

Windows Journey to DevOps



Microsoft in 2007



Microsoft in 2007

In 2007, my job was to tell country managers that they wouldn't get their bonuses



Microsoft in 2007

Worldwide Vista Deployment Predictions

8% to 10%



Windows Vista™

Microsoft in 2007

Worldwide Vista Deployment ~~Predictions~~

1%



Three Big Challenges

Telemetry

Data siloed

3rd Party Data

Customer Connection

Great At Reaching Out

Less support for inbound

Speed

3 Year Waterfall
Cadence Was Slow

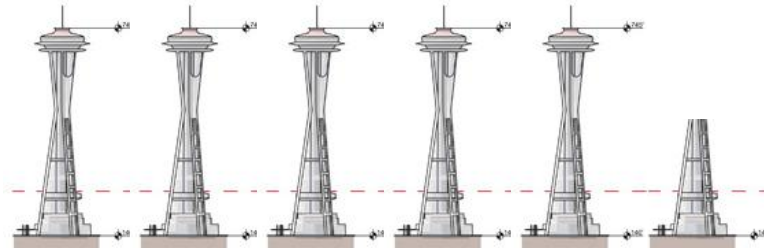
12,000 ENGINEERS CREATE A LOT OF STUFF...

11M

Work Items



If every one were a sheet of paper, it would be as tall as



5.5

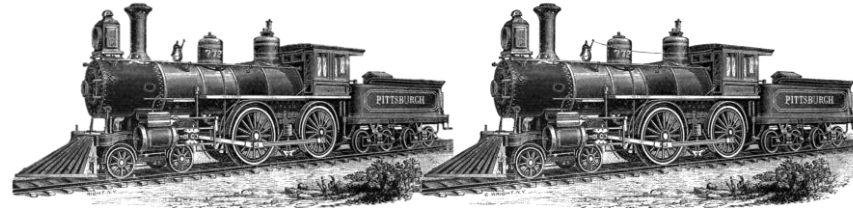
Space Needles

350M

Revisions



If every one were a feather, it would weigh as much as



2

Steam Engines

2.54M

Queries &
Updates /day



If every one were performed by a human, it would be the population of



Chicago

Illinois

Scale can be like a learning disability

Scale can be like a learning disability

It's often invisible and you need your own terms

Today's Scale—Fall Creator Update

11,985	Software Engineers in WDG that need to work together
7,305	Developers bringing in code to WDG repos
3,974,374	Commits in development timeframe
497,903	Pull Requests
68,646	Official Lab builds
1,159	Machine years of build resources for Lab builds
4,201,457	Developer desktop builds
949	Machine years for test resources
3,188,972,675	Test cases executed

