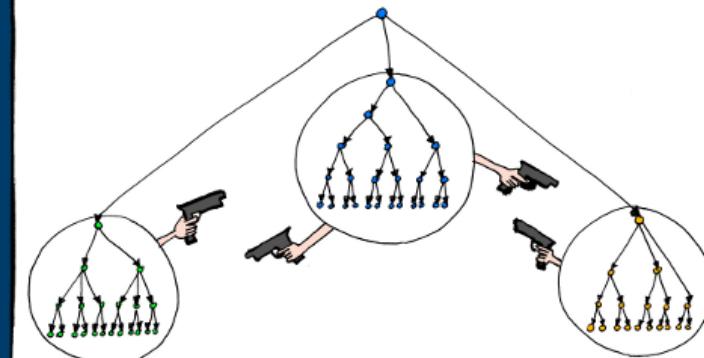
GOOGLE



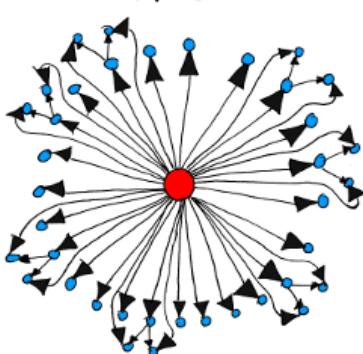
FACEBOOK



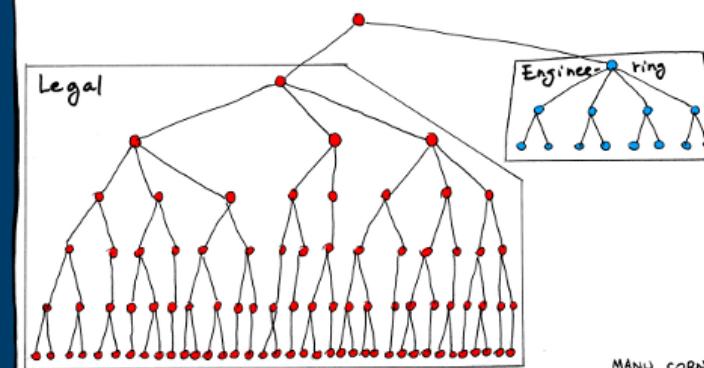
MICROSOFT



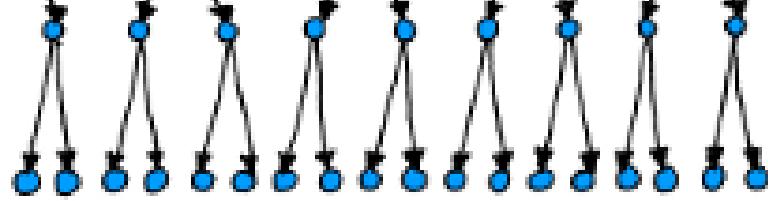
APPLE



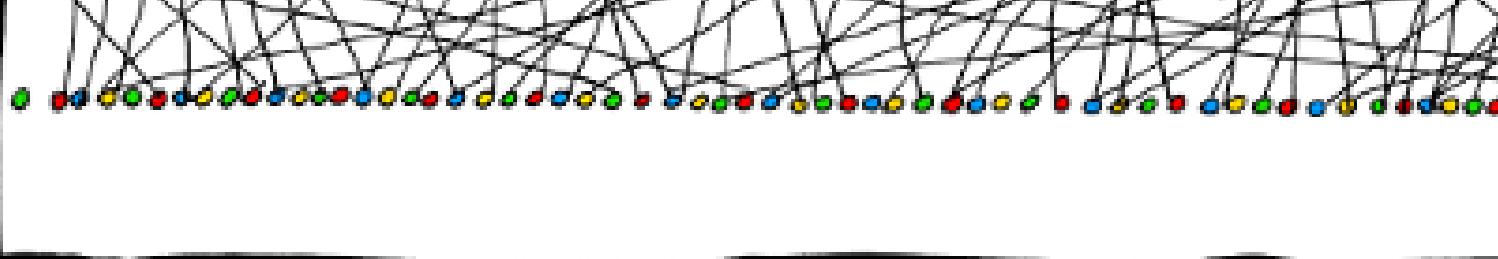
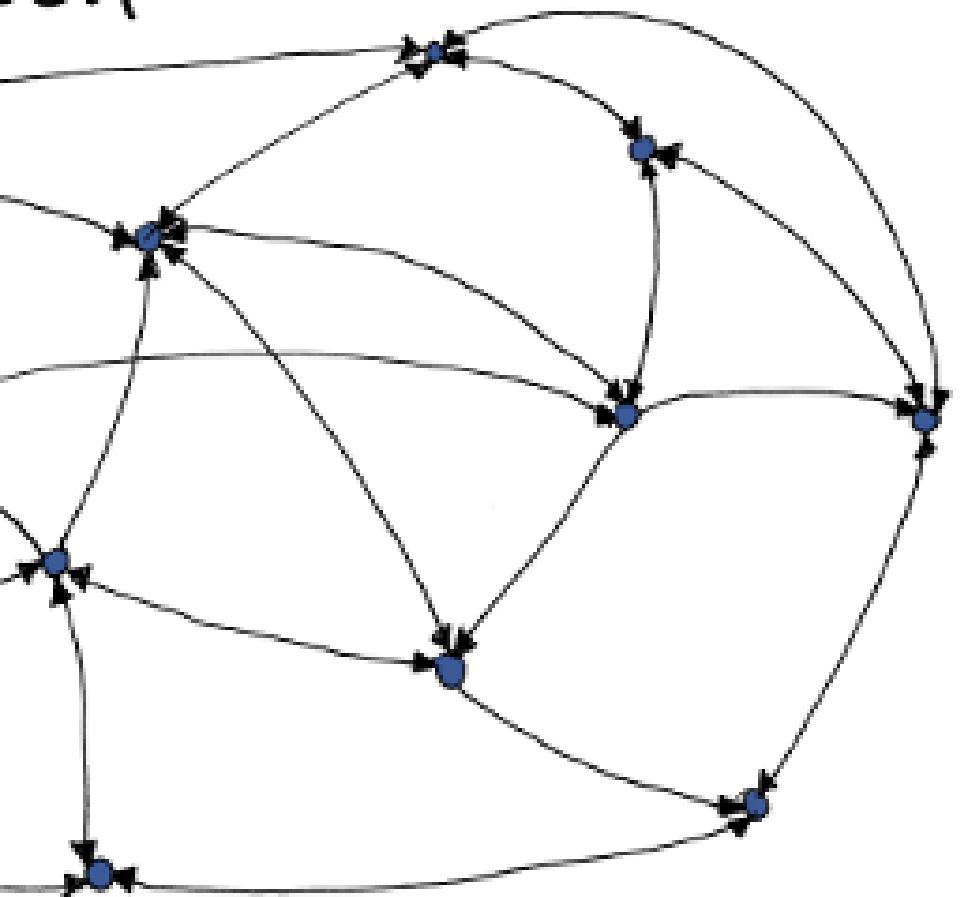
ORACLE



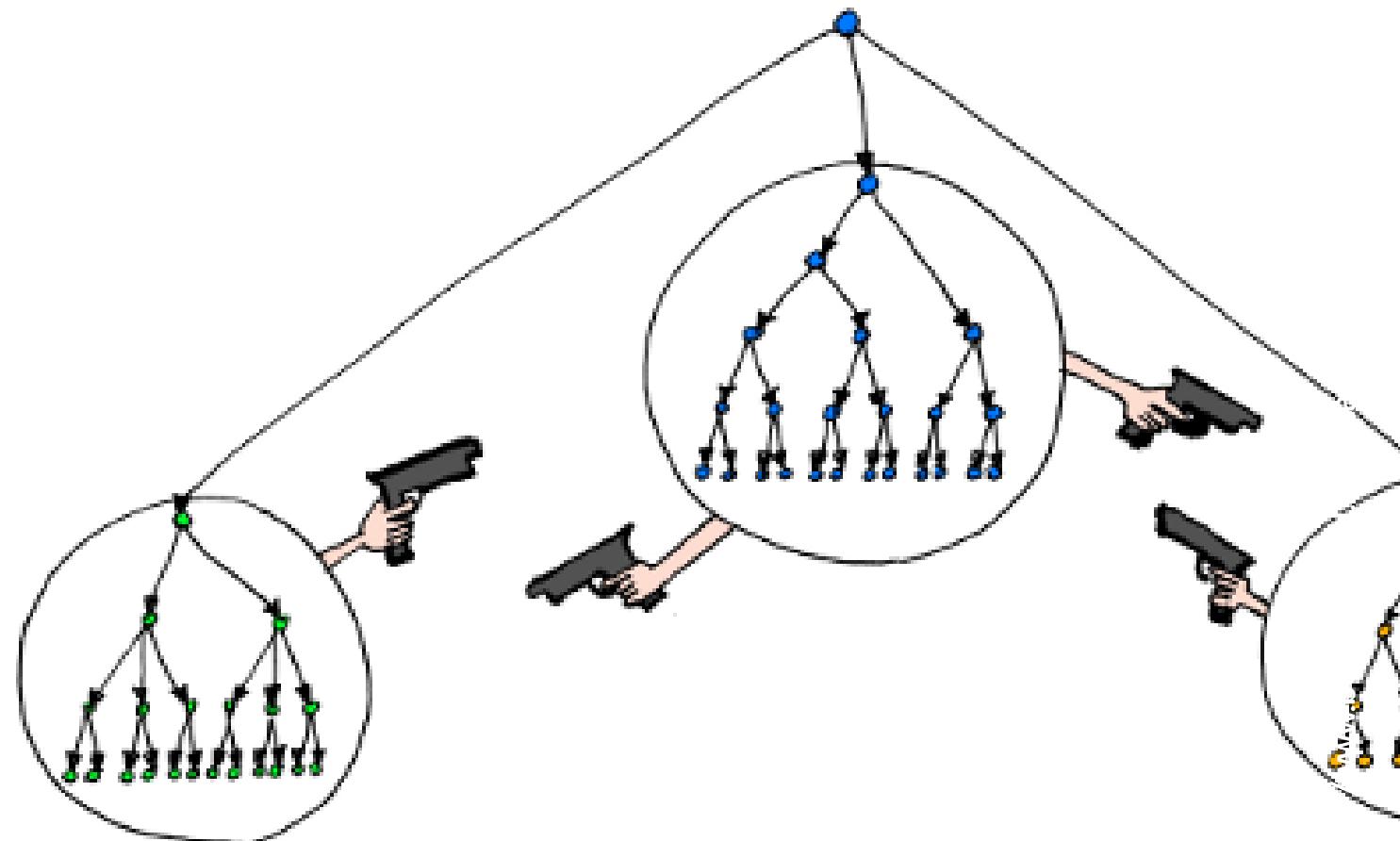
MANU CORNET



book



MICROSOFT

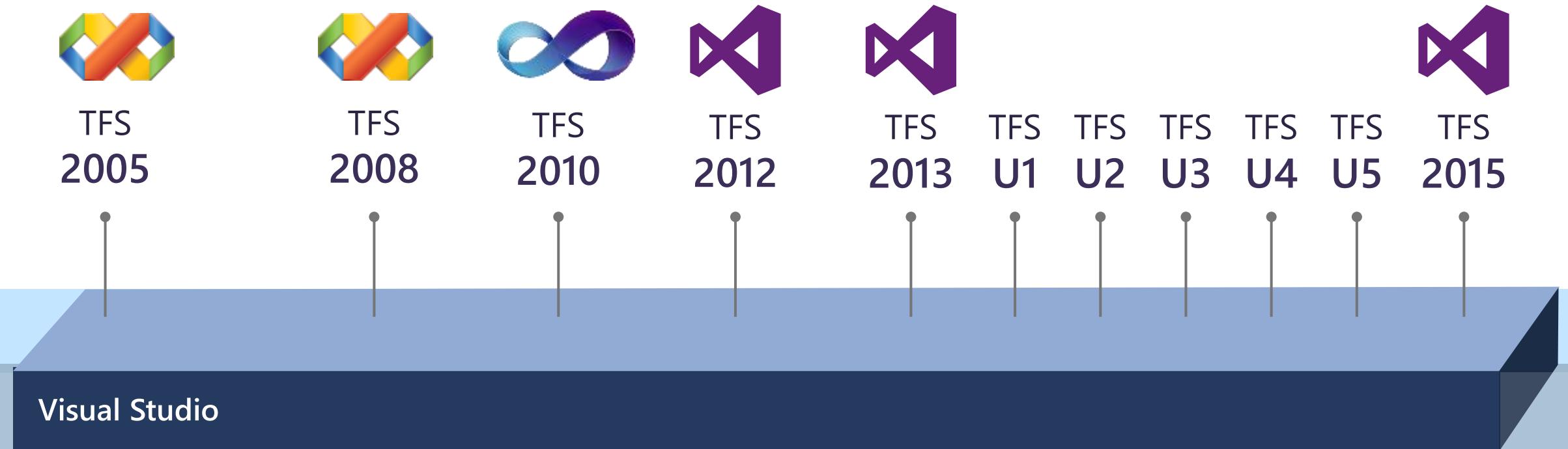


THE HYDRA

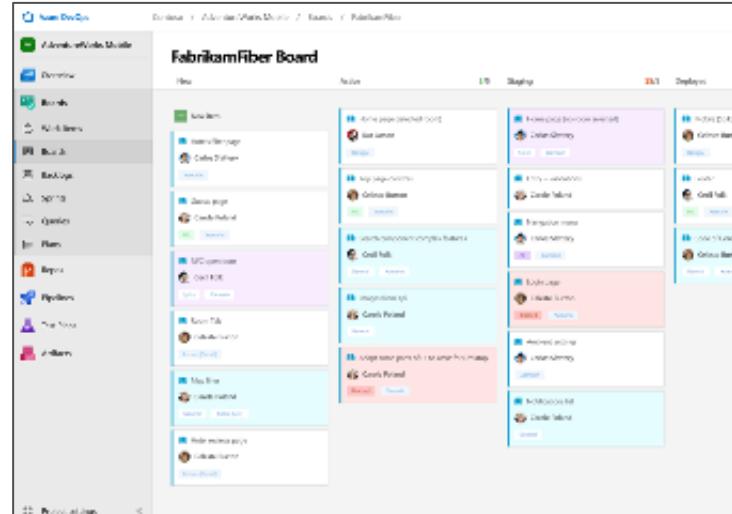
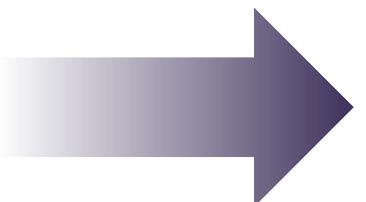
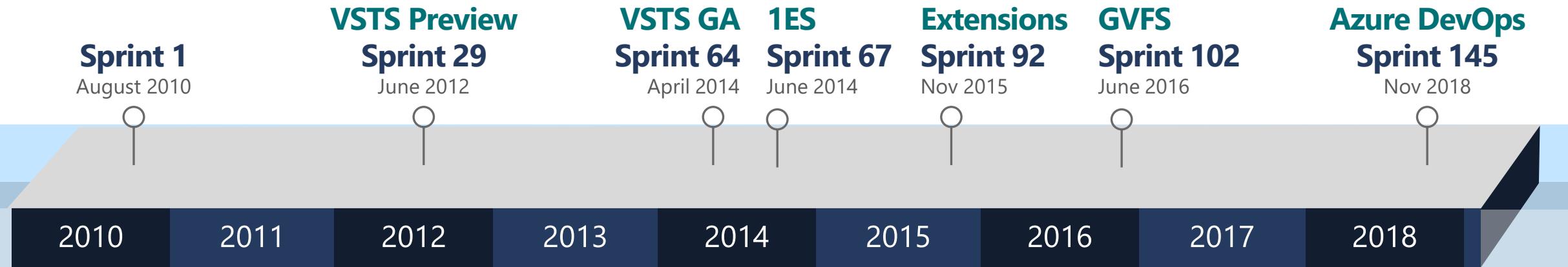


