

Windows Journey to DevOps

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Windows Engineering Systems

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Azure 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

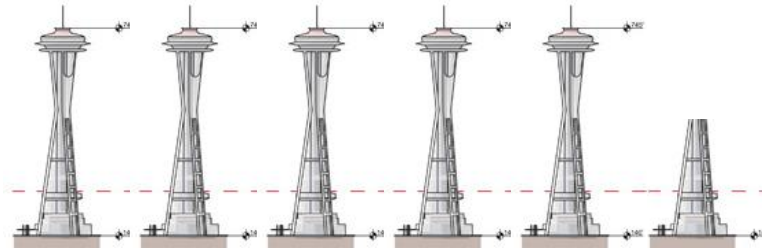
12,000 ENGINEERS CREATE A LOT OF STUFF...

11M

Work Items



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



5.5

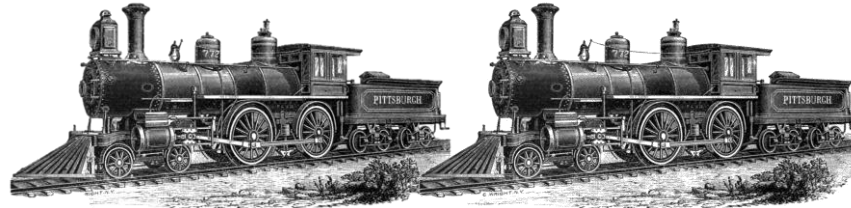
Space Needles

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

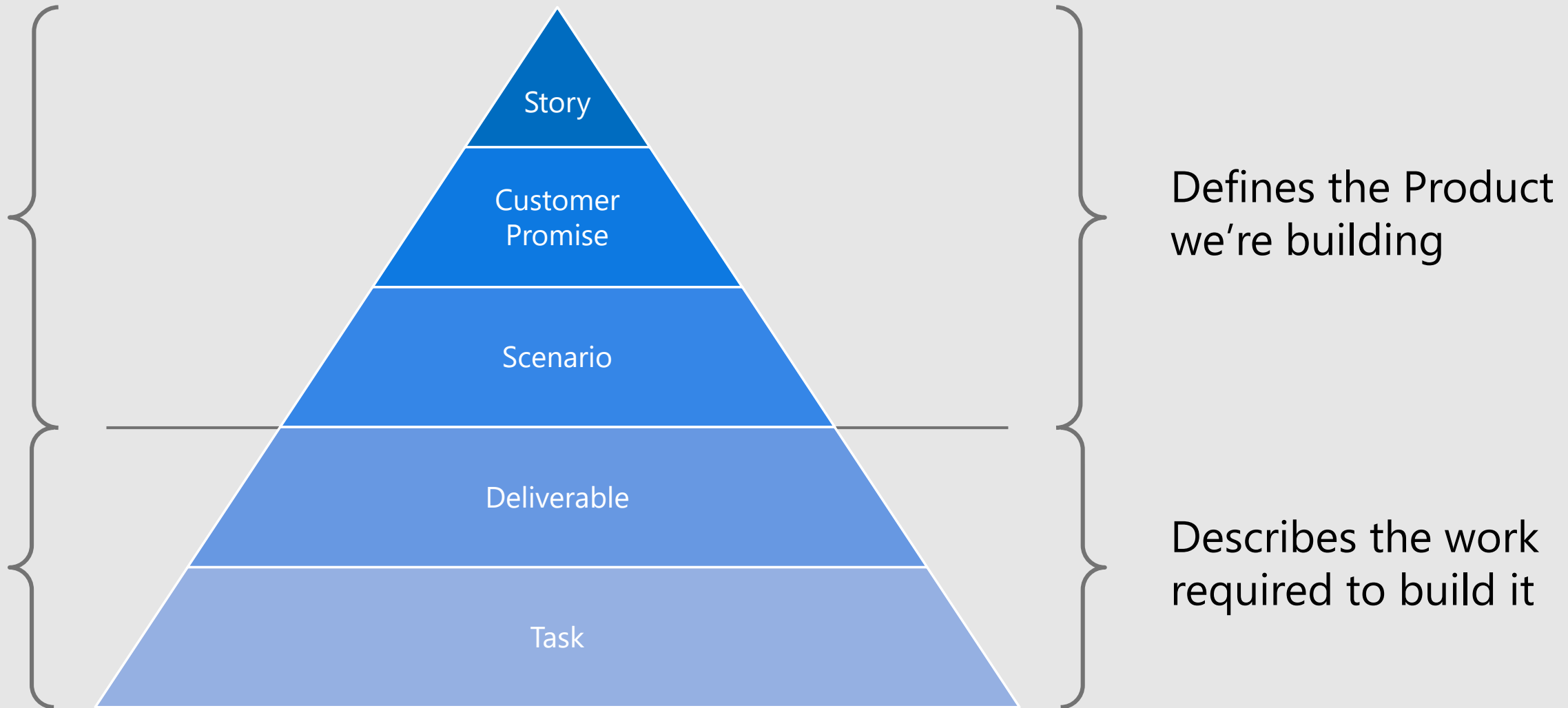