Today's Frequency—Fall Creator Update

Multiple Daily

Windows Defender signature updates
Store and Services updates

Weekly

Windows Servicing updates

Daily - Biweekly

Windows Store Apps updates

Monthly

Xbox updates

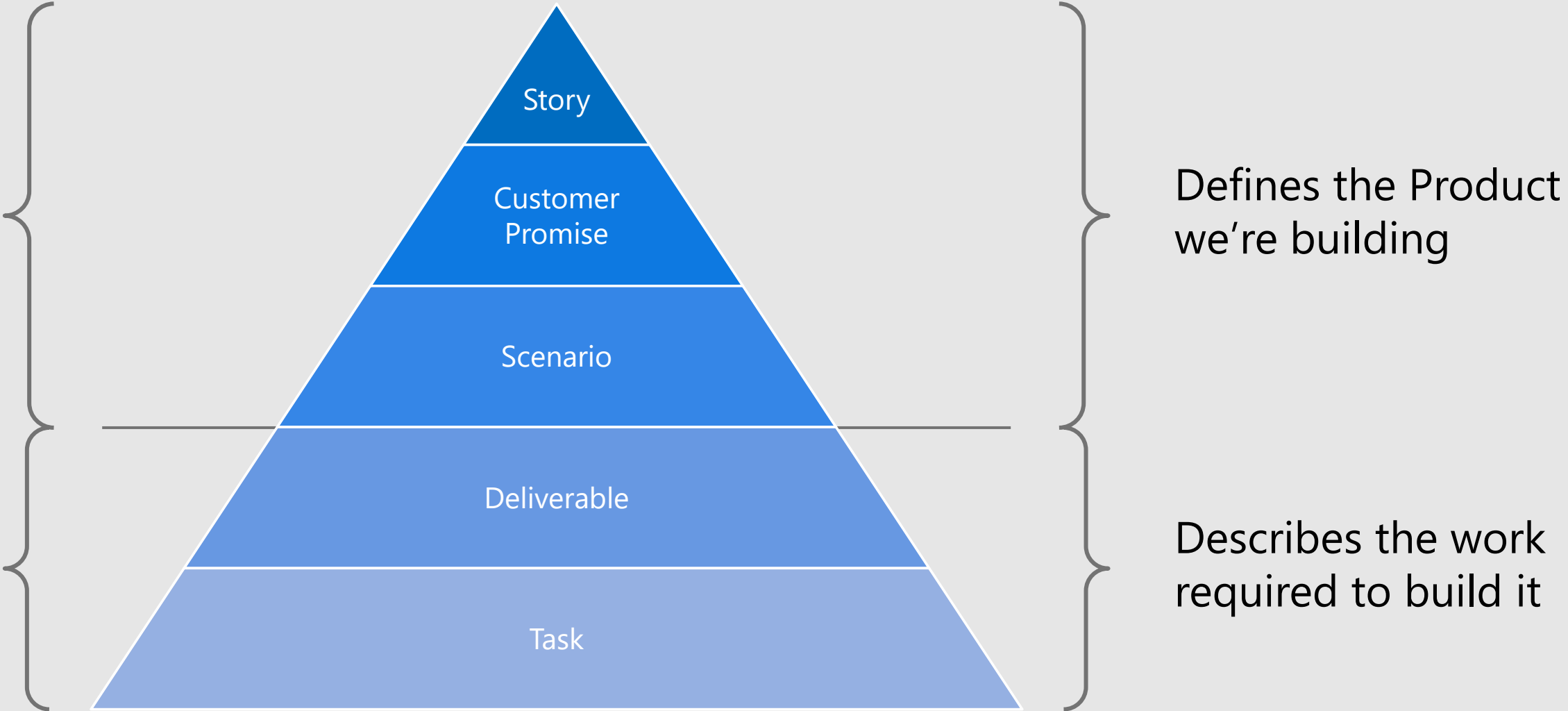
Semiannually

Windows feature updates

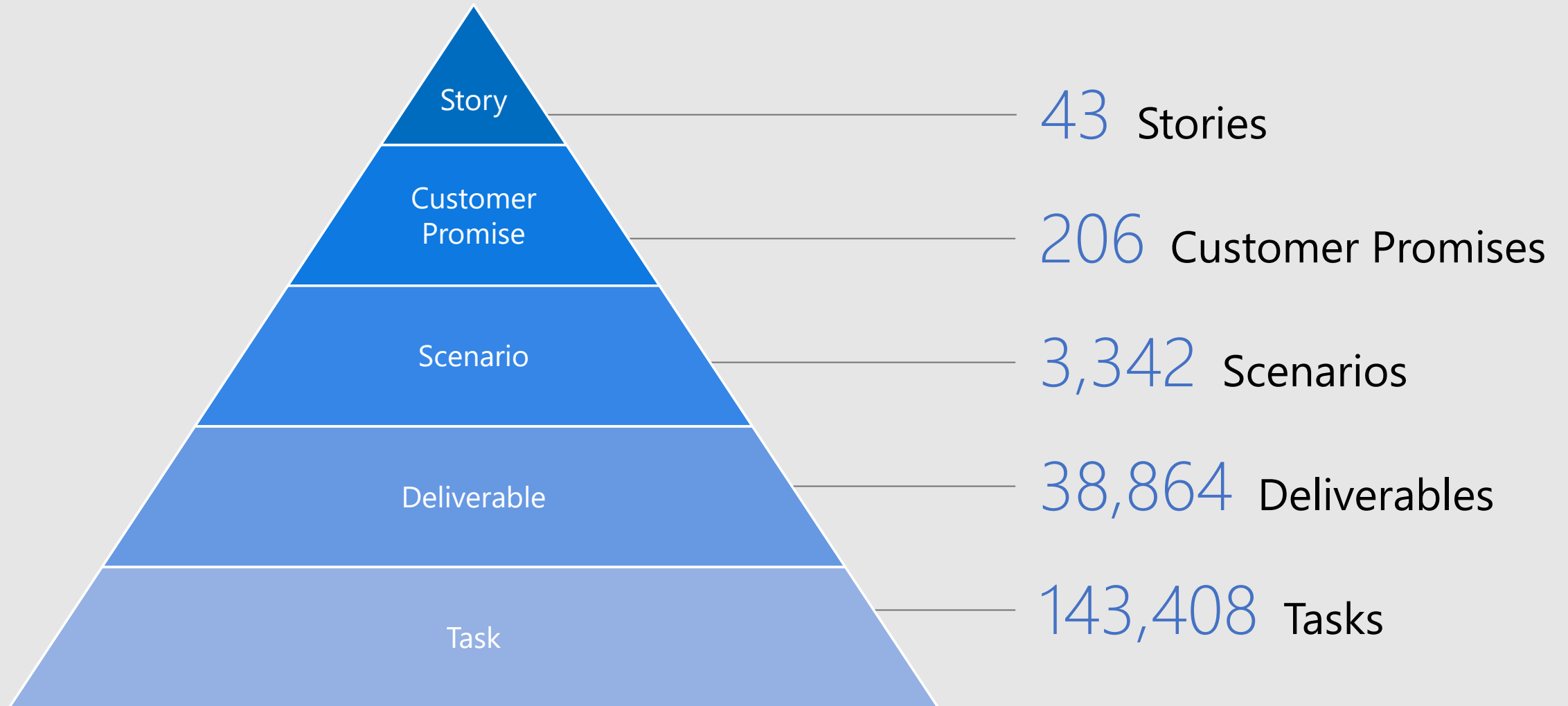
18-24mos

Device releases

Taxonomy Enables Alignment and Autonomy



TAXONOMY BY THE NUMBERS IN 2017



TRACKING STORIES

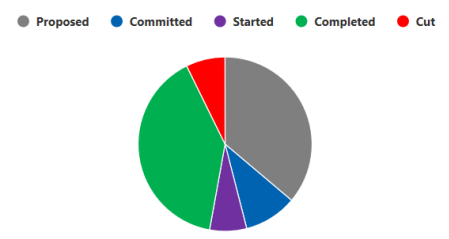
An engineering system that enables feature team agility, filtered by Customer Promise Release(s) = RS4, RS5, Scenario Release(s) = "RS4, RS5", Deliverable Release(s) = "RS4, RS5"

Story Review | Drilldown | Timeline

Search title or tag

Story Summary

State of Deliverables

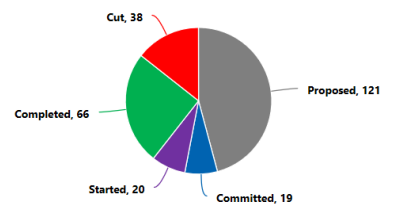


Teams Involved



Customer Promise (1/14): Converge experiences for engineers on VS IDE and VSTS

State of Deliverables



Showing : 264 deliverable items, including : 12 dependencies

Rank	AreaLevel3	Risk ASMT	State	Release	Iteration	Title
	ES	On Track	Proposed	RS5	Future	[ECA] [TVS] Campaigns aligned with WDG SA team
	ES	On Track	Proposed	RS5	Future	[ECA] [TVS] Streamlining of tools and rules
	ES		Proposed	RS5	Future	Enable pipeline to take configurations based on what teams want to run optionally (in addition to min bar).
1	ES	On Track	Proposed	RS5	Future	[ECA] [TVS] Improve how results are presented to developers
1	ES		Started	RS5	Future	[Pkg ES] Streamline customer support and responsiveness
749	ES		Completed	RS4	1710	Provide code signing for mission critical applications by collaborating with PRSS
900	ES		Completed	RS4	1712	Automate Geneva agent deployment based on OU structure
900	ES		Completed	RS4	1711	Drive infrastructure efficiencies by visualizing Package ES build pool for machine utilization and health
900	ES		Completed	RS4	1710	Improve build reliability by whitelisting external dependency sites in WDG networking
900	ES		Completed	RS4	1709	Need a way to manage DTL hard drive space to avoid build breaks
900	ES		Started	RS4	Future	Need an easy way to keep common utilities (like GIT) up to date on DTL build agents

UNDERSTANDING DEPENDENCIES – BY TEAMS AND BY STATE

OS | Dashboards | Code | Work | Build and Release | Test | Search work items in this project