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THE JOURNEY



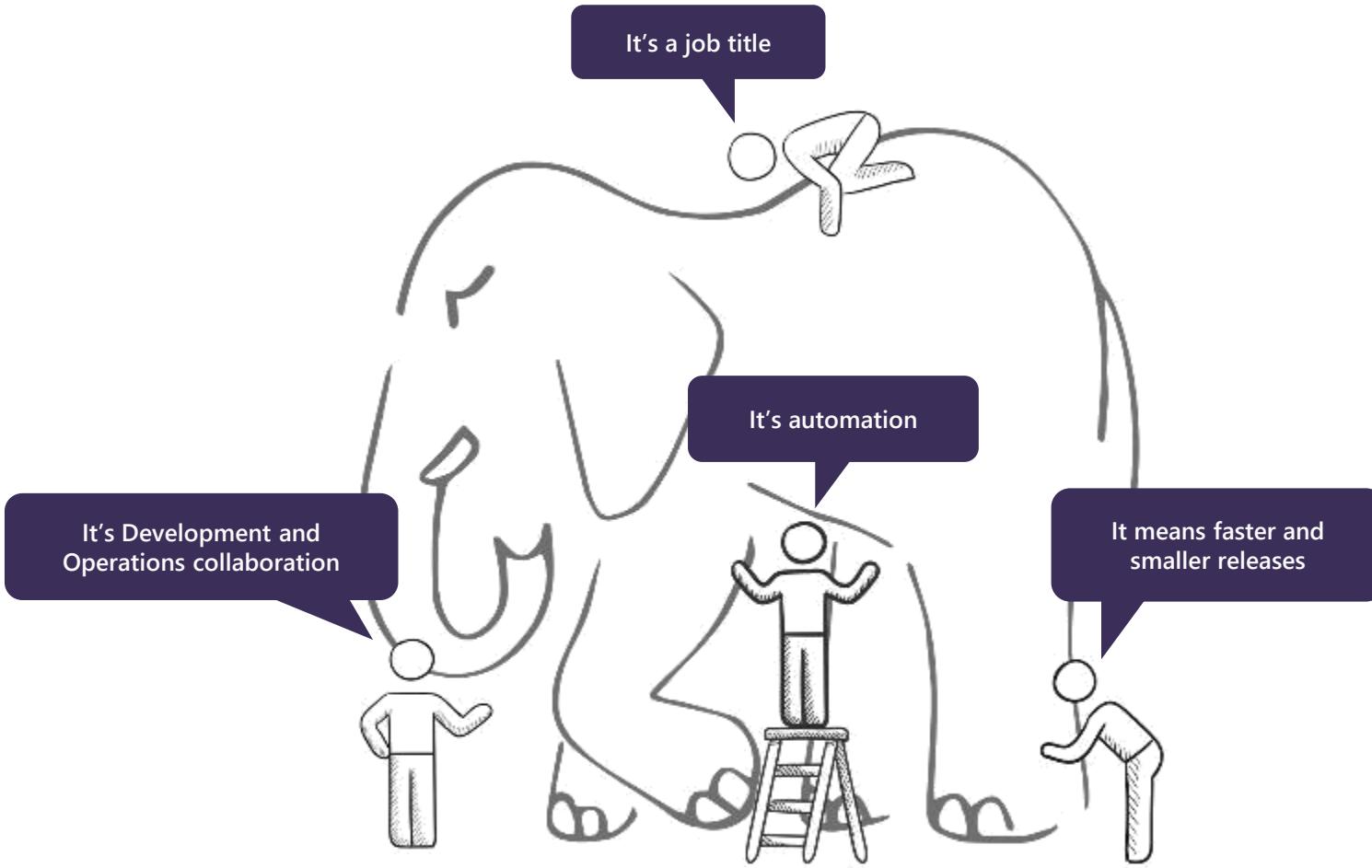
THE JOURNEY TO DEVOPS



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How we became agile and transformed a box software product into a service...

WHAT IS DEVOPS?



“DevOps is the union of people, process, and products to enable continuous delivery of value to our end users.”

- Donovan Brown

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“Don’t deploy on a Friday!”

- Rory Preddy

@RoryPreddy

AZURE DEVOPS

DevOps for any language and any platform



Azure Boards

Deliver value to your users faster using proven agile tools to plan, track, and discuss work across your teams.



Azure Pipelines

Build, test, and deploy with CI/CD that works with any language, platform, and cloud. Connect to GitHub or any other Git provider and deploy continuously.



Azure Repos

Get unlimited, cloud-hosted private Git repos and collaborate to build better code with pull requests and advanced file management.



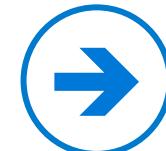
Azure Test Plans

Test and ship with confidence using manual and exploratory testing tools.



Azure Artifacts

Create, host, and share packages with your team, and add artifacts to your CI/CD pipelines with a single click.



<https://azure.com/devops>

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Get 3rd Party Extensions in the Azure DevOps Marketplace

Visual Studio | Marketplace

Dave Burnison (dabu@microsoft.com) Sign out 

Visual Studio Visual Studio Code **Azure DevOps** Subscriptions

Build your own Publish extensions

Jenkins AWS Chef Docker Terraform RedGate 

24 Results Showing: All categories Hosted On: Any Price: Any Visibility: All Sort By: Relevance

 AWS Tools for Microsoft Amazon Web Services 6.7K Tasks for Amazon S3, AWS Elastic Beanstalk, AWS CodeDeploy, AWS Lambda...  FREE	 Docker Integration Microsoft 10.6K Build, push, run or deploy Docker images and multi-container Docker applications.  FREE	 Jenkins Integration Microsoft 4.7K Jenkins is an award-winning, cross-platform, continuous integration and continuous delivery system.  FREE	 Redgate ReadyRoll Redgate Software 2.8K Develop and deploy databases in Visual Studio with migration scripts.  FREE	 AWS S3 Upload Marcus Felling 653 Build task to upload a file to S3 bucket in AWS.  FREE	 Terraform Peter Groeneweger 975 Build extension that enables you to run Terraforms on the build agent.  FREE
 Chef Integration Chef 594 Tasks for performing common Chef operations against the Chef Automate platform.  FREE	 Docker build task Lambda3 1.3K Adds a build task that enables Docker actions.  FREE	 Terraform Tyler Evert 154 Build extension for running Terraform commands.  FREE	 Terraform Jamie Phillips 22 Use Terraform with VSTS.  FREE	 VSTS Terraform James Sheridan 1 Build extension that enables you to run Terraform via a build agent.  FREE	 CloudBees Jenkins Platform CloudBees 119 Configure CloudBees Jenkins Platform to integrate with your Visual Studio Team...  FREE



<https://marketplace.visualstudio.com/azuredevops>

DEVOPS IN MICROSOFT

96,000

Engineers using
Azure DevOps



6.3m

Builds per month



5m

Work items viewed
per day



163,000

Deployments per day

2m

Git commits per month



500m

Test executions per day



500k

Work items updated
per day



Five habits we've learned so far



Five habits we've learned so far



LISTEN TO OUR CUSTOMERS

QUANTITIVELY & QUALITATIVELY

Developer Community
Get help from our community supported forum

Search here first for problems, suggestions, answers, topics, and users

Stack Overflow [azure-devops]

Questions tagged [azure-devops]

Sponsored links for this tag

- Create a free Azure DevOps account today
- Learn more about Azure DevOps
- What is DevOps?
- Free unlimited builds for open source projects on Linux, Mac or Windows
- Migrate from TFS to Azure DevOps

Azure DevOps is a suite of 5 services you use together or independently. For example, Azure Pipelines provides build services (CI), that are free for open source projects and available in the GitHub marketplace. Azure Pipelines also provides release management for continuous delivery (CD) to any ...

Learn more... Top users Synonyms (7)

7,330 questions

Info Newest Featured Frequent Votes Active Unanswered

3 Create remote GIT branch with Azure Repos
I am implementing a GIT repository in Visual Studio Online (and VS 2015 pro) and I am trying to implement a branching strategy that requires multiple remote branches. So, given that I start with "...
1 answer git visual-studio-2015 azure-devops modified 1 hour ago Quiver 610 2 12 32

1 Modify Azure AppService ipsecurity during release from Azure Pipelines
I am trying to add new ip addresses to the whitelist of Azure AppService. I am unable to use XML Transformation or simply replace tokens as the needed list of new entries will be obtained in the ...
1 answer powershell azure azure-devops release whitelist modified 1 hour ago Martin Brandl 34.2k 10 48 84

454 views

1 Build sqiproj on Azure DevOps
I'm trying to use Azure DevOps Pipelines to build my .NET Core 2.1 solution from GitHub. It includes a SQL

Related Tags

- tfs × 1779
- azure-pipelines × 1020
- azure × 839
- git × 767
- visual-studio × 616
- azure-pipelines-release-pipeline × 470
- c# × 459
- azure-pipelines-build-task × 344
- continuous-integration × 339
- tfsbuild × 334

more related tags

Hot Network Questions

Largest word chain from a list of words
Word for a person responsible for collecting and

Projects - Home https://dev.azure.com/loecd़

Azure DevOps

My organizations

- LoECDA
- BlackShirt
- mydemos
- devrel

60 more organizations

LoECDA

Projects My work items My pull requests

TM Team Module This is a PowerShell module named Team for using TFS and VSTS from PowerShell. The code is Open source in GitHub.

We want your feedback!

How likely are you to recommend Visual Studio Team Services to a friend or colleague? *

NOT AT ALL LIKELY EXTREMELY LIKELY

Get started Service status Report a bug Contact support Make a suggestion Privacy policy Code of conduct

Location Business Champ Engaged Monthly WIT VC NPS Resp.

Location	Business	Champ	Engaged Users	Monthly	WIT	VC	NPS	Resp.
Dublin, Ireland	Professional services	aaronha	7303 ↑	335	56%	56%	32%	204
London, England	Professional services	midenn	5216 ↑	363	62%	46%	28%	164
Norway, NL, Houston	Oilfield services	samgu	4242 ↑	195	64%	54%	2%	203
New York, NY	Professional services	trevorc	3973 ↑	423	60%	55%	17%	195
Amsterdam, NL	Oil & gas	jeffbe	3848 ↑	94	56%	35%	8%	167
New York, NY	Financial information / ana	amitigup	3197 ↑	409	72%	32%	20%	154
Medellin, Colombia	Commercial banking	mariorod	2682 ➔	24	80%	31%	-11%	90
Peoria, IL	Heavy equipment manufac	abarr	2644 ↑	137	57%	42%	23%	137
London, England	Oil & gas	rajr	2197 ↑	209	54%	34%	-8%	62
Princeton, NJ	Reinsurance	hdixon	1768 ↑	97	61%	27%	-20%	81
London, England	Professional services	jsharma	1668 ↑	376	48%	45%	40%	45
San Ramon, CA	Oil & gas	puagarw	1667 ↑	342	47%	42%	40%	48
Utrecht, NL	Insurance	saumyav	1554 ↑	66	73%	23%	-38%	16
Göteborg, Sweden	Automotive	sadar	1455 ↑	97	61%	41%	20%	46
Seattle, WA	IT Consulting	aaronha	1408 ↑	136	35%	43%	55%	47
Raleigh, NC	Computer assisted legal res	roferg	1392 ➔	11	38%	61%	21%	47
Liberty Lake, WA	Energy and water resource	buckh	1377 ↑	107	68%	49%	-2%	66
Seattle, WA	Freight forwarding service	midenn	1327 ➔	11	59%	0%	-52%	27
Amsterdam, NL	Financial services	shashb	1316 ↑	298	50%	30%	3%	38
Bentonville, AR	Retail	buckh	1304 ➔	18	47%	52%	-3%	34
Amsterdam, NL	Information Services	fraga	1251 ➔	35	56%	61%	10%	40
Auckland, NZ	Telecommunications	atinb	1249 ➔	-8	73%	15%	19%	37
Palo Alto, CA	Computer hardware & softwa	mariorod	1242 ↑	78	64%	17%	5%	59
Lowell, AR	Trucking & transport	gauravsi	1226 ↑	57	77%	74%	40%	5
Charleston, SC	Software publishing	chrispat	1165 ➔	31	63%	60%	-28%	47

YOU GET WHAT YOU MEASURE (DON'T MEASURE WHAT YOU DON'T WANT)

Customer Usage

- Acquisition
- Engagement
- Satisfaction (NPS)
- Churn
- Feature Usage

Pipeline Velocity

- Time to Build
- Time to Test
- Time to Deploy
- Time to Improve
- Failed and flaky automation