Semiannually

Windows feature updates

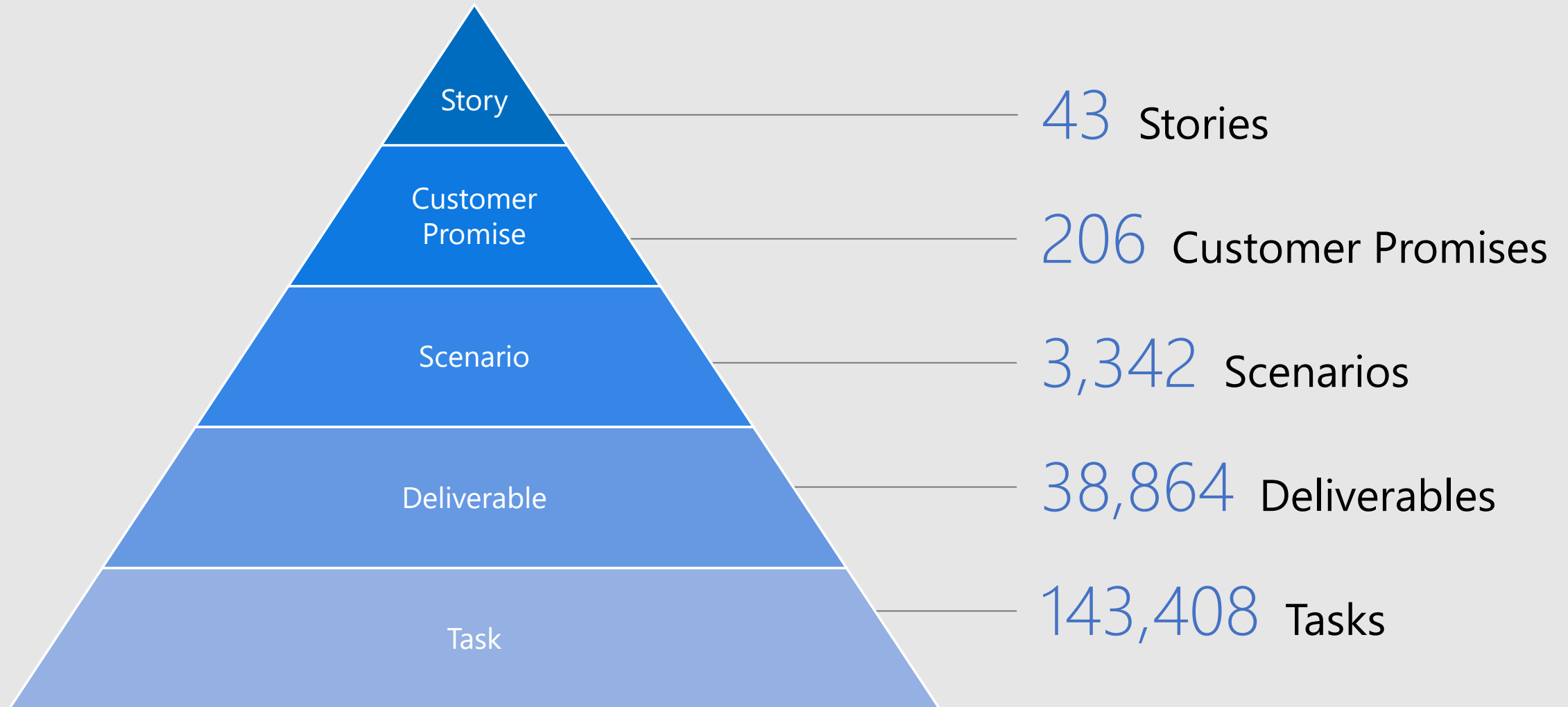
18-24mos

Device releases

Taxonomy Enables Alignment and Autonomy



TAXONOMY BY THE NUMBERS IN 2017



TRACKING STORIES

OS

Dashboards

Code

Work

Build and Release

Test

Search work items in this project

Overview

Iteration Tracker

Story Tracker

Dependency Tracker

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

Proposed

Committed

Started

Completed

Cut

Teams Involved

ES

Fundamentals

DevPartners

SiGMA

Other