Overview | Iteration Tracker | Story Tracker | Dependency Tracker

Story Area

OS\Core\SIGMa

Iteration: Any

Product Family: Any

Product: Any

Release: RS5,RS6

Dependency as: Deliverable

State: Any

Risk Assessment: Any

Priority: Any

Rank: Any

Select Dependency Partners: Any

Producer on top

Cross-account dependencies

Dependencies I'm Consuming | Dependencies I'm Producing | Dependency Availability Timeline | Risk Graph

+ New Dependency | Search title or tag

Dependency State ▼
 Group By Area | Group By Story

Drill Down ⬇ ⬆

- Proposed (189)
- Committed (111)
- Started (9)
- Completed (27)
- Cut (30)
- Other (0)

Showing : 366 unique dependencies | Column Options

Id	Ran...	Area Path	Title (Producer on top)	State	Risk Asse...	Consumers	Producers
11540809	5	OS\Core\SIGMa\SCON - Sensors and Conne...	> [USB-C] Deliver a Type-C MUTT to the Ecosystem	Committed	On Tr...	PCE	SIGMa
12524893	5	OS\Core\SIGMa\SCON - Sensors and Connectiv...	> Bluetooth: Automated HLK testing to validate Andromeda	Proposed	On Tr...	SIGMa	SIGMa
14414444	5	OS\Core\SIGMa\SCON - Sensors and Connectiv...	> [USB-C] Automate triage and provide self-debug mechanisms for US...	Proposed	On Tr...	PCE	SIGMa
11789160	10	OS\Core\SIGMa\Device Platform\First Party Engi...	> eSE support in QSEE/TEE (Ensure eSE Functions Well on AND (Especia...	Committed	On Tr...	STACK	SIGMa
14610761	10	OS\Core\SIGMa\Device Platform\First Party Engi...	> eSE Secure Wipe (or Factory Reset) Support in UEFI/TZ	Committed	On Tr...	STACK	SIGMa
10287021	11	OS\Core\SIGMa\Device Platform\QC Platform	> Mobile to OneCore Lab & Automation - Gates & Existing Automation	Completed	On Tr...	SIGMa	SIGMa
12636074	15	OS\Core\SIGMa\SCON - Sensors and Connectiv...	> Bluetooth: WCOS support State Separation	Committed	On Tr...	SIGMa	SIGMa
15411895	15	OS\Core\SIGMa\SCON - Sensors and Connectiv...	> [Dependency][StateSep] State separation support for UMDf service r...	Committed	On Tr...	SIGMa	SIGMa
10964110	20	OS\Core\SIGMa\Device Platform\DnD - Devices...	> [Andromeda] Devices using WCOS can use a common driver submiss...	Started	On Tr...	SIGMa	SIGMa
15376918	20	OS\Core\SIGMa\SCON - Sensors and Connectiv...	> Buses: Evaluate and validate HLK content for WCOS	Committed	On Tr...	SIGMa	SIGMa
15377148	20	OS\Core\SIGMa\SCON - Sensors and Connectiv...	> WDF: Evaluate and validate HLK content for WCOS	Proposed	On Tr...	SIGMa	SIGMa

TRACKING WORK ACROSS MONTHLY ITERATIONS

OS | Dashboards | Code | Work | Build and Release | Test | Settings
Search work items in this project

Overview | Iteration Tracker | Story Tracker | Dependency Tracker

Area: OS\Core\ES

View: Iteration View

Group By: Customer Promise

States: Any

Product Family: Any

Product: Any

Release: RS4,RS5

Discipline: Any

Show Hierarchy: Off

Deliverables or Claims: All Deliverables

Choose Columns

Deliverables
Dependencies
Cost

Make Work Management Easier for ICs

Previous ← 2/19 → Next

1802 (01/29-02/25) ▾

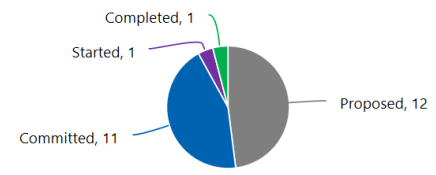
At-a-glance

- ➡ 0 Moved Out
- ➡ 0 Moved From Previous
- ➡ 1 Moved In

Risk Assessment

AtRisk ⚠	1
OffTrack 🚫	0
OnTrack ✅	1

State of Deliverables



Showing (0) producer dependencies

Risk ASMT ↓	State	Title
⚠ At Risk	Committed	🕒 Bugger - MSIT Security Review to enable Bugger as a Line Of Business Store App
✅ On Track	Committed	🕒 Performance - Clean-up of old releases and iterations (pending Jedi vote)
	Committed	🕒 SmartWITs - Suggest parent link on Task WIT
	Committed	🕒 Reporting - Feature Request: Dependency Tracker - Priority/Rank - filter on "Blank"
	Proposed	🕒 Bots - Complete Security Review
	Committed	🕒 Ownership - Use trackers' Toolbar for copy hyperlink be in the browser URL and add feedback button
	Proposed	🕒 Performance - Analyze Archive Users
	Committed	🕒 Ownership - Awareness - Contribute to reSearch code to display a link to Ownership
	Proposed	🕒 SmartWITs - Suggest Area Path & Assigned To with Work Item 1 Click

AT A GLANCE - CUSTOMIZED WIDGETS FOR DASHBOARDS

OS / ES Dashboards Code Work Build and Release Test

Overview RS4 Endgame Cleanup Iteration Tracker Story Tracker Dependency Tracker

Total Bugs per Dev (not just RS4)

Use this section to help with Bug Jail criteria

- Legend Bugs/Dev** (Green =< 10, 10 < Yellow =< 20, Red > 20)

RS4 Bugs

Use this section to help drive ES RS4

- Legend Bug Heatmap** (Green =< 20, 20 < Yellow =< 50, Red > 50)

ES RS4 Bug Glide (9/1-3/23)

RS4 All Bugs by Dev Team Area

Area	Bugs
QBI-Quality...	341
BLD-Build	165
ESP-Engineer...	125
Other	21

ES Bug Heatmap (Redstone/RS4)

Area Level 4	Active Bugs 48 hr	Active Bugs	Bugs Past Due	Blocking Bugs	Hot Bugs
BLD-Build	27	34	0	7	0
CLASS-Compiler...	2	2	0	1	0
EL-Engineering L...	0	3	0	0	0
ENG-Engineering...	104	108	0	18	1
ESP-Engineering...	3	3	0	0	0
QBI-Quality Built...	35	41	0	11	0
Other	24	32	0	4	0

BLD Bugs/Dev

8.5

per dev

QBI Bugs/Dev

12

per dev

SCALES Bugs/Dev

11

per dev

RS4 Countdown

39

days remaining

ES RS4 All by Assigned To

ES RQV Engineering Signoff Bugs - Active (6)

ID	Title	Assigned To	Area Path	Activated...
14894...	cppwint.exe has a dependen...	Paul Cole	OS\Core\E...	1/26/2018...
15316...	[Watson Failure] caused by F...	Alex Riem...	OS\Core\E...	1/4/2018 1...
15727...	[Canary Blocking] ICM: 58652...	Rob Hain	OS\Core\E...	1/31/2018...
15643...	[Compat][ARM64][Centennial...	dex-triage	OS\Core\E...	1/26/2018...
15630...	[Compat][ARM64][Centennial...	dex-triage	OS\Core\E...	1/26/2018...
15643...	[Compat][ARM64][Centennial...	dex-triage	OS\Core\E...	1/27/2018...