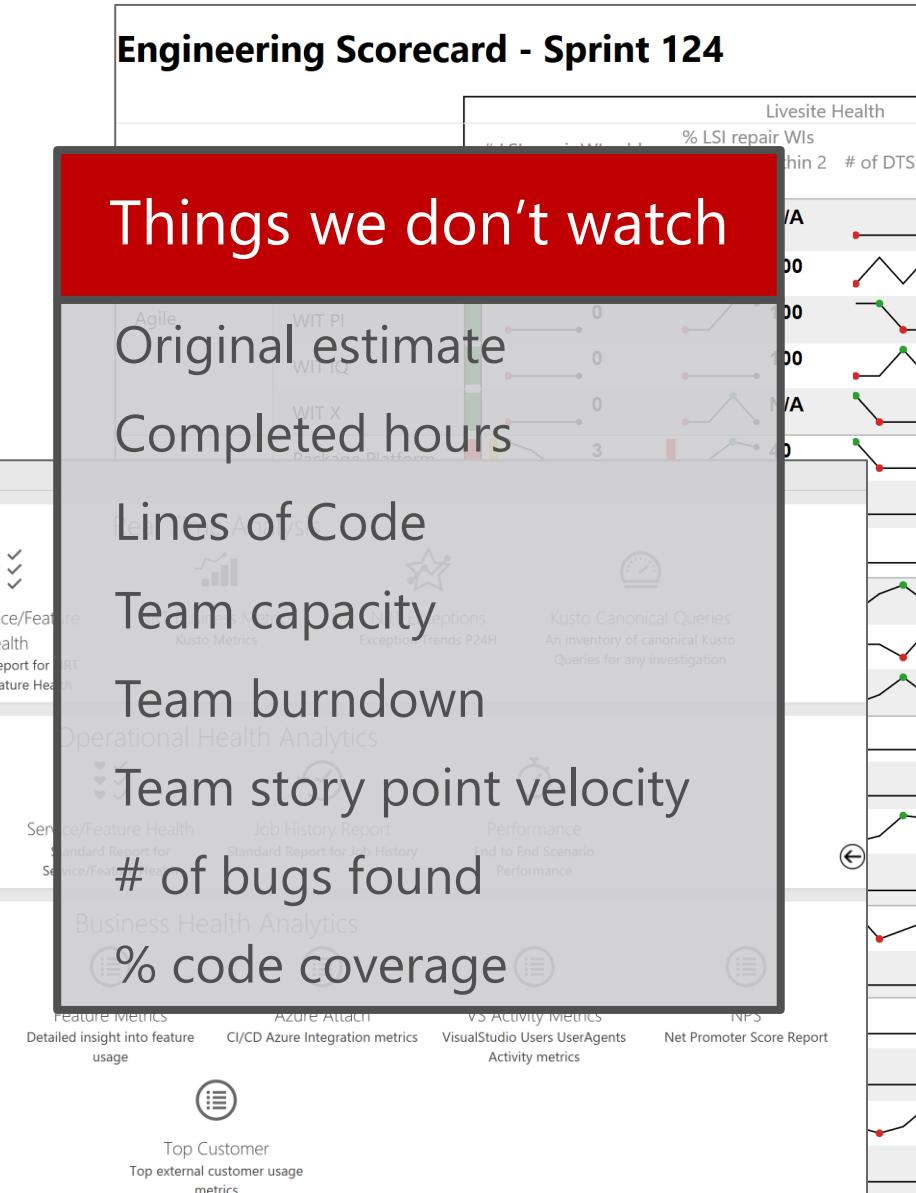
Live Site Health

- Time to Detect
- Time to Communicate
- Time to Mitigate
- Which customers affected
- Incident Prevention Items
- Aging Prevention Items
- SLA per Customer
- Customer Support Metrics

Engineering Scorecard - Sprint 124

Things we don't watch

- Original estimate
- Completed hours
- Lines of Code
- Team capacity
- Team burndown
- Team story point velocity
- # of bugs found
- % code coverage



Our Definition of Done

Live in production,
collecting telemetry
that examines the
hypothesis which
motivated the
deployment.



Build-Measure-Learn

Hypothesis



We believe {customer segment} wants {product/feature} because {value prop}

Experiment



To **prove** or **disprove** the above, the team will conduct the following **experiment(s)**: ...

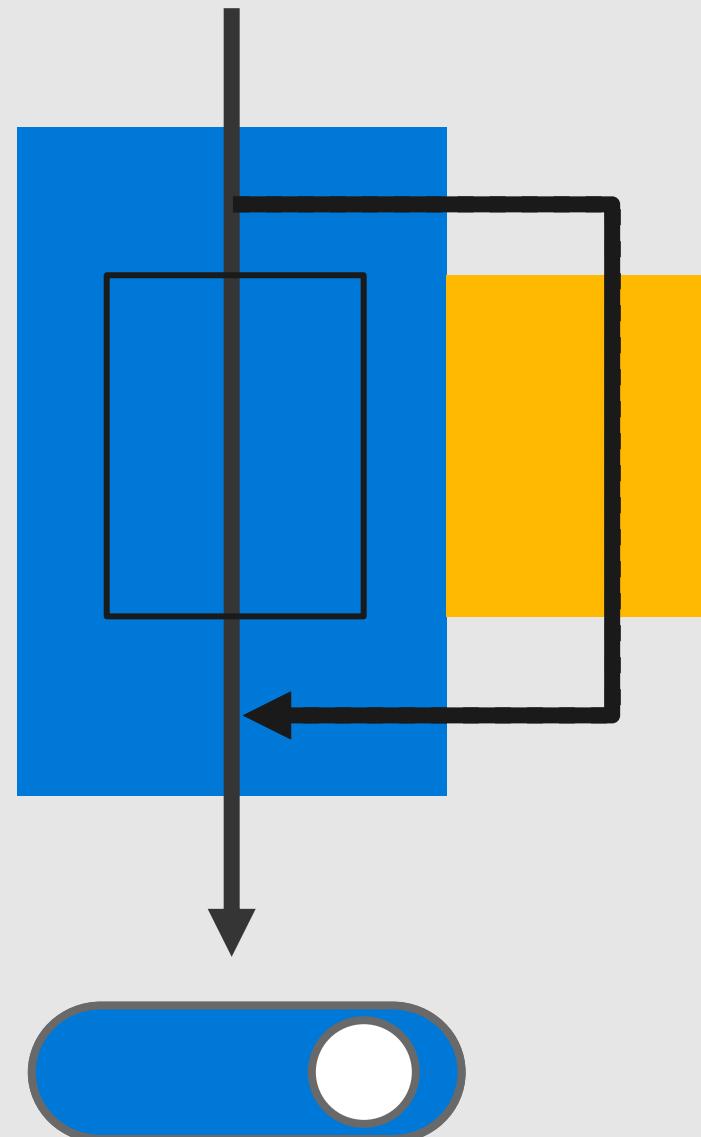
Learning



The above experiment(s) **proved** or **disproved** the hypothesis by impacting the following **metric(s)**: ...

Learn - Feature Flags

- All code is deployed, but feature flags control exposure
 - Reduces integration debt
- Flags provide runtime control down to individual user
- Users can be added or removed with no redeployment
- Mechanism for progressive experimentation & refinement
- Enables dark launch



Five habits we've learned so far



Roles

Engineering is responsible for production with Service Delivery Team

- Engineers
 - 24/7 on-call for their Product issues
 - Incidents in backlog (2 sprint rule)
- Site Reliability Engineers
 - Platform issues
 - Full production access



Incidents

- Communication externally to customers and internally to teams
- Gather data for repair items & mitigate incidents for customers
- Every action recorded

Severity 2 | TFS-WEU-2: Perf issues due to high CPU utilization by SSH service | In Progress ✓ Ready for Review ✓ Completed ✓

Primary Incident	TTD	TTM	TTE	TTN	Impact Duration
41287996	38m	40m	51m	1h 38m	40 minutes

Owning Service Visual Studio Team Services | Owning Team DRI-TFS | Owner Chris Sidi (chrisid) | Incident Manager Sainath Yerragudi (v-saye)

Communications Manager Ian Stewart (ianst)

Timeline

Impact Start *	Detection	Mitigation *	Eng. Engaged	First Customer Advisory	Other1	Comms. Engaged
06/30 10:35	06/30 11:13	06/30 11:15	06/30 11:26	06/30 12:13	06/30 12:26	06/30 13:04

Impact

Customer Impact

In WEU-2 we had high CPU utilization by SSH Service, due to that 49 users were impacted on first instance and 184 users were impacted on second instance in West Europe region and they experience degraded performance. Chart below shows trend of customer impact per our CEN definition.

Root Cause

Root Cause Title

TFS-WEU-2: Perf issues due to high CPU utilization by SSH service

Root Cause Details

Starting with M119, following a deployment, TeamFoundationSSHService's CPU would climb to consume 350% cpu (3.5 cores of an 8 core AT). In combination with w3wp's CPU, overall CPU was high enough to queue requests and cause slow commands.

The problem is MethodCPUCycleTracker in VssRequestContext consumes too much CPU due to its ConcurrentDictionary. This fix had already been merged to releases branch, but wasn't part of the latest deploy to this scale unit.

Bug:
https://mseng.visualstudio.com/VSONline/_workitems/edit/102

I chose "Caused by Change: Yes" below given that this was a code change introduced with M119. This wasn't caused by a configuration change.

Detection and Mitigation

Detection Source

Monitoring

Detection Details

TFS Customer Impact Monitor (CIA)

Mitigation Steps

- We got a Kalypso CIA alert
- By the time SD-DRI acknowledged the issue it got self-mitigated and it was intermittent, so SD created a bridge and engaged TFS DRI
- SD DRI Initial investigation says that deployment happened at following timings and they were matching to it.

```
ChangeRecord
| where PreciseTimeStamp > datetime('2017-06-30 13:00')
| where PreciseTimeStamp < datetime('2017-06-30 15:45')
| where componentName == "Team Foundation Service"
| where locationName contains "weu2"
| project PreciseTimeStamp , TaskName, status, ['title'], description, locationName , buildNumber
| order by PreciseTimeStamp desc
```

Repeat Outage

No

Category

Human Error - Code Defect

Caused by Change

No

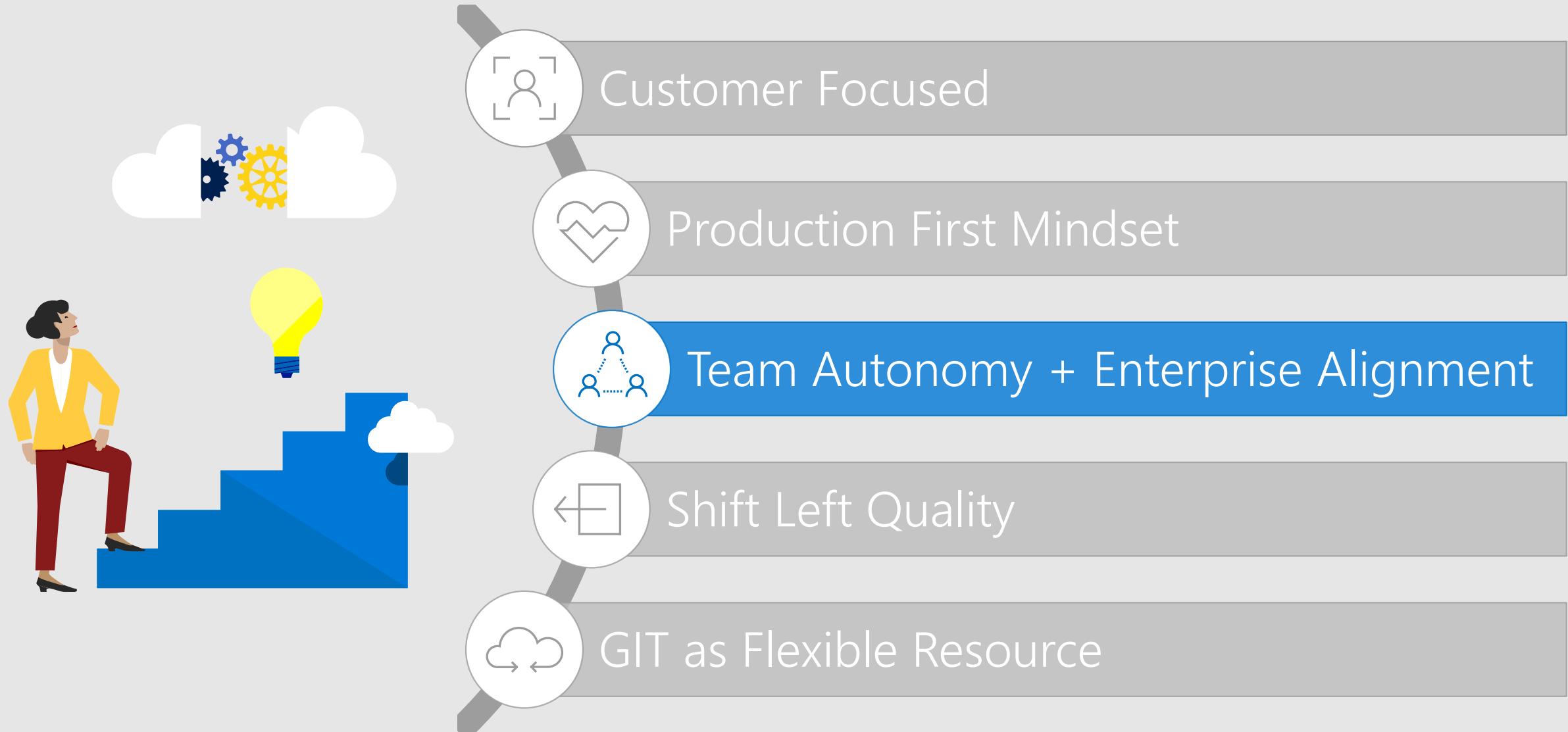
Fix

Bug has been deployed

Repair Items

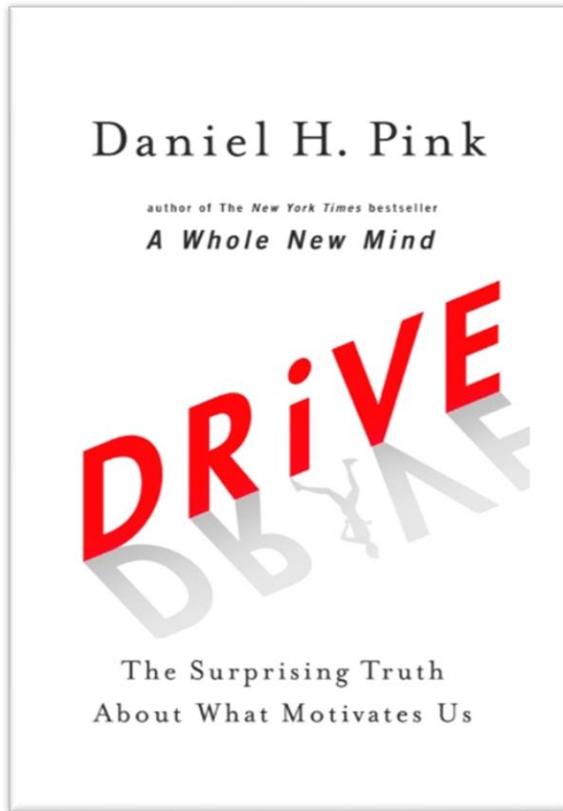
Source	Bug ID	Type	Delivery	Title	Owner	State
mseng	1028577	Fix	ShortTerm	MethodCPUCycleTracker is using too much CPU due to its ConcurrentDictionary		Closed
mseng	1029357	Diagnose	ShortTerm	Add SSH process CPU views in TFS DevOps reports	Venkata Sainath Reddy Yerragudi (MINDTREE LIMITED)	Resolved