[View query](#)

CLASS Bugs/Dev

4.1

per dev

Nebula Bugs/Dev

6.6

per dev

STREAM Bugs/Dev

6.8

per dev

EL Bugs/Dev

0.1

per dev

NAVIGATING AREAS AND TEAMS

- ▼ **Projects** [Clear all](#)
- OS
 - OSGS
 - Surface
 - XBOX

NEW Teams can now be created here (vsoteamwizard is retired). Simply right click and choose "New Team" on your AreaPath. [More information](#)

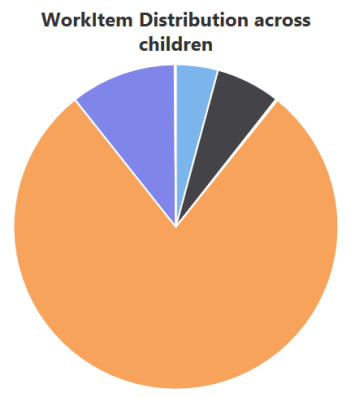
Looking for Files? See the [new Ownership extension](#)

Enter Area Name or alias 🔍 New Edit Move Delete Area Area Mappings 📄 Export

Id	Name	Path	Work Items	Dev Owner	DI Owner	PM Owner	Triage Own...
	▼ OS	... OS	5,492,953				
68958	🔒 > Analog	OS\Analog	230,504	DB Don Box	DB Don Box	OA Ori Amiga	
64884	> Apps	OS\Apps	352,403	Jeff West	JS Jignesh...	NF Natahri...	Nate...
88829	🔒 > Care	OS\Care	8,542	GK Giridhar...	HK Harpre...	HK Harpre...	
64760	🔒 > Core	OS\Core	4,315,355	HS Henry S...	MF Michael...	HB Harv Bh...	
87579	🔒 > WE	OS\WE	579,347	JJ Jeff John...	EG Evan Gol...	CF Chuck Fr...	
76490	🔒 > XBOX	OS\XBOX	6,331	Louis Ka...	Louis Ka...	Louis Ka...	
	> OSGS	OSGS	1,614,773				
	> Surface	Surface	1,110				
	> XBOX	XBOX	1,512,474				

[Feedback](#) ⓘ

OS



FINDING FILES AND OWNERS

- Projects
- Repositories

Enter file name, file path or alias

Change Owners | Add Files | Show Servicing Area | Exclusions | Export

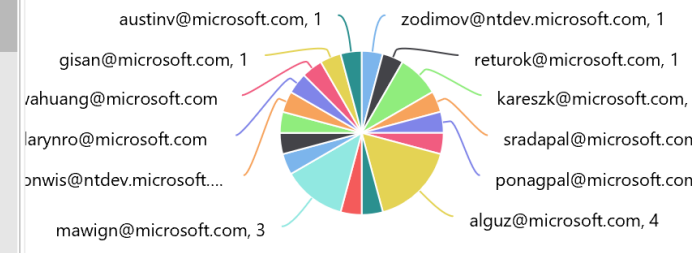
3,109,762 Files Shipping (25,434) Non Shipping (81,658) Checked In (3,002,670)

Name	Total Files	Area Path	Dev Owner	DI Owner	PM Owner
[Manually Added Files]	11,803				
admin	201,844				
amcore	10,062				
analog	182,640				
avcore	86,165				
base	211,418				
build	568				
com	46,450				
data	1,907				
drivers	79,245				
ds	140,137				
enduser	38,367				
gamecore	31	XBOX\XboxOne\Platform\AppPlat	Matt Dissi...	Darryl Russi	Jeremy C
hub	741				
inbox	5,078				
inetcore	17,311				
inetsrv	39,760				
iot	7,613				

Source Path : admin

Pull Requests with linked Work Items

Pull Requests by Contributor



Primary Contributor : Alex Guzman

ZD Zoran Dimov OS\Core\Fundamentals\WaaS Flying 5/2/2018
 Phase 2: Generate INC files with direct file operations -- use the new tool
 1763063 official/rs_fun_flight 16335851

RT Rebecca Tu... OS\Core\ES\STREAM\SCM\Git 5/30/2017
 Updated placeholder.txt Updated placeholder.txt
 507590 official/rs_play 11283943

K Karesz Kec... OS\Core\ES\SCALES - Speedy 5/10/2017

What about all that (err...legacy) code?

What About Code Velocity?

ON AVERAGE, EACH MONTH

7.3K	Developers making code changes
11K	Topic branches
367K	10 commits per minute
33K	1,100 pull requests per day
9.7K	Branch Integrations

OUR BRANCH MERGE LOOKS LIKE THIS



Err...Jez and Nicole said yesterday ...

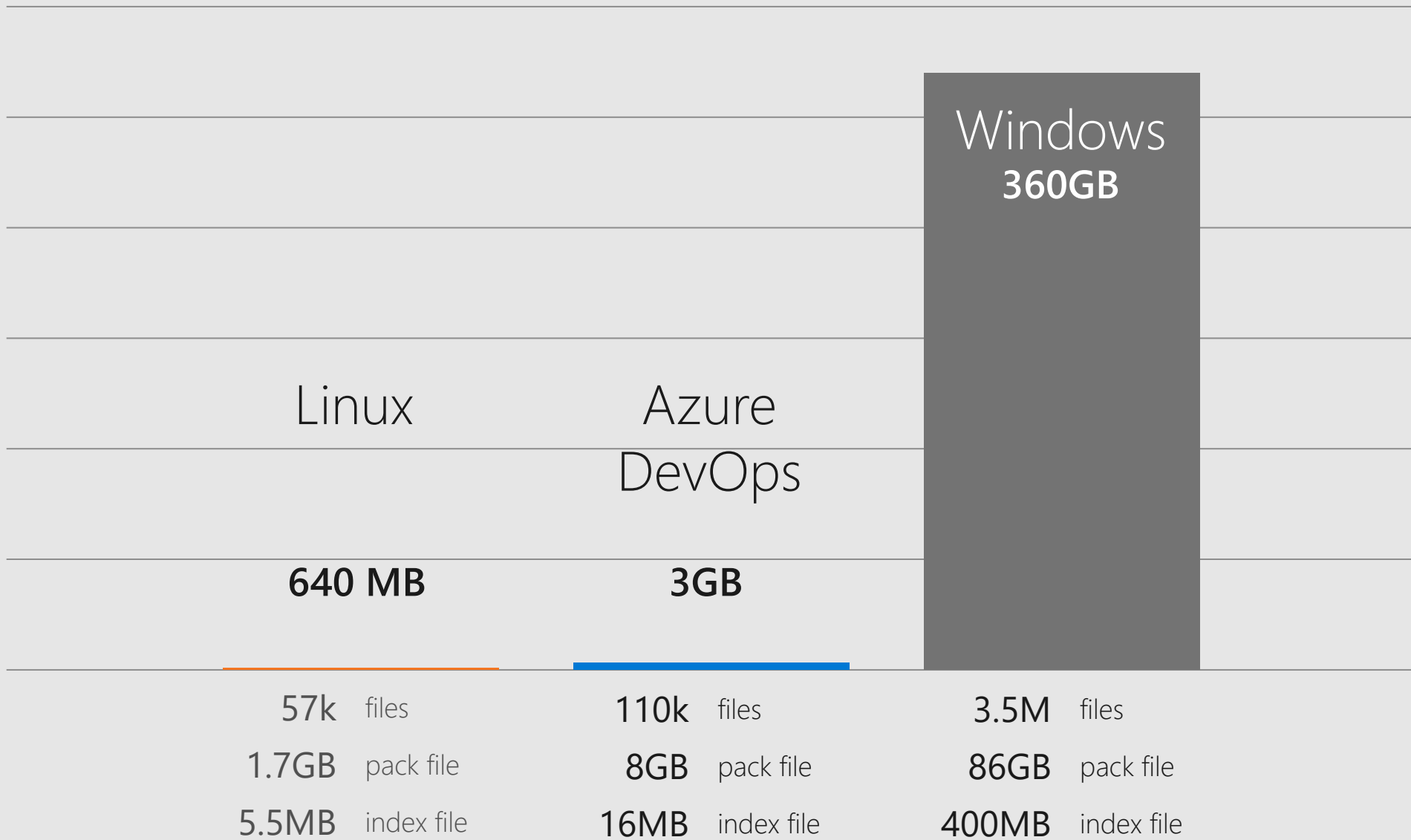
Some of my other favorite data findings!

- Change advisory boards are **useless***
- Industry **doesn't matter**
- Integration times and branch lifetimes **lasting hours are better than days**

Why Did We Pick Git as a Starting Point

- Evaluated Git against Source Depot
- Found Git was the only solution that could meet all our needs
- But only if, we could get the scale

No.	Requirement	SD	Perforce	Git w/VSO
1	Large Scale	✓	✓	✗
2	High Availability (HA/DR)	✓	✓	✗
3	Support a “Monolithic” Code Base	✓	✓	✗
4	Fast Performance	✗	✓	✓
5	Monitoring and KPI Support	✓	✓	✗
6	Code Review	✓	✓	✓
7	Strong Merge Conflict Support	✗	✓	✓
8	Payload Tracking	✗	✓	✓
9	Branch Maintenance	✗	✓	✓
10	High Code Velocity	✗	✓	✓
11	Collaborative Development	✗	✓	✓
12	Enable Experimentation	✗	✓	✓
13	Easy Code Sharing	✗	✓	✓
14	Easy Code Movement	✗	✓	✓
15	Fast Learning Curve	✗	✗	✓
16	Open Source Tooling Innovations	✗	✗	✓
17	Distributed Development	✗	✓	✓
18	Single Source Store	✗	✗	✗
19	Social Profiles	✗	✓	✓
20	Integrated Support for DevDiv Tools	✗	✗	✓



Git on Windows repository

12 hrs clone

3 hrs checkout

8 mins status

30 mins commit

To make Git work for Windows, we made Git 300x faster

(It took three attempts.)