Five habits we've learned so far



AGILE AT SCALE WITH ALIGNED AUTONOMY

"Let's try to give our teams three things.... Autonomy, Mastery, Purpose"



Organization

Roles

Teams

Cadence

Taxonomy

Plan

Practices

Alignment

Autonomy

@RoryPreddy

TEAM STRUCTURE



ORG CHART



PROGRAM
MANAGEMENT

DEVELOPMENT

TESTING

ORG CHART



PROGRAM
MANAGEMENT

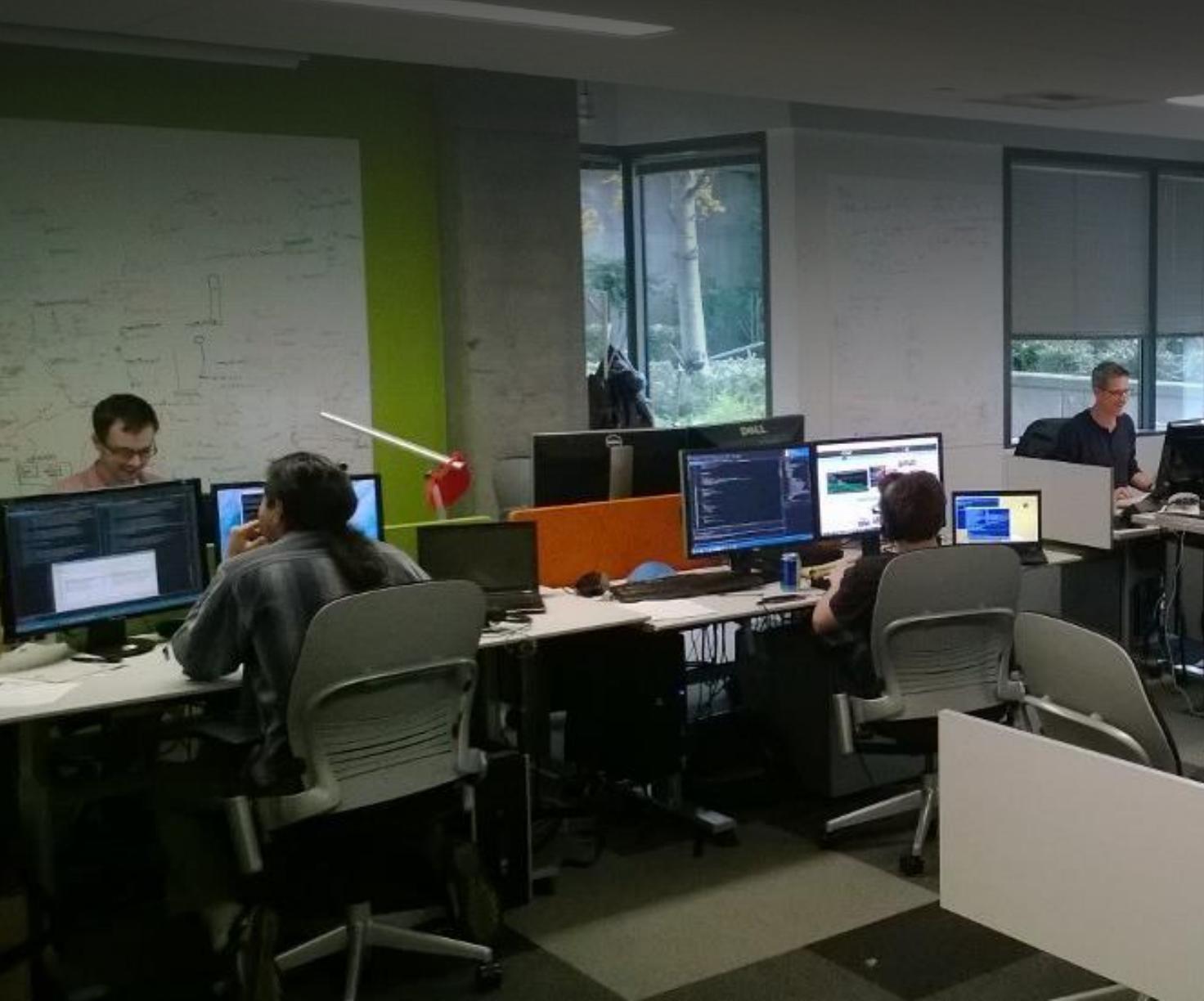


ENGINEERING



OPs

TEAMS



Physical team rooms

Cross discipline

10-12 people

Self managing

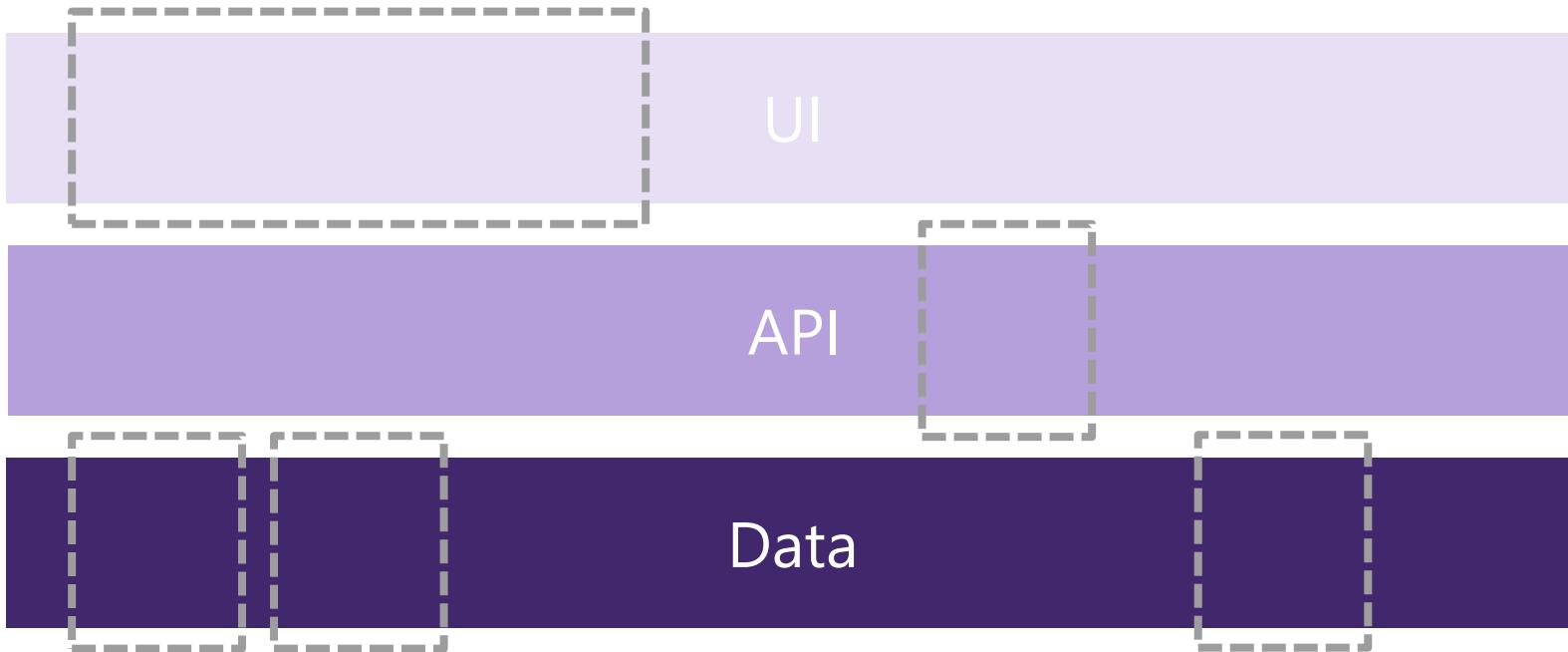
Clear charter and goals

Intact for 12-18 months

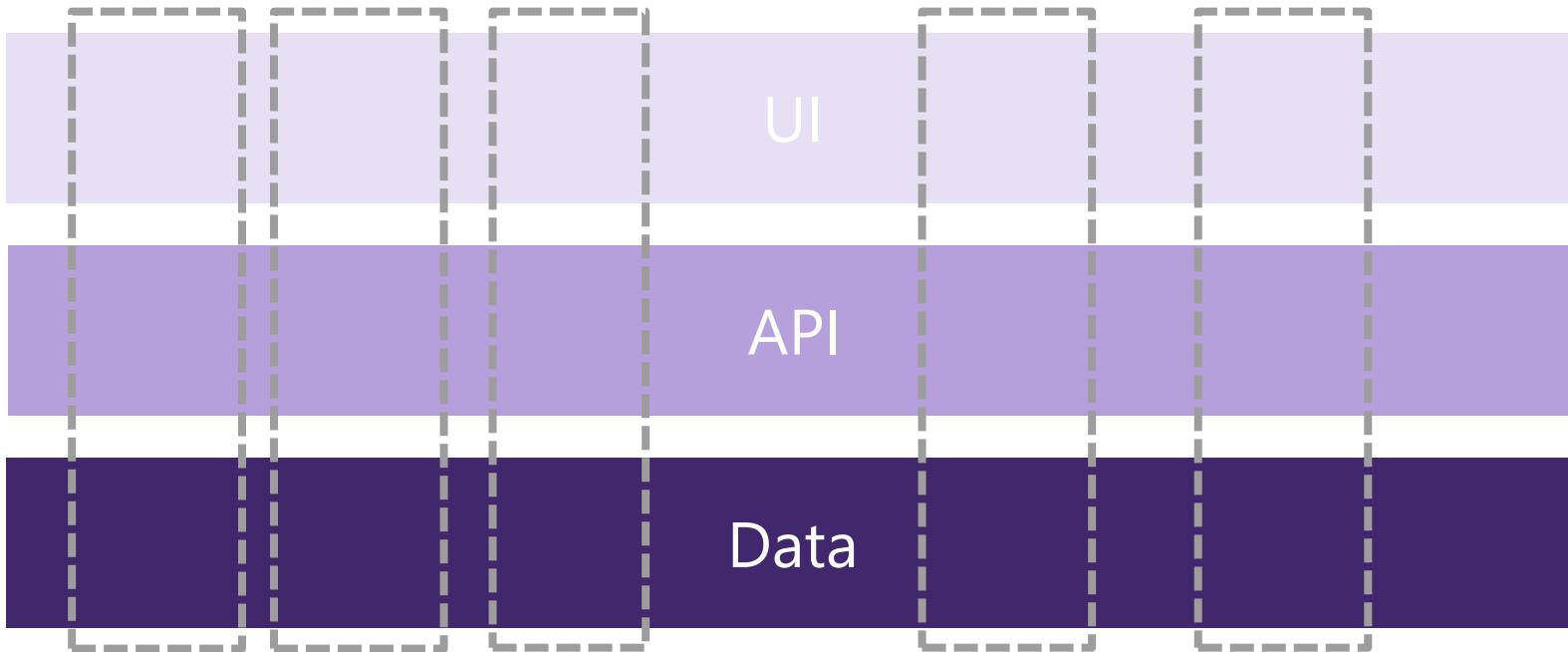
Own features in production

Own deployment of features

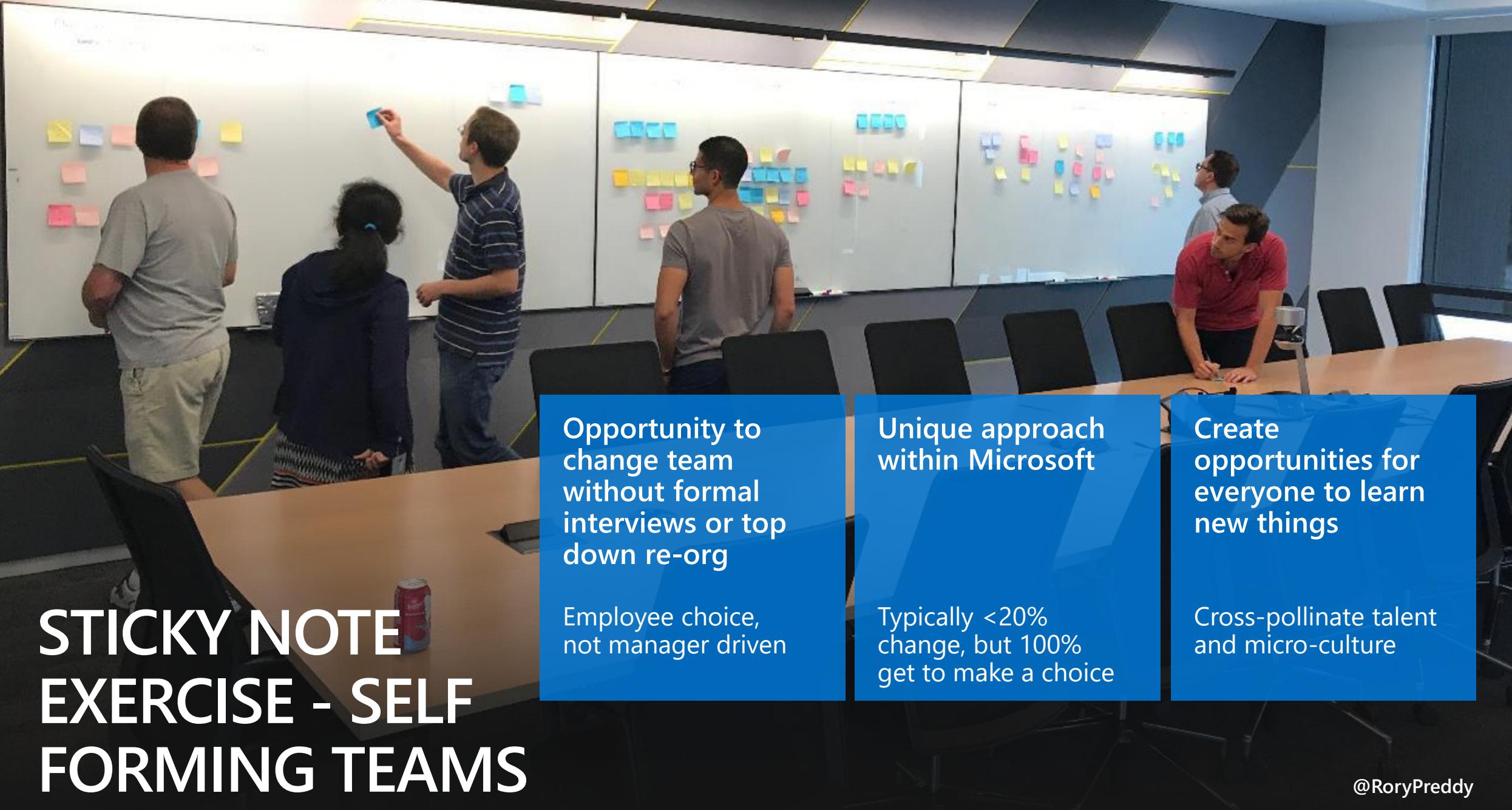
INSTEAD OF HORIZONTAL...



WE STRIVE FOR VERTICAL



STICKY NOTE EXERCISE - SELF FORMING TEAMS



Opportunity to change team without formal interviews or top down re-org

Employee choice, not manager driven

Unique approach within Microsoft

Typically <20% change, but 100% get to make a choice

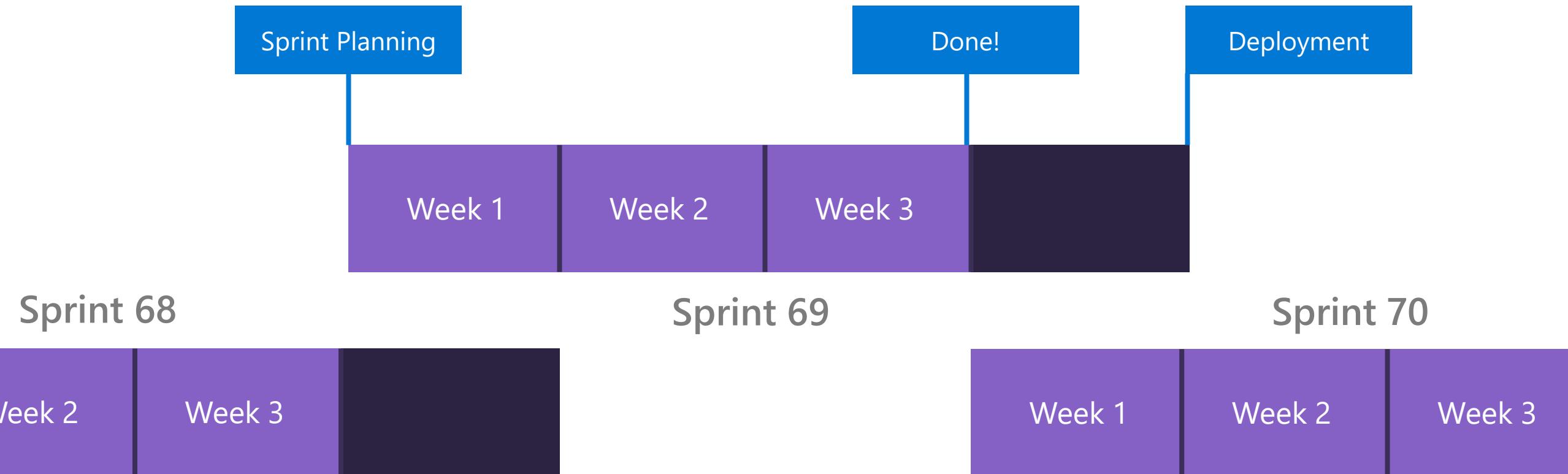
Create opportunities for everyone to learn new things

Cross-pollinate talent and micro-culture

HOW DO YOU STAY IN SYNC? - 3-WEEK SPRINTS



3 WEEK SPRINTS



3 WEEK SPRINTS

The sprint
plan



What we
accomplished



Week 1

Week 2

Week 3

Sprint 85

Week 2

Week 3

Sprint 86

Week 1

Sprint 87

Week 2

Week 3

SPRINT MAIL

Plan



Collaboration - Sprint 41 Plan - Message (HTML)

FILE MESSAGE

Mon 12/3/2012 12:42 PM
David Gorena Elizondo
Collaboration - Sprint 41 Plan

To: VS Cloud Services All
Cc: TFS Collaboration

Retention Policy: Delete after 1 year (1 year)
Expires: Never

Our team has started to collaborate with VC folks on the user story that will enable the E2E for GIT scenarios. We expect to be done with this E2E experience this sprint. We acknowledge the fact that we're entering 'holiday' sprints, but our goals will also include remaining under the bug cap, completing our engagement with the Airstream team, and continuing the 'Team room' momentum with a more formalized design after the spiking that happened last sprint.

Goals

- Remain under the bug cap
- Collaborate with the VC team on enabling the E2E for the GIT story
- Continue the 'Team Room' momentum with a more formalized design

User Stories

ID	Title	Goal for end of sprint
832408	Bugs (Starting sprint with 23)	Remain under the bug cap
987548	I can mention a work item (#ID) as part of a GIT commit	Enable, together with the VC team, the E2E story
983673	Airstream	Complete engagement with the Airstream team
1021717	I can understand our design approach for the virtual Team Room	Start on a more formalized design for Team Room

Thanks,
The Collaboration team

David Gorena Elizondo RD: Can't edit HTML field in Excel - in some situations

Collaboration - Sprint 41 Results - Message (HTML)

FILE MESSAGE

Thu 1/3/2013 9:38 AM
Justin Marks
Collaboration - Sprint 41 Results

To: VS Cloud Services All
Cc: TFS Collaboration

You forwarded this message on 1/7/2013 8:54 AM.

Even with the holidays the team was able to get a bunch of stories completed. The Collaboration team has really embraced collaborating with other feature teams:

- We've had a strong collaboration with the VC team on delivering an E2E story around linking GIT commits to work items as can be seen in the below sprint video
- We worked with the Airstream team to pull down and validate the RI so that the discussion service is now being built in production using Airstream
- With the help of the WIX team we added the ability to send email from the product backlog

All the while we continued to stay on top of bugs dropping below 20!

Sprint Demo

TFS Collaboration
Sprint 41 Demo

GIT work item association

Justin Marks RD: TFS 2012 - Excel integration: Hide "hidden" work item types

Accomplished



@RoryPreddy

SPRINT MAIL – PER EPIC

✉ Value delivered against each Objective *for Epic*

✉ Video by *Epic* objective

✉ Value planned for *Epic* in next sprint

Tue 11/27/2018 15:15
Aaron Bjork
Azure Boards S144/145
To Azure DevOps Sprint Communication
[View message in browser](#)

Kanban for Outlook [Get more add-](#)

Below is an update on the Boards Q4 OKR progress, <http://aka.ms/AzureBoardsOKRs>. To view the backlog of each Boards team visit <http://aka.ms/AzureBoardsFeatures>.

1. Objective: Azure Boards work items can be linked to GitHub commits and PRs.

S144: At Connect, we're releasing a public preview of the Azure Boards integration with GitHub, enabling GitHub.com users to:

1. Configure connections from a Boards project to one or more GitHub repos. (Admins only)
2. Create links by mentioning a Boards work item in a GitHub commit message, PR title, or PR description.
3. See GitHub links in the Development section in the Boards work item.
4. See Boards work items listed in the Pipelines build results when building GitHub commits that link to Boards work items.

This sprint, the admin UX was redesigned. User studies were encouraging with users finding the key tasks of creating connections and adding repos to be straightforward. The team also completed the integration of work items into the Pipelines build summary. Updates to the [Boards marketing page](#) (to include a section that highlights the GitHub integration value-prop) were sent to the ACOM team ([designs](#)). A blog post for the Azure Blog has been drafted and is out for review. Content plans have also been prepared to help users configure and use the integration.

S145: The first half of Sprint 145 will focus on preparation for Connect. We'll start the sprint with a UX walkthrough to identify and prioritize any items that need to be hot fixed. Testing and daily walkthroughs will continue up to launch. All content supporting the launch (marketing page, blog post, release notes, docs) will be finalized and published.

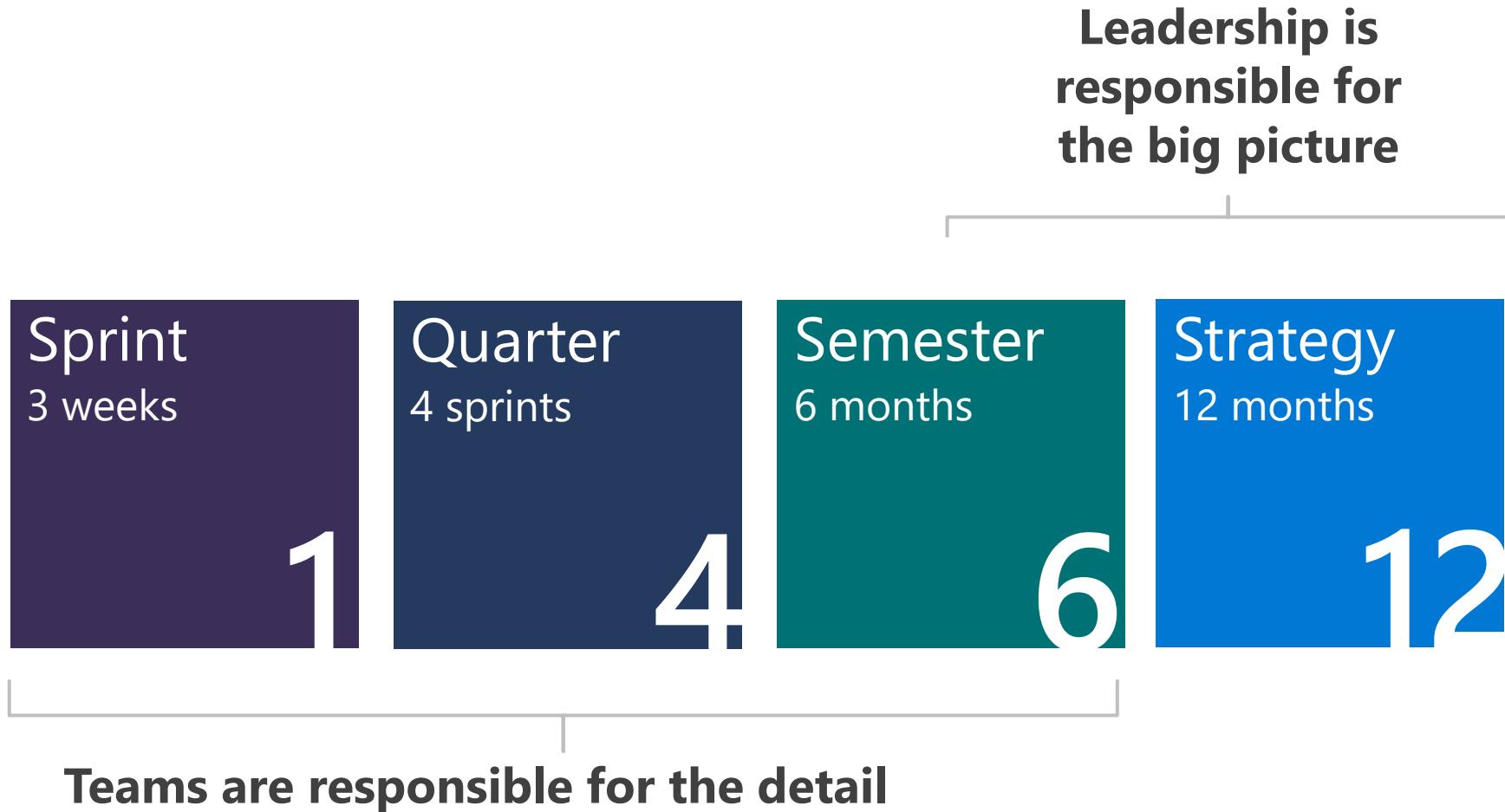
After launch, we'll be focusing on landing GitHub Enterprise support for Azure DevOps Server RC2.

2. Objective: Azure Boards is the leading choice for teams using GitHub.

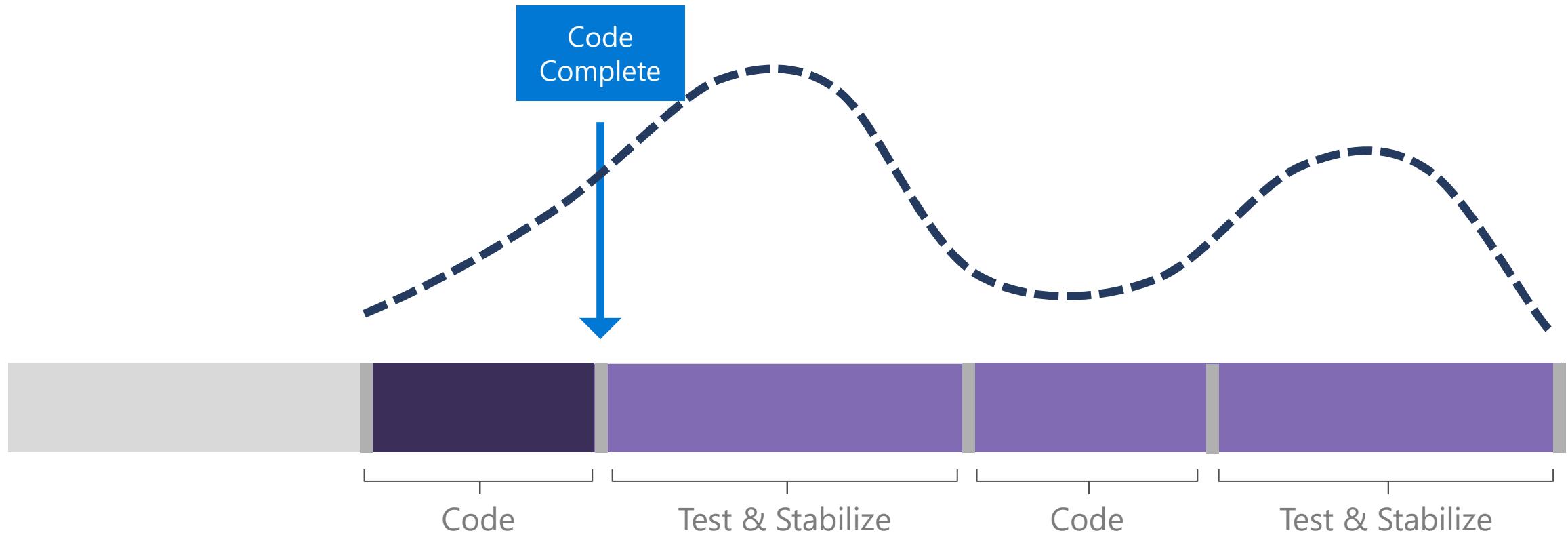
S144: With this being the last sprint before Connect() on December 4th, we shifted priorities mid-sprint to immediately address bumps and roadblocks in our acquisition funnel and day-1 experiences.