Git + GVFS on Windows repository

~~12 hrs~~ 5 mins clone

~~3 hrs~~ 30 secs checkout

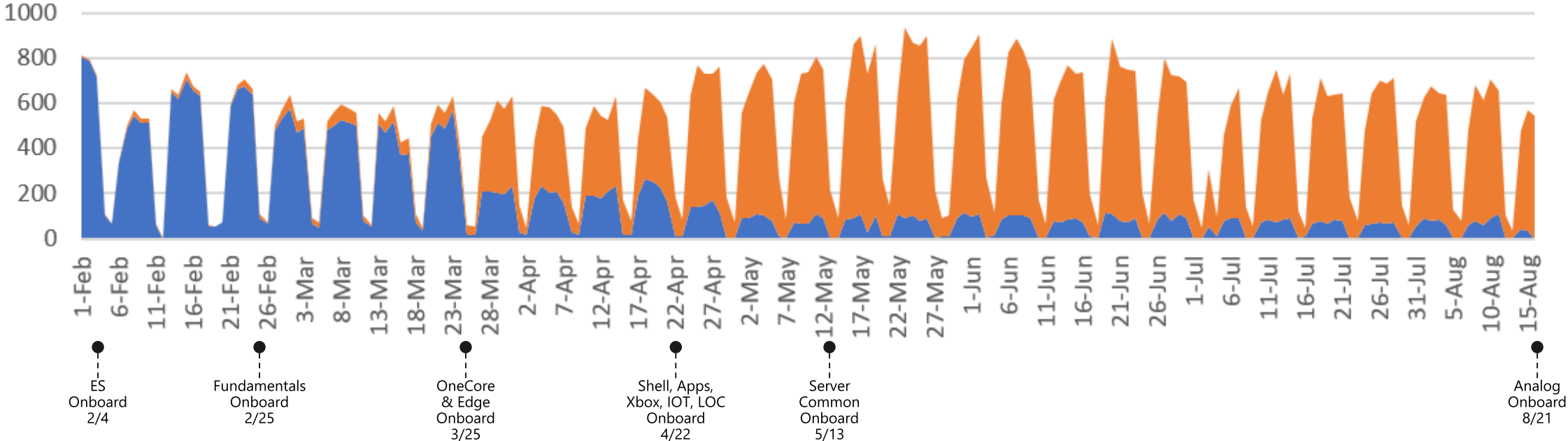
~~8 mins~~ 8 secs status

~~30 mins~~ 6 secs commit

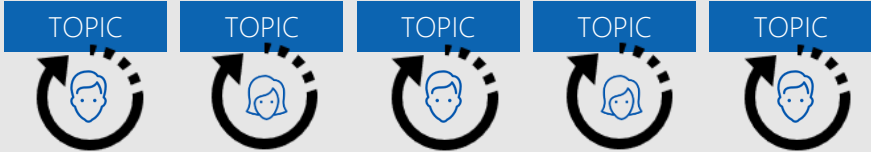
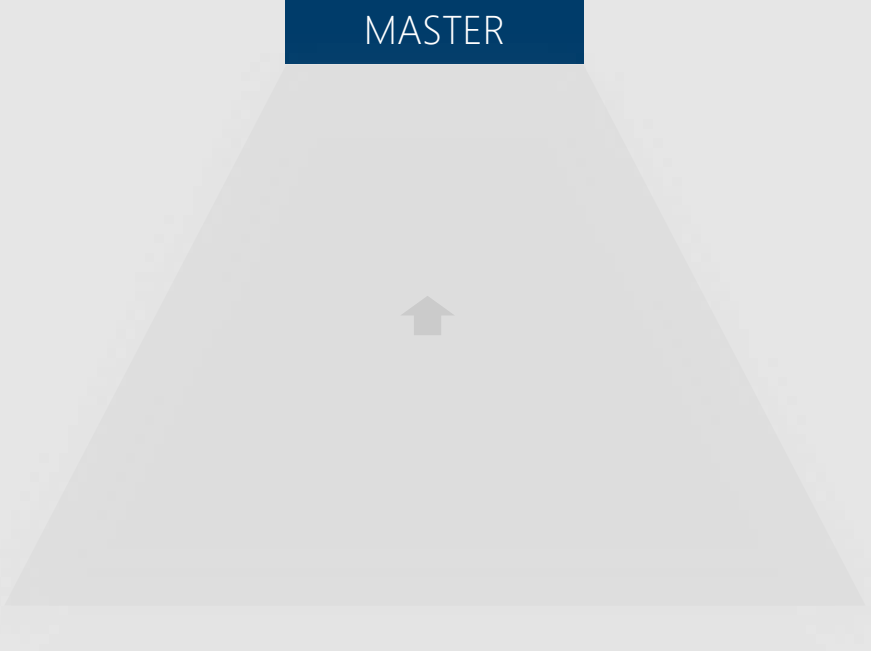
Git Crossover – Getting Faster Without Pausing

Git Onboarding Schedule & Productivity Impact (Git Pull Request/SDX Submit Measures)

■ SDX Submits ■ Git PRs

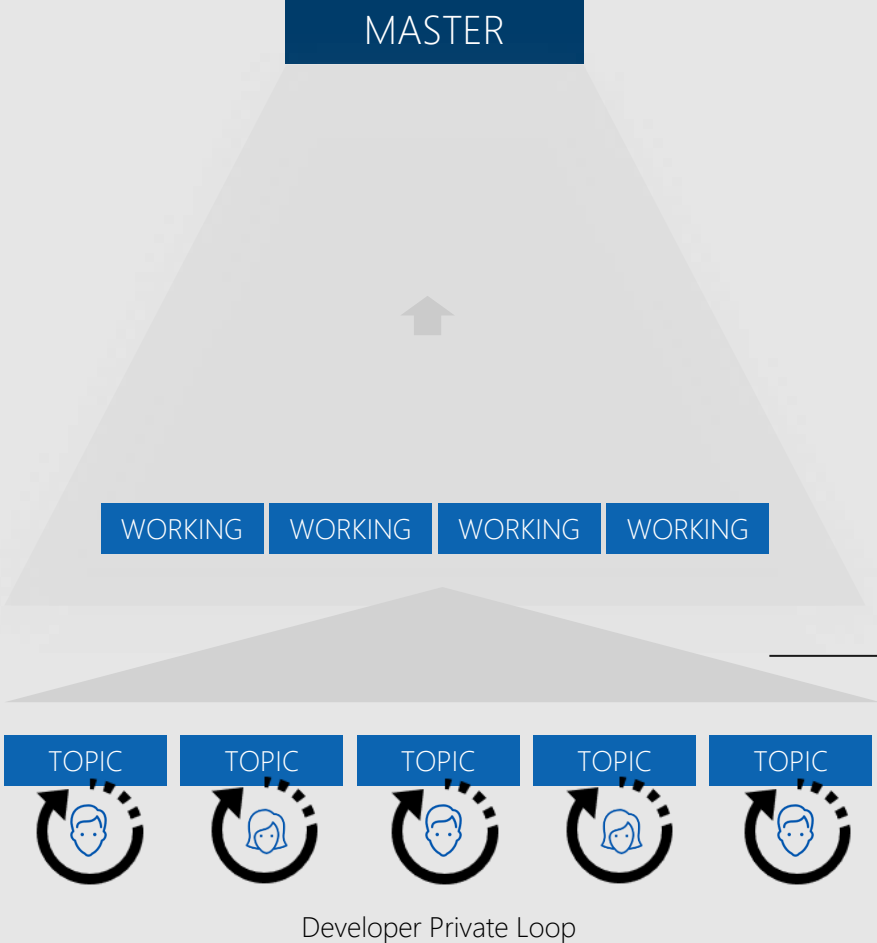


How Do We Flow All That Code?