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PLANNING



QUALITY BEFORE

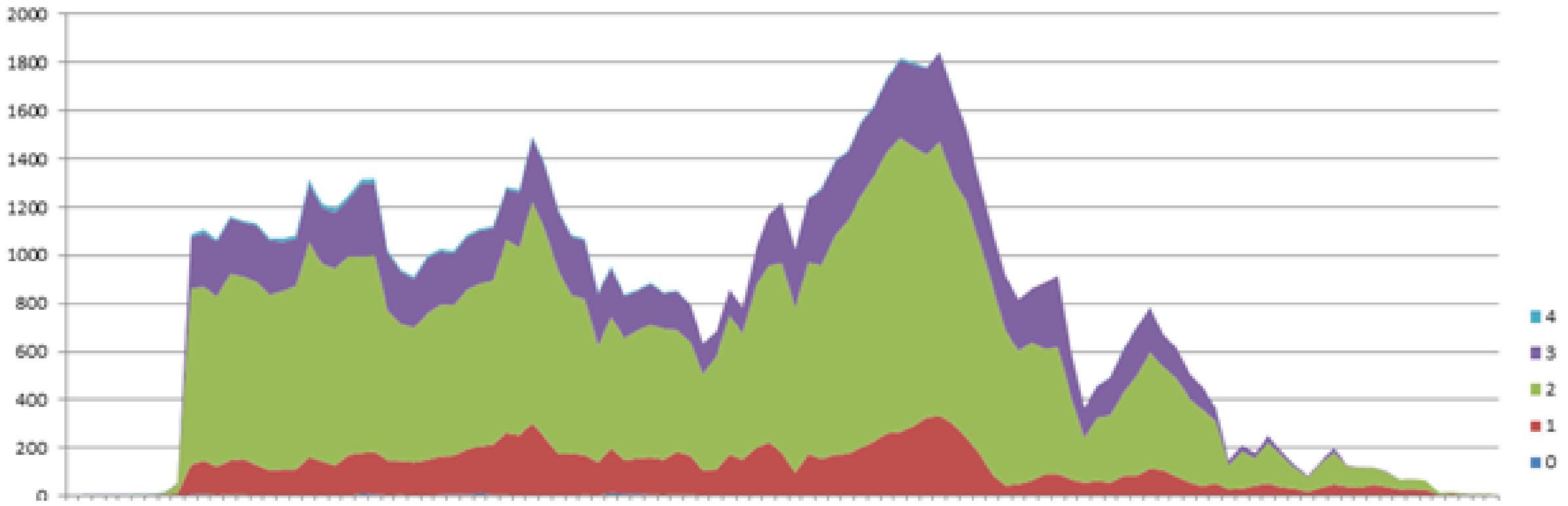


QUALITY BEFORE

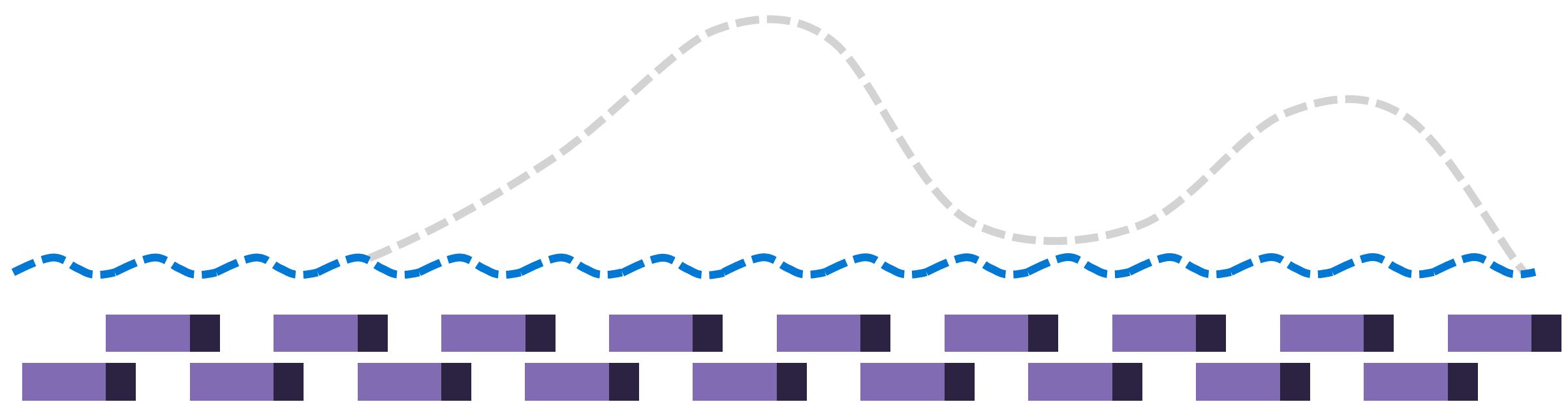
Multi-year
cycles

Milestones and
stabilizations

Debt

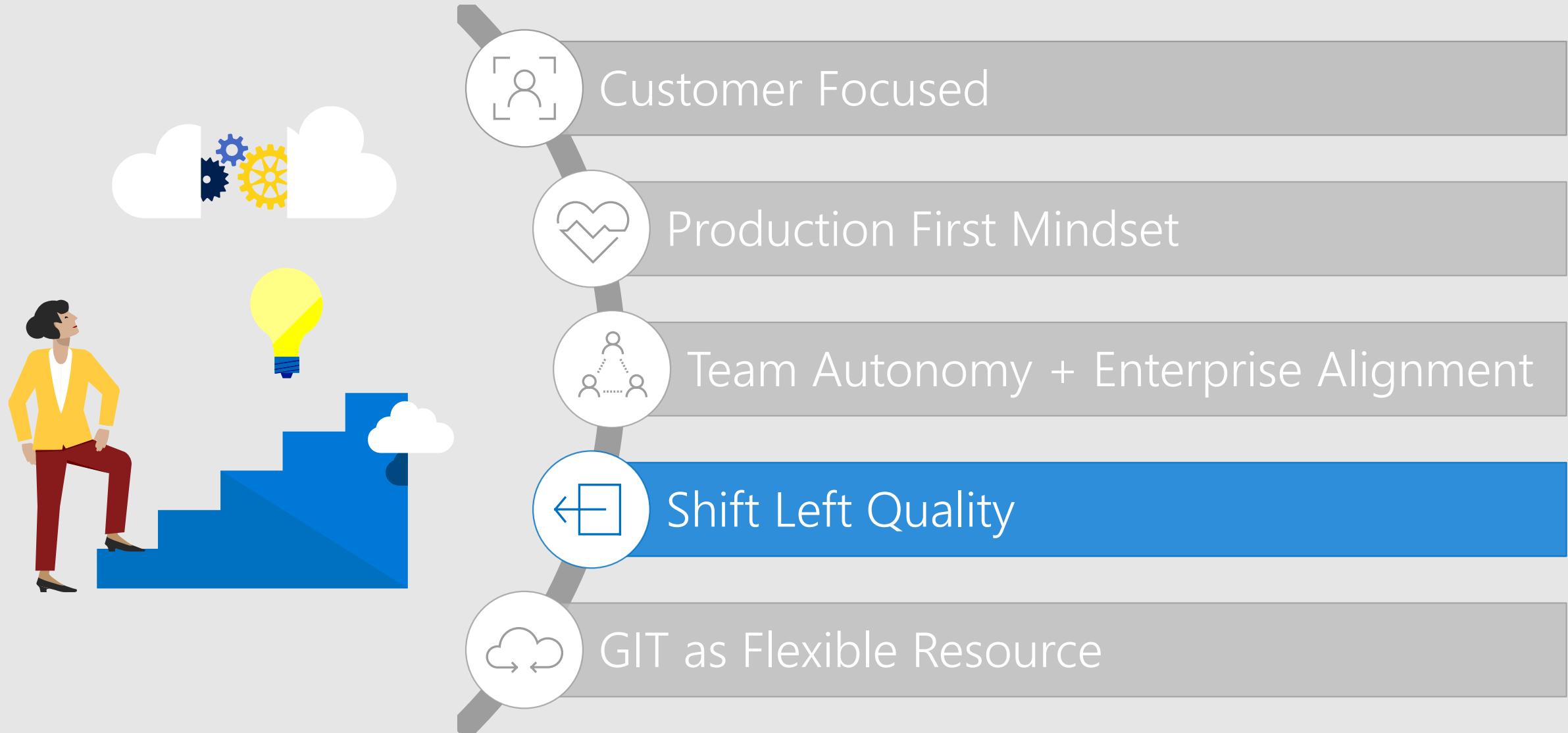


QUALITY AFTER



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Five habits we've learned so far



Managing the pipeline:

How do you

go fast

and

not

break things?

DO NOT INCUR DEBT

WE ALL FOLLOW A SIMPLE RULE WE CALL THE “BUG CAP”:

$$\# \text{ engineers on your team} \times 4 = ?$$

ENGINEERING SCORECARD

		Livesite Health						Engineering Debt					
		% of LSIs automatically detected (Current Quarter)	Max TTM (mins)(Current Quarter)	# LSI repair WIs older than 2 sprints	% LSI repair WIs Within SLA(2 sprints)	# of DTS over SLA		# P0 or P1 bugs > 21 days	# Active bugs per engr	DevFabric NAR Reliability	DevFabric SelfTest & Basics Reliability	Security: # WI > 21 days	
Agile	Backlogs	NA	NA	1	80.0	0		1	5.4	97.74	99.85	0	
	Kanban	NA	NA	0	100.0	0		0	4.6	92.49	NA	0	
	Modern WIT	0	360	3	78.6	1		0	2.3	96.98	100.00	0	
	Agile IDC	NA	NA	0	NA	0		1	3.6	88.56	NA	0	
	WIT IQ	100	NA	1	93.8	1		2	3.1	89.68	99.71	0	
Enterprise Social	People	NA	NA	1	66.7	0		3	3.8	85.2	NA	0	
	Code Sharing	NA	NA	0	NA	0		1	2.8	100	NA	0	
	Dashboards	NA	NA	0	NA	0		2	3.1	80.83	99.81	0	
ESSC	Engineering Productivity Systems	NA	NA	0	100.0	0		3	4.5	NA	NA	0	
	MSDN Subscriptions	NA	NA	0	NA	0		1	5.2	NA	NA	0	
	Service Insights	NA	NA	1	83.3	0		5	3.2	NA	NA	0	
NC DevX	Build	66	890	1	85.7	4		1	5.5	74.07	99.55	0	
	Java	NA	NA	0	NA	0		0	0.2	NA	NA	0	
	Version Control Client	NA	NA	0	100.0	0		9	7.5	85.25	99.90	0	
	Version Control Server	66	687	5	82.1	1		2	4.2	96.52	100.00	0	
NC Services Platform	Cloud Admin and Tools	0	26	3	75.0	0		4	4.9	85.26	99.94	0	
	Cloud Services Framework	33	24480	4	78.9	2		5	3.7	99.05	100.00	0	
	Open ALM	NA	NA	1	66.7	1		3	3.2	85.15	99.81	0	
SCS	Acquisition	100	344	0	100.0	0		1	2.2	86.66	NA	0	
	Identity	75	14160	8	52.9	0		25	7.3	91.03	100.00	1	
	Licensing and Accounts	NA	NA	0	100.0	0		12	6.5	94.35	99.96	0	
	Enterprise Authorization	50	620	3	75.0	0		11	3.6	92.23	99.43	0	
	VSO Commerce	NA	NA	0	100.0	0		1	2	93.89	NA	0	
TSE	Enterprise Analytics	0	686	0	NA	0		0	2	NA	NA	0	
Service Delivery	Service Delivery	80	5280	0	100.0	0		2	1.8	NA	NA	2	
VSCS	VSCS	71	24480	32	82.1	10		95	4.3	93	99.00	3	

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BUGS

Teams	Active								Resolved						Total Resolved	Total Active	Bug Bar	Active Bugs Diff w/Last Report		
	P0 Bugs	VSO Bugs	Hosted Sprint 84	Hosted Sprint 85	Dev14 RTM Bugs	Dev14 Update 1	Stale Bugs	Incoming in last week	Fixed last Week	VSO Bugs	Hosted Sprint 84	Dev14 RTM Resolved	7d ZRB							
Agile	1	144				12		107	99	17		1	5	25	158			-3		
Agile		12				1		14	1			1		1	13	13				
Agile IDC		21						32	31	11					13	21	2.63	1		
Backlogs		24				2		26	37	2				2	4	27	3.18	1		
Kanban		20				4		4	18	2				1	5	24	2.53	-3		
Modern WIT		27				1		13	7	2				2	2	29	2.76	-2		
WIT IQ	1	40				4		18	5						44	4.19	1	-1		
Cross Site		30					181	1	2	8		9	38	268			-30			
Enterprise Social		96				10	27	25	24	102	4		94	105	111		3			
Code Sharing		22				2	12	9	12	14			9	14	29	2.32	1			
Dashboards		28				4		6	7	25	3			24	28	32	3.05	1		
People		46				4	15	10	5	63	1			61	63	50	4.00	1		
ESSC	1	60					38	27	15	74	1		82	92	113		5			
Engineering Productivity Systems	1	23					8	16	5	8			6	11	42	5.60	6			
MSDN Subscriptions		11					12	7	9	1				11	16	42	4.94	-2		
Service Insights		26					18	4	1	65	1			65	65	29	3.41	1		
NC DevX		80	1	2		107	15	115	63	30	4	2	23	85	192		-49			
Build		36	1	2		11	8	43	37	11	1				27	49	4.67	2		
Java		1				1		3	1					1	1	4	0.73	0		
Version Control Client		7				79		43	20	1				7	27	87	6.96	-57		
Version Control Server		36				16	7	26	5	18	3	2	15	30	52	4.16	6			
NC Services Platform	2	94	2	2	5	53	24	73	39	23	1		17	27	153		10			
Cloud Admin and Tools	2	30	2	2	5	33	16	28	10	2	1		1	4	69	6.57	8			
Cloud Services Framework		36				2		21	21	5				2	6	38	3.04	-6		
Open ALM		28				18	8	24	8	16				14	17	46	4.38	8		
Shared Cloud Services	1	164		3	2	8	45	96	90	95	3	1	71	109	198		-13			
Acquisition		15					1	10	11	22	1			19	23	15	2.31	-1		
Enterprise Authorization		28				1	2	8	10	7	13			8	14	31	3.88	0		
Identity	1	69		1	1	3	22	16	9	21	2			24	26	73	7.68	0		
Licensing and Accounts		35		2		2	3	20	23	21			1	11	23	37	6.73	-6		
Shared Cloud Services						1				3				3	3	1		1		
VSCOM Site		6								11	12	15	1		3	6	30	3		
VSO Commerce		11								28	25	14			3	14	11	1.47	-10	
TSE		13				2	1	2	3	8			6	8	15		4			
Enterprise Analytics		13				2	1	2	3	8			6	8	15	2.73	4			
VSCS		4				10		15	4	10			10	12	15		13			
Grand Total	5	685	3	7	7	202	331	461	339	367	13	4	317	501	1223					
Difference w/last report		▲ 0	◆ 9	◆ 1	▲ 0	▲ 0	◆ 202	◆ 6		● -8	◆ 2	◆ 2	◆ 9	◆ 50	● -60					