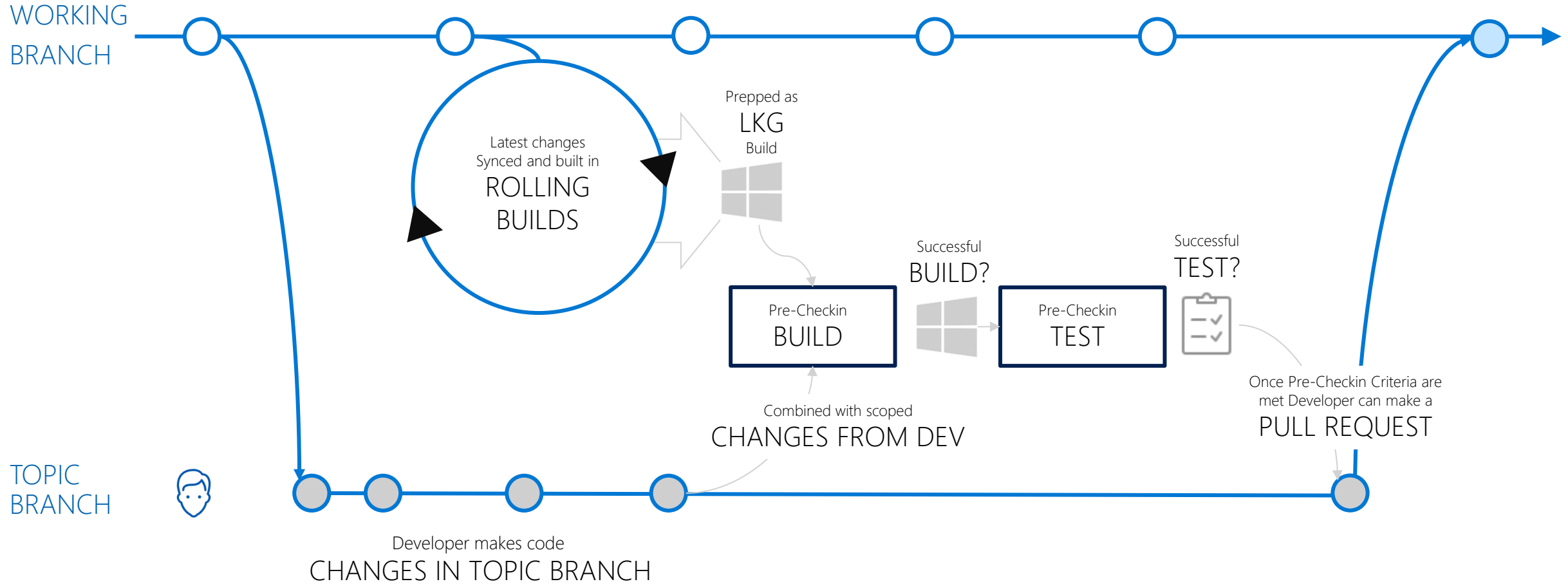
Developer Private Loop

Working with Azure Repos on a Windows-Scale PCV



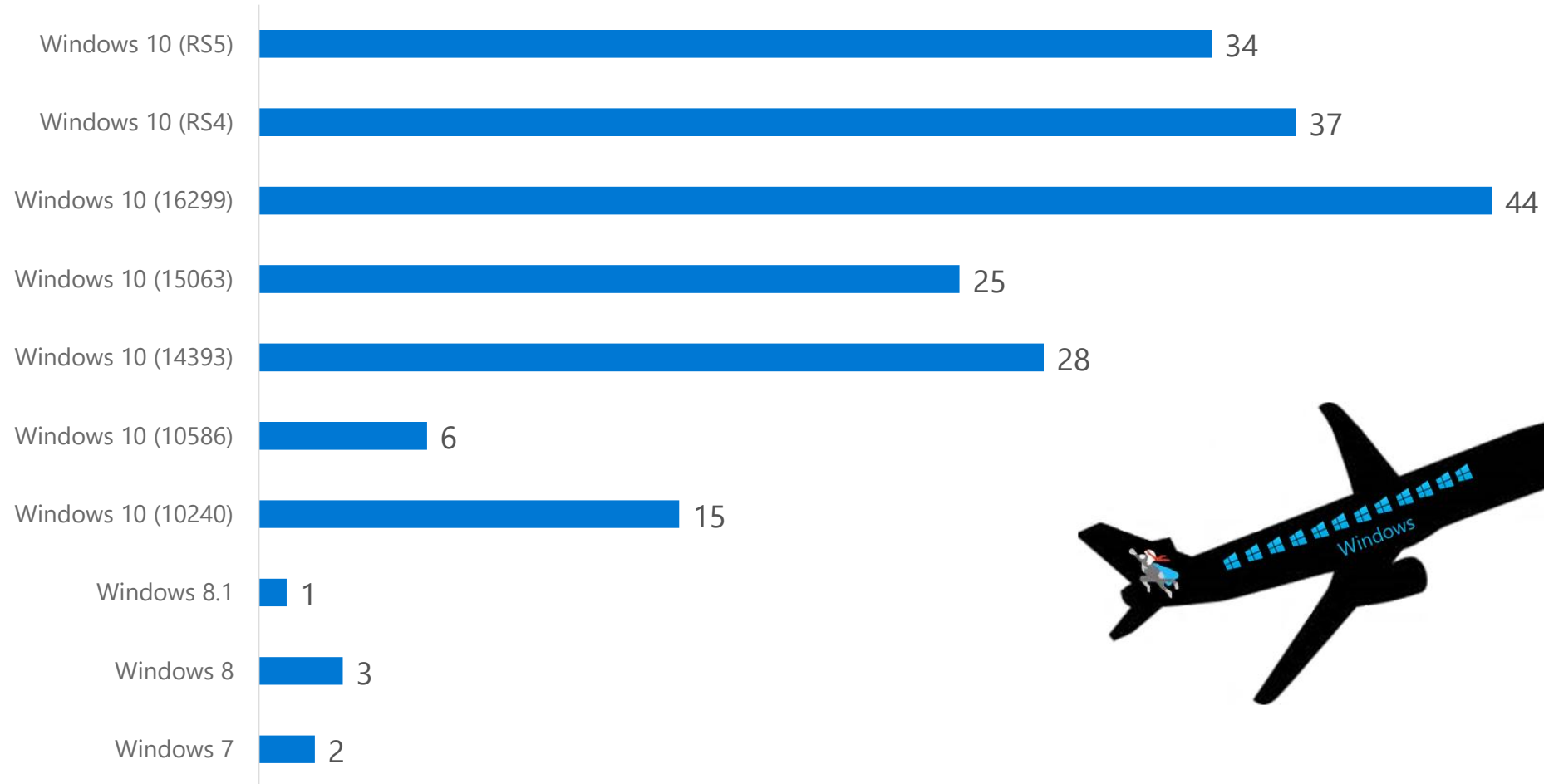
Pre-checkin Validation (PCV)

Pre-Checkin Validation



Windows Insiders—Development In The Open

Windows Insiders Public Previews



Now Sharing with the World

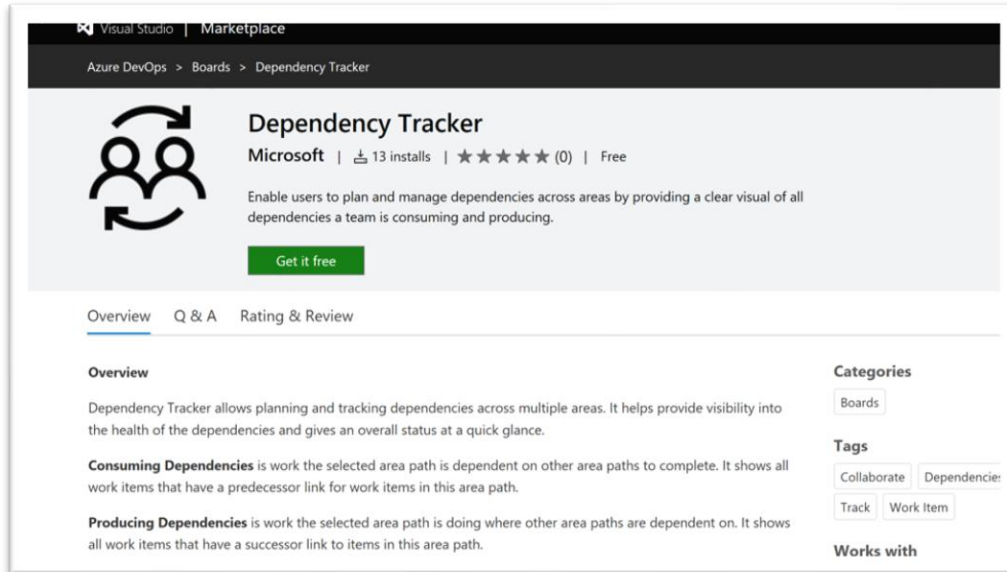


<http://Aka.ms/WorkItemOneClick>

<http://Aka.ms/WiMigrator>

DEPENDENCY TRACKER

Dependency Tracker allows planning and tracking dependencies across multiple areas. It helps provide visibility into the health of the dependencies and gives an overall status at a quick glance.



Visual Studio | Marketplace
Azure DevOps > Boards > Dependency Tracker

Dependency Tracker

Microsoft | 13 installs | ★★★★★ (0) | Free

Enable users to plan and manage dependencies across areas by providing a clear visual of all dependencies a team is consuming and producing.

[Get it free](#)

Overview | Q & A | Rating & Review

Overview

Dependency Tracker allows planning and tracking dependencies across multiple areas. It helps provide visibility into the health of the dependencies and gives an overall status at a quick glance.

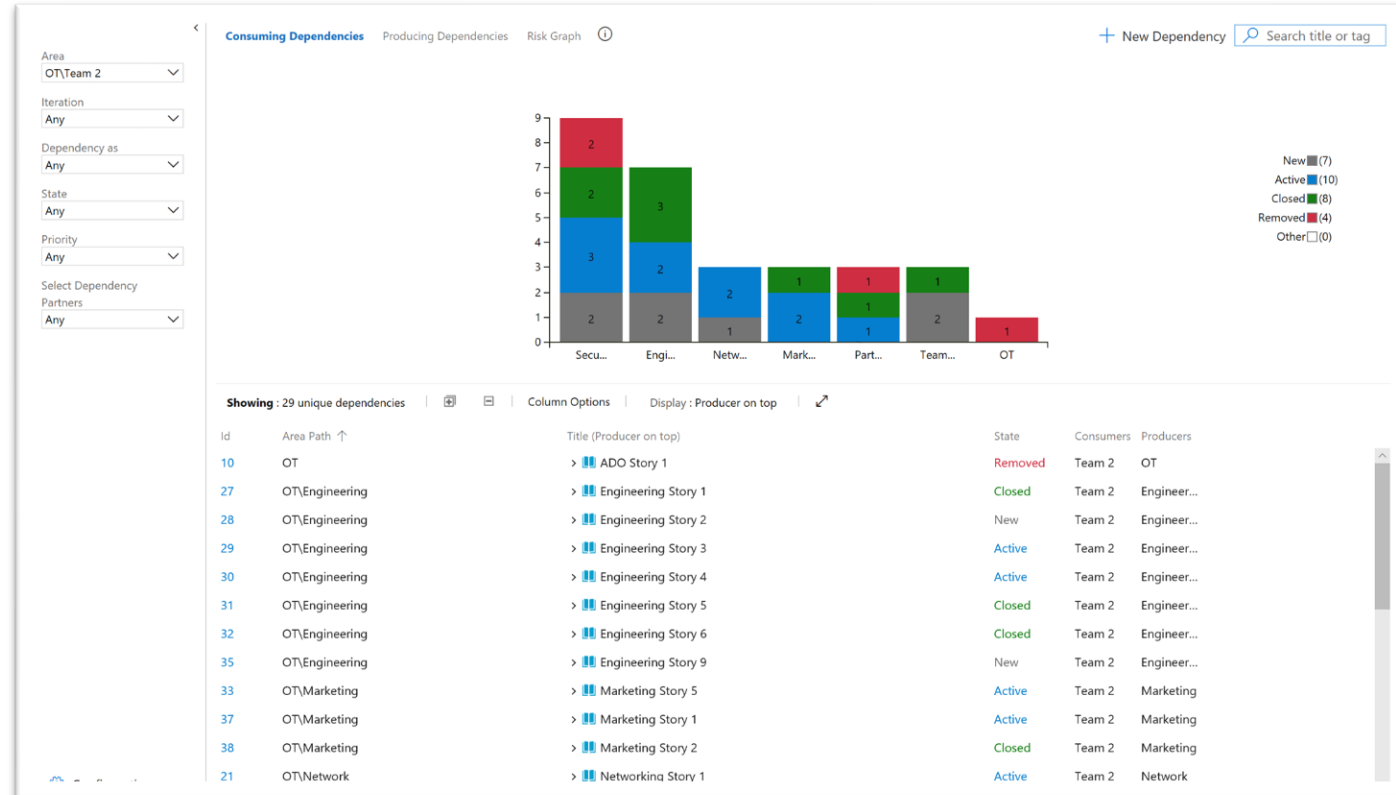
Consuming Dependencies is work the selected area path is dependent on other area paths to complete. It shows all work items that have a predecessor link for work items in this area path.

Producing Dependencies is work the selected area path is doing where other area paths are dependent on. It shows all work items that have a successor link to items in this area path.

Categories
Boards

Tags
Collaborate | Dependency | Track | Work Item

Works with



<http://Aka.ms/DependencyTracker>

GETTING 12,000 SOFTWARE ENGINEERS TO WORK INDEPENDENTLY AND TOGETHER



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<http://aka.ms/devops>