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BUGS

102	4		94	105	111		3
14			9	14	29	2.32	1
25	3		24	28	32	3.05	1
63	1		61	63	50	4.00	1
74	1		82	92	113		5
8			6	11	42	5.60	6
1			11	16	42	4.94	-2
65	1		65	65	29	3.41	1
30	4	2	23	85	192		-49
11	1			27	49	4.67	2
			1	1	4	0.73	0
1			7	27	87	6.96	-57
18	3	2	15	30	52	4.16	6
23	1		17	27	153		10
2	1		1	4	69	6.57	8
5			2	6	38	3.04	-6
16			14	17	46	4.38	8
95	3	1	71	109	198		-13
22	1		19	23	15	2.31	-1
13			8	14	31	3.88	0
21	2		24	26	73	7.68	0
21		1	11	23	37	6.73	-6
7			7	7	1		

Testing: Shift Left from Integration to Unit

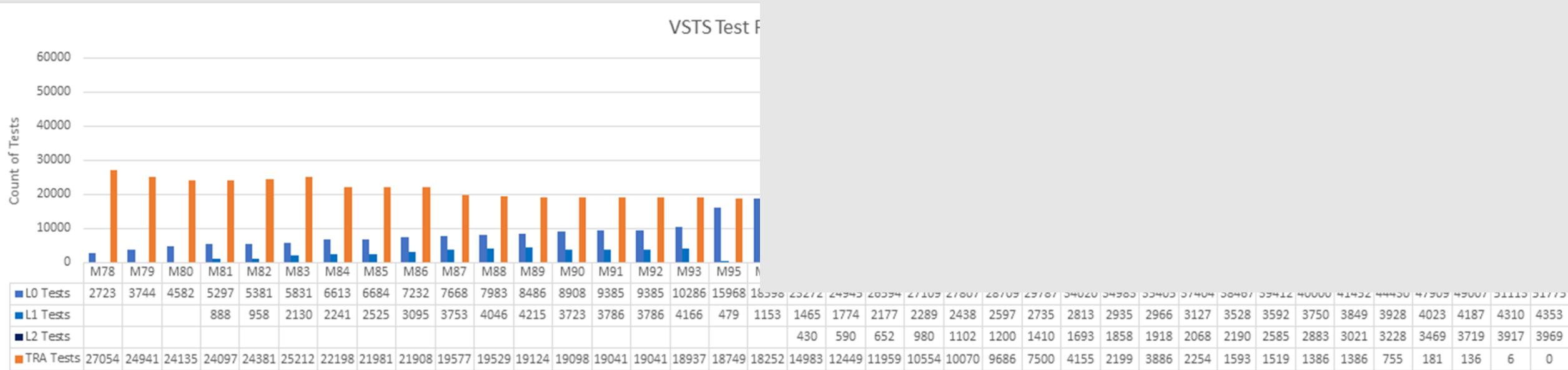
L0 – Requires only built binaries, no dependencies

L1 – Adds ability to use SQL and file system

Run L0 & L1 in the pull request builds

L2 – Test a service via REST APIs

L3 – Full environment to test end to end



Pull Requests

PR's are point of code review

L0+L1 Tests performed before merge

Result:

Shift-left testing to pre-merge

1/5 Pull requests fail

Makes CI build failures rare

1/100 CI builds fail

The screenshot shows a Microsoft VSTS pull request overview page. The URL is mseng.visualstudio.com/VSOnline/Modern%20WIT/_git/VSO/pullrequest/260803#_a=overview. The pull request is titled "Added keyboard shortcuts to Queries pivot page #1081972" and is marked as "COMPLETED". It was merged by Karthik Balasubramanian on 23/09/2017 at 11:45. The commit hash is 600e7b9b. The description states: "Added keyboard shortcuts to Queries pivot page 🎉 Bug 1081972: Add shortcuts to query directory page". The "Policies" section shows that all required policies were met: "1 reviewer approved", "Build succeeded", and "CredScan Validation succeeded". The "Status" section shows that all CI tests have passed. The "Work Items" section lists a single work item: "1081972 Add shortcuts to query direct...". The "Reviewers" section shows that WIT IQ and Modern WIT have approved the pull request. The "Labels" section has an "Add label" button. The main body of the page shows a timeline of comments and actions:

- Karthik Balasubramanian completed the pull request.
- Karthik Balasubramanian set the pull request to automatically complete when all policies succeed.
- Matthew Manela approved the pull request and asked to make sure it works after XHR navigate.
- Karthik Balasubramanian responded about current implementation working due to full page navigation.
- Matthew Manela suggested using hub navigation service.
- Matthew Manela asked about navigating between hubs.
- Matthew Manela suggested using XHR.
- Matthew Manela approved the pull request.
- Matthew Manela joined as a reviewer.
- Karthik Balasubramanian pushed a commit creating update 6.
- Karthik Balasubramanian reverted a method override.

Tests Against the Pull Request

✓ Build VSO.PR_20180516.119

- ✓ Phase 1
 - ✓ Job
 - ✓ Initialize Job
 - ✓ Pre-job: Kill orphan processes
 - ✓ Get sources
 - ✓ ChangelImpactAnalysis
 - ✓ Init
 - ✓ Pre-Scorch
 - ✓ Verify Docker Image Exists
 - ✗ Docker Pull Image
 - ✓ Build with L0 L1
 - ✗ Validate Build
 - ✓ Check for Warnings
 - ✗ Ensure REST Clients up to date
 - ✗ Run L0 Tests
 - ✗ Check for Test Warnings
 - ✓ Publish L0 Test Results
 - ✗ Delete Container If Exists

VSO.PR / Build VSO.PR_20180516.119

Edit build definition Queue new build... Download all logs as zip Retain indefinitely Release

Build succeeded

Build VSO.PR_20180516.119 ran for 25 minutes (VSTSP0Pool), completed 72 seconds ago

Summary Timeline Artifacts Code coverage* Tests WhiteSource Bolt Build Report

Build details

Definition	VSO.PR
Source	344574
Source version	Commit 72b476c5
Requested by	Microsoft.VisualStudio.Services.TFS on behalf of Deborshi Saha
Queue name	VSTSP0Pool
Queued	Wednesday, May 16, 2018 1:33 PM
Started	Wednesday, May 16, 2018 1:33 PM
Finished	Wednesday, May 16, 2018 1:58 PM
Retained state	Retained by release

Issues

Phase 1

- ✗ EXEC (0, 0)
EXEC(0,0): Error Message:
- ✗ EXEC (0, 0)
EXEC(0,0): Error message: Exception of type 'System.OutOfMemoryException' was thrown.

Associated changes

830bf04 Authored by debsha
Adding Public access moniker to get sps location url for pageContext

Test Results

Reduce duration by running only impacted tests: [Enable Test Impact Analysis](#)

Completed Runs

Total tests	Failed tests	Pass percentage	Run duration
78104 (+78104)	0 (+0)	100% (+100%)	20m 7s (+20m 7s)

Passed (78104) Failed (0) New (0) Existing (0) Others (0)

Not Reported 295

[Detailed report >](#)

Code Coverage

No build code coverage data available.

Feedback in minutes, before acceptance of PR

Green Means Green, Red Means Red

Master Branch Runs																
Environments\Builds	...516.12	...516.13	...516.14	...516.15	...516.16	...516.17	...516.18	...516.19	...516.20	...516.21	...516.22	...516.23	...516.24	...516.25	...516.26	
Sps.SelfHost.CodeDev	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
Sps.SelfHost.VSTS	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
Sps.Selftest.CodeDev	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
Sps.Selftest.VSTS	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
Tfs.Deploy	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✗ 50%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✗ 50%	✓ 100%	✓ 100%	✓ 100%	✗ 50%	
Tfs.SelfHost.CodeDev	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✗ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
Tfs.SelfHost.VSTS	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✗ 99.62%	✓ 100%									
Tfs.Selftest.CodeDev	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
Tfs.Selftest.VSTS	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
TfsOnPrem.SelfHost	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	
TfsOnPrem.SelfTest	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	✓ 100%	

Only all-green builds get to release

Your aim won't
be perfect.

Control the
blast radius.



Progressive Exposure

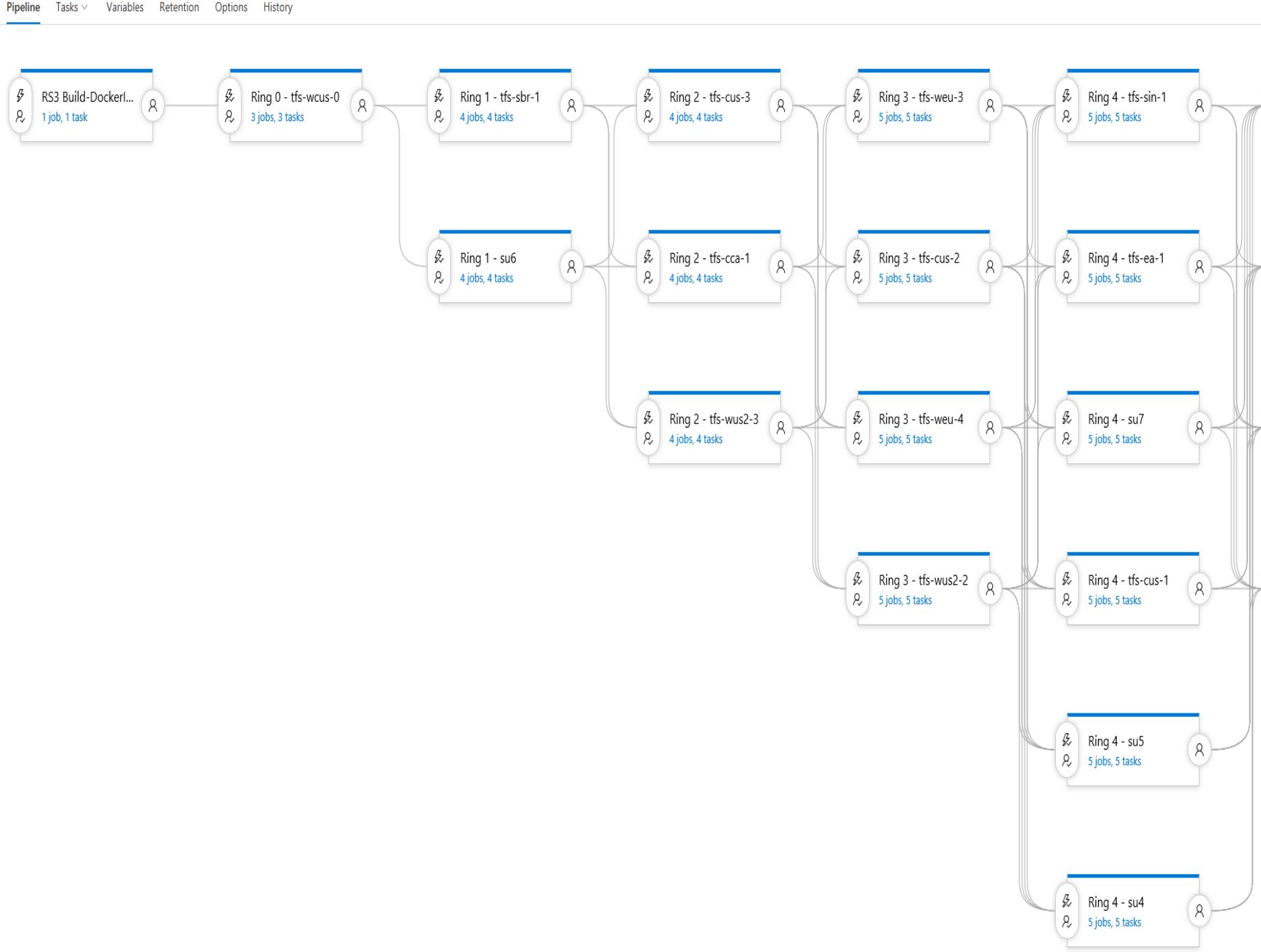
Deploy **one** stage at a time

Result:

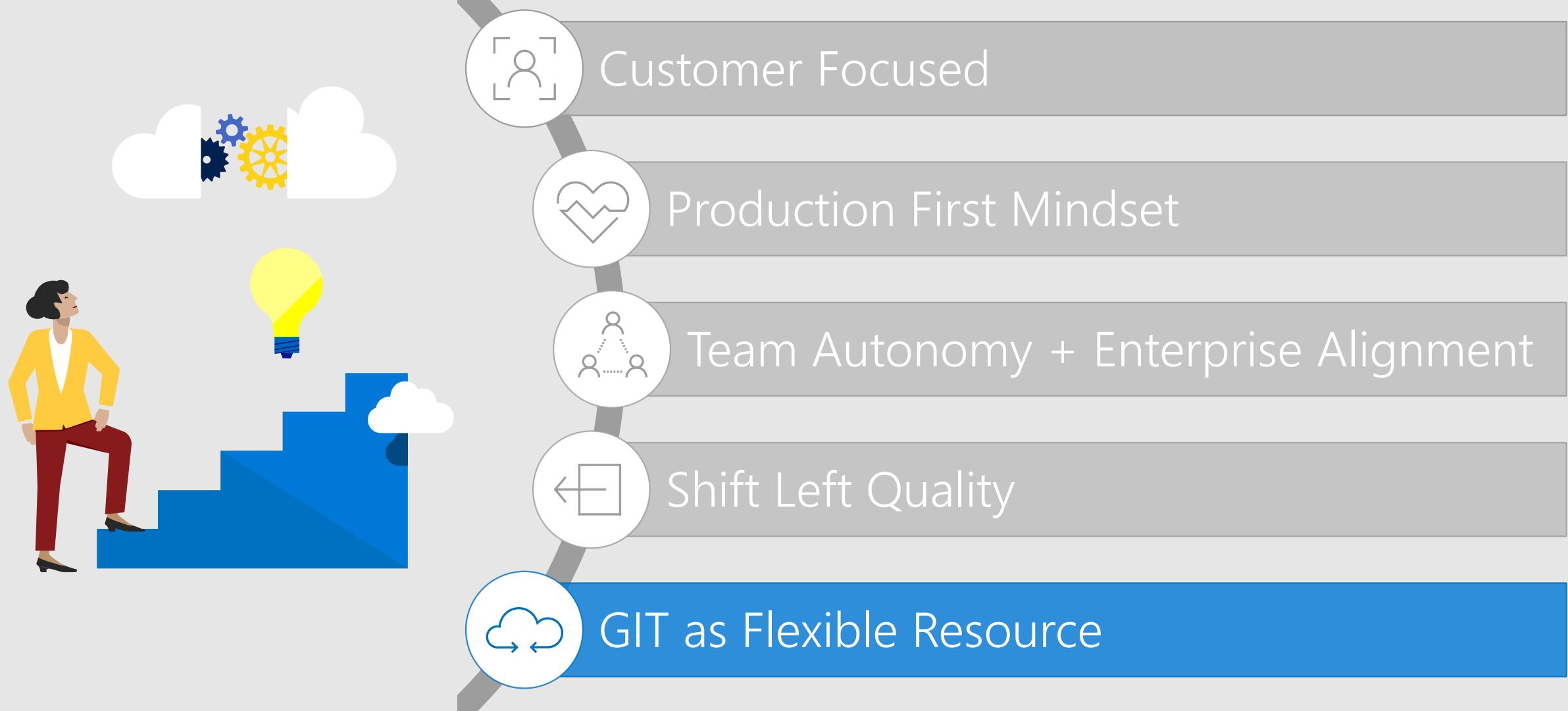
Visibility into impact of every deployment

Move across

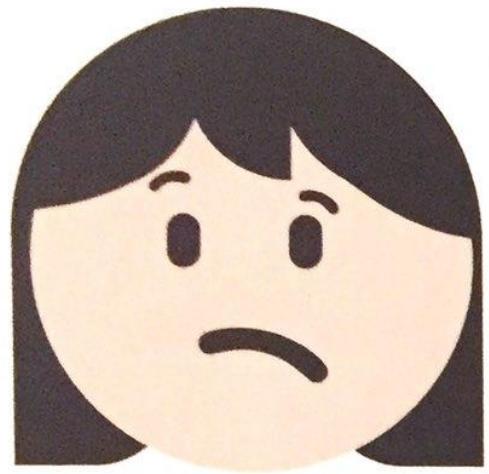
1. Canary
2. Data centers with small user counts
3. Data center with large user count
4. Highest latency
5. The rest



Five habits we've learned so far



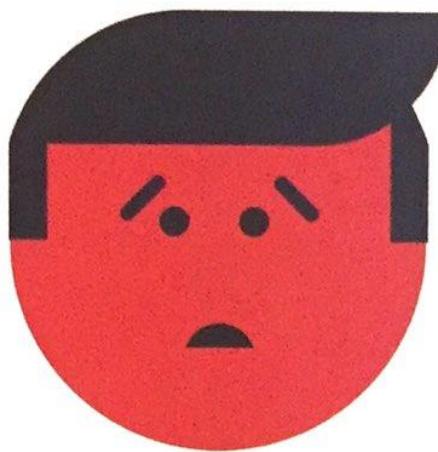
5 STAGES OF GIT



DENIAL



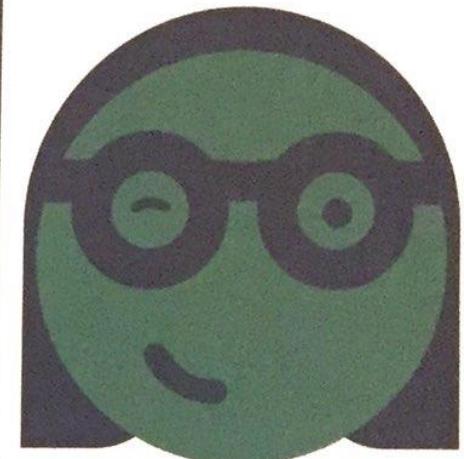
ANGER



BARGAINING



DEPRESSION

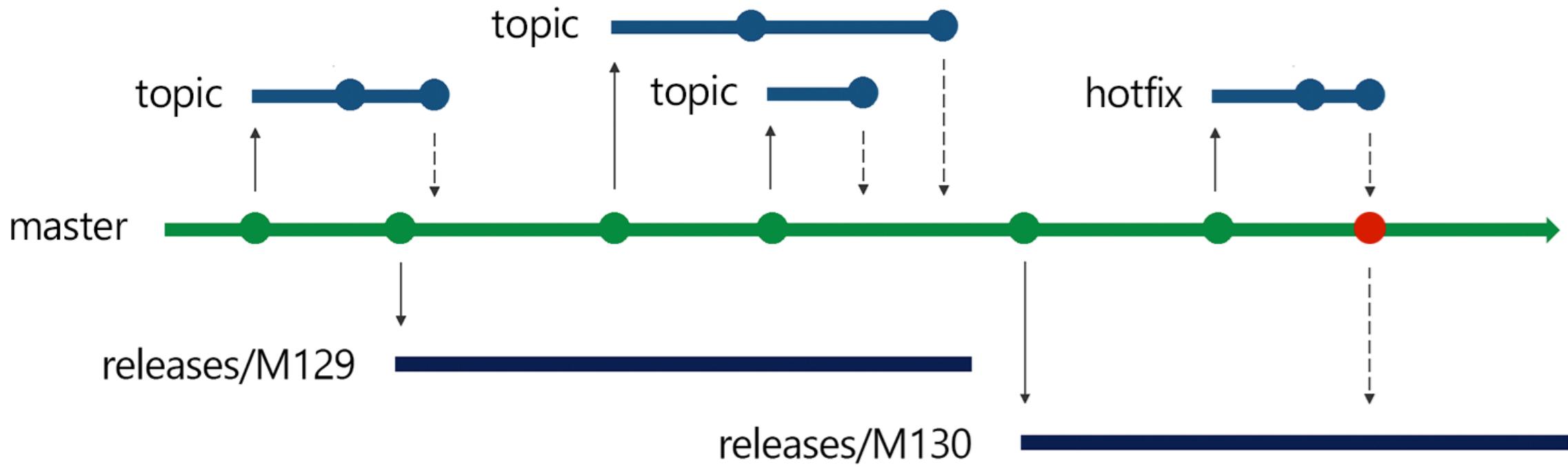


ACCEPTANCE

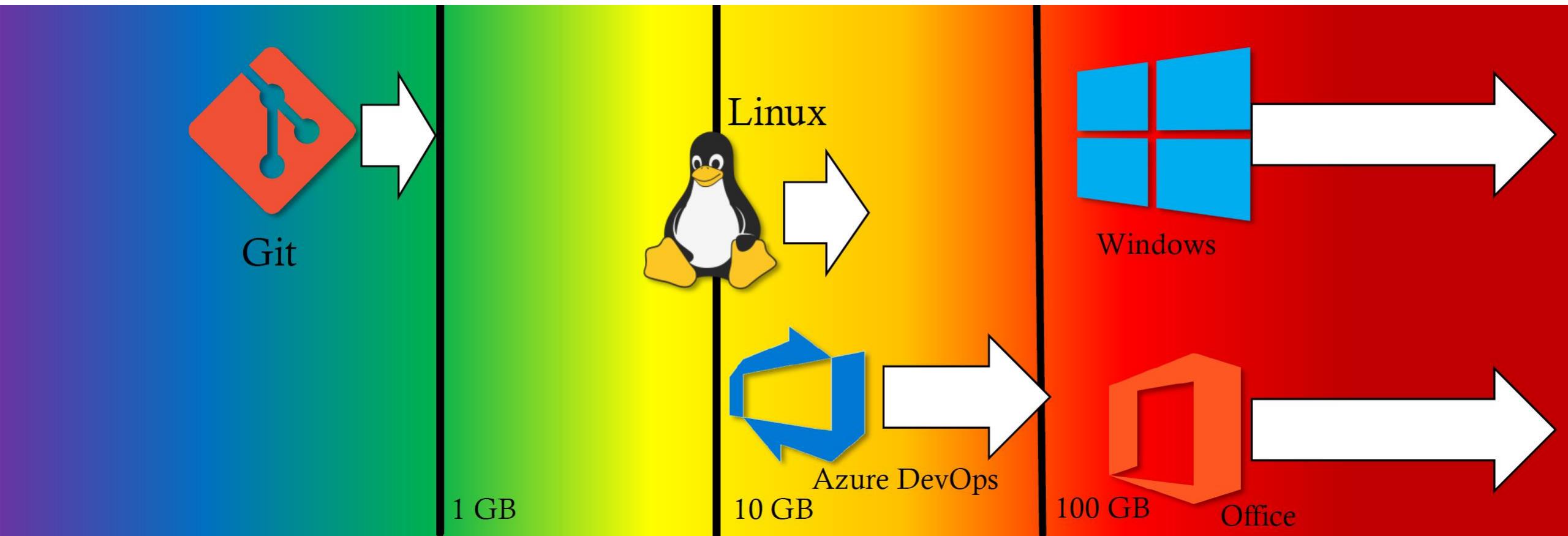


RELEASE FLOW

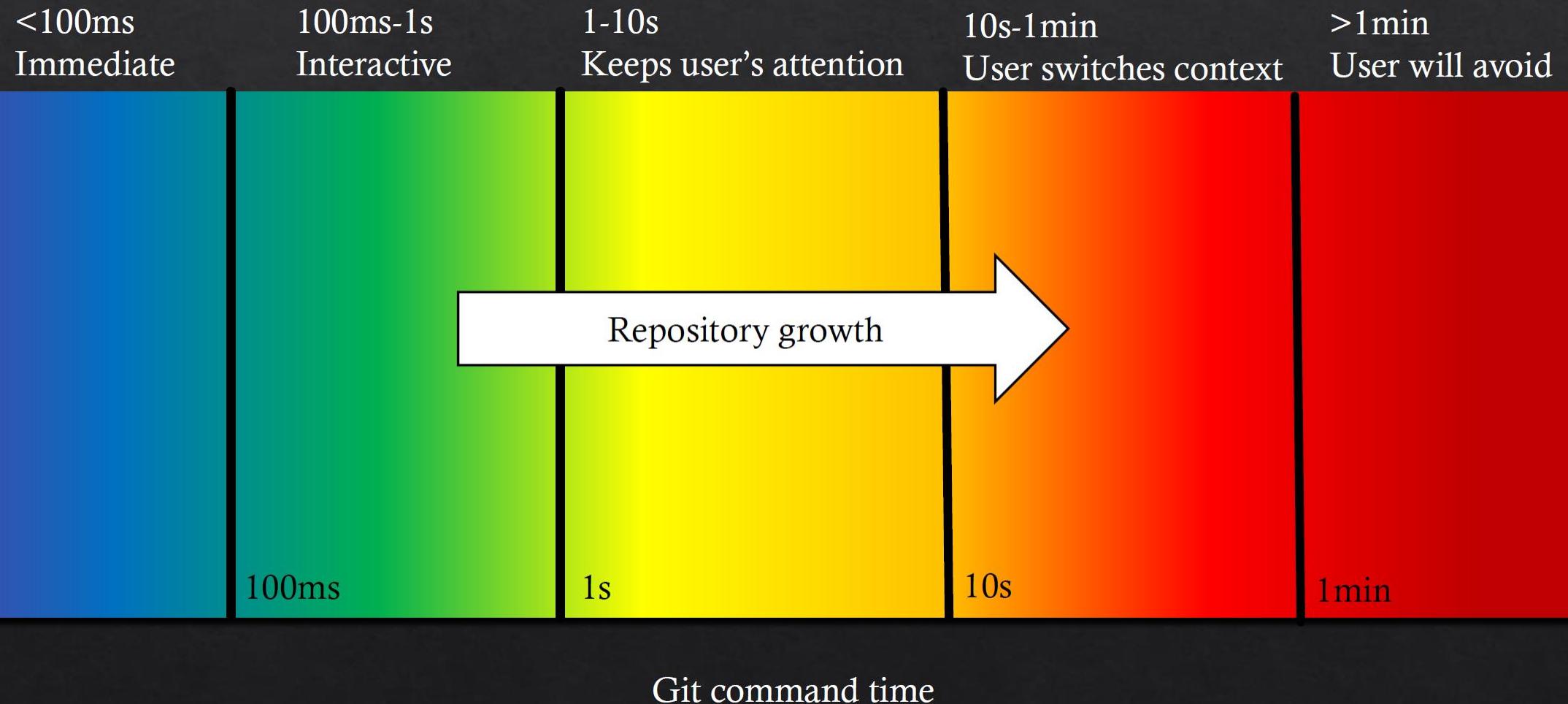
USING TRUNK BASED DEVELOPMENT TO AVOID MERGE DEBT



Spectrum of Scale



Spectrum of Perceived Performance



VIRTUAL FILE SYSTEM (VFS) FOR GIT

1. Focus on the files that matter.
2. Reduce object transfer.
3. Don't wait for expensive operations.

Action	Without VFS for Git	With VFS for Git
Clone (Bare)	12+ hours	4-5 minutes
Checkout	3 hours	30 seconds
Status	10 minutes	3 seconds
Commit	30 minutes	6 seconds



- Developed on GitHub
- DotNet core application coded in C#
- Bypass the need of a virtualized filesystem
- Open-Source

<https://github.com/microsoft/scalar>

@RoryPreddy

OUR DEVOPS TRANSFORMATION

the story so far

Before

- 4-6 month milestones
- Horizontal teams
- Personal offices
- Long planning cycles
- PM, Dev, Test
- Yearly customer engagement
- Feature branches
- 20+ person teams
- Secret roadmap
- Bug debt accumulated
- 100 page spec documents
- Private repositories
- Deep organizational hierarchy
- Success is a measure of install numbers
- Features shipped once a year

After

- 3-week sprints
- Vertical teams
- Team rooms
- Continual Planning & Learning
- PM & Engineering
- Continual customer engagement
- Everyone in master
- 8-12 person teams
- Publicly shared roadmap
- Debt paid as incurred
- Mockups in PPT
- Inner source
- Flattened organization hierarchy
- User satisfaction determines success
- Features shipped every sprint

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RESOURCES

THANK YOU!!

<https://aka.ms/devops-at-microsoft>