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

State of Deliverables

Completed, 66

Cut, 38

Proposed, 121

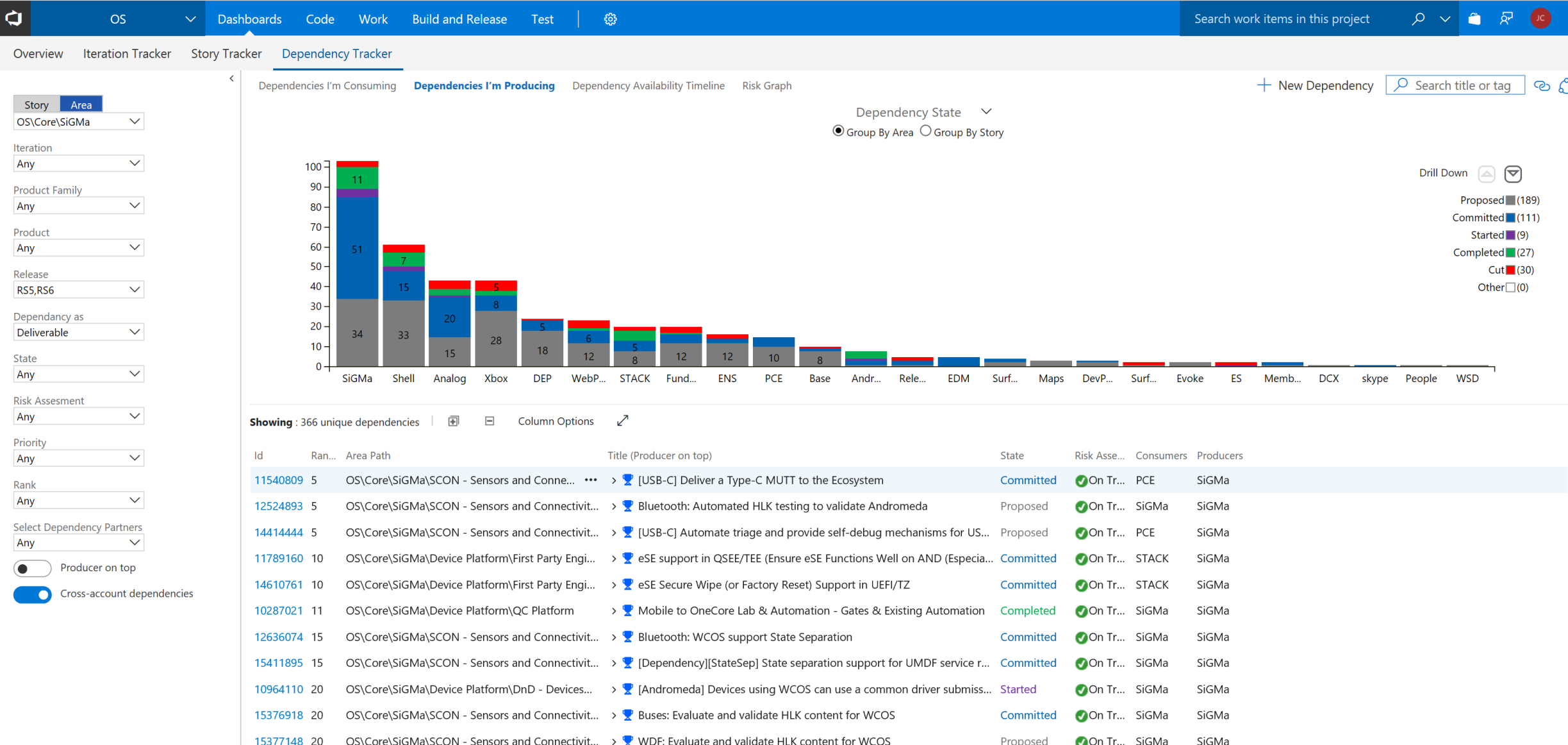
Started, 20

Committed, 19

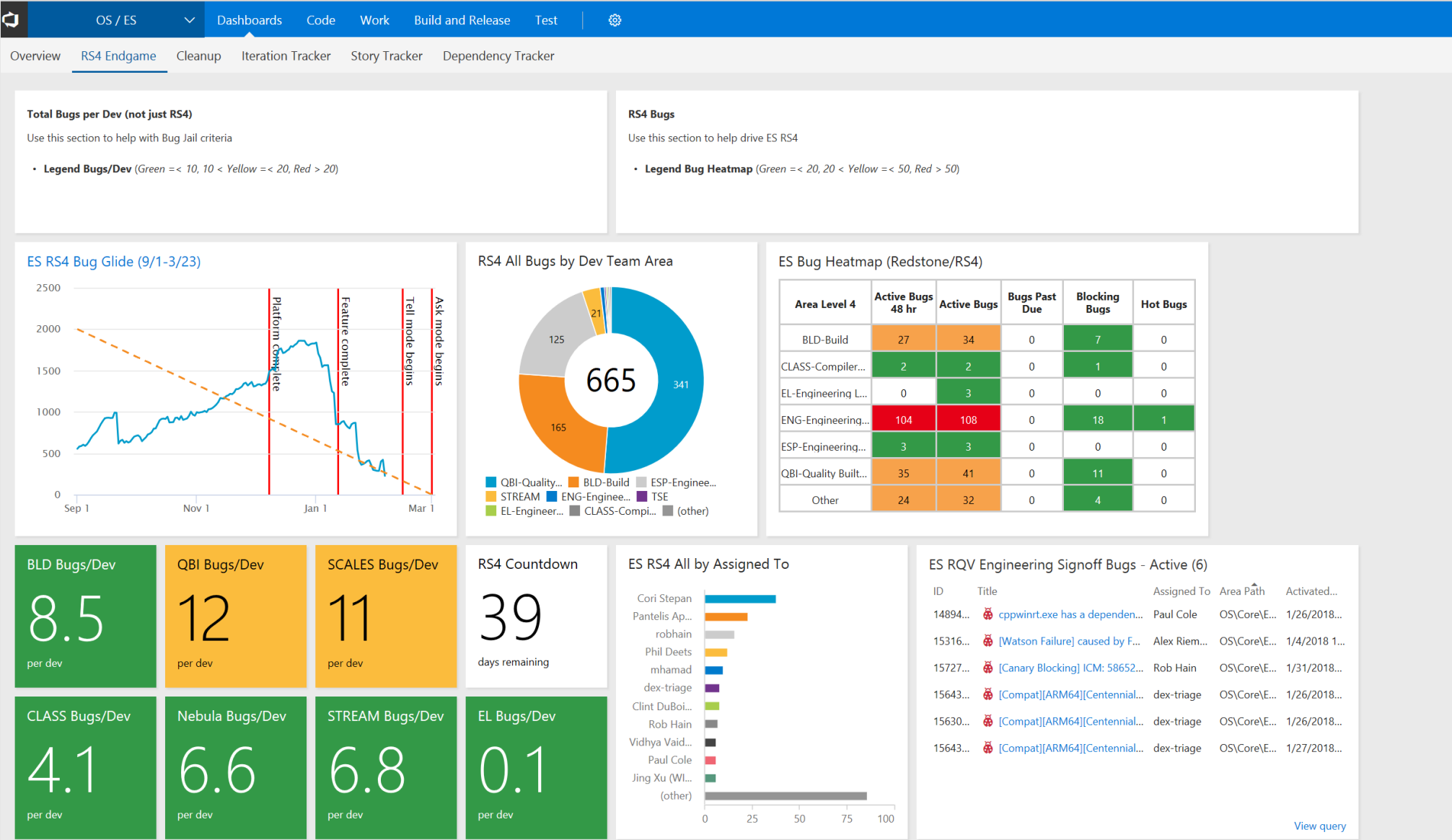
Showing : 264 deliverable items, including : 12 dependencies

| 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



AT A GLANCE - CUSTOMIZED WIDGETS FOR DASHBOARDS



NAVIGATING AREAS AND TEAMS

OS / ES

Dashboards

Code

Work

Build and Release

Test

Analytics

Search work items in this project

Work Items

Backlogs

Queries*

Plans

Wiql Playground

Areas

▼ 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 | <div><div></div>> Analog</div> | OS\Analog | 230,504 | <div>DB</div> Don Box | <div>DB</div> Don Box | <div>OA</div> Ori Amiga | |
| 64884 | <div>> Apps</div> | OS\Apps | 352,403 | <div></div> Jeff West | <div>JS</div> Jignesh... | <div>NF</div> Natahri... | <div></div> Nate... |
| 88829 | <div><div></div>> Care</div> | OS\Care | 8,542 | <div>GK</div> Giridhar... | <div>HK</div> Harpre... | <div>HK</div> Harpre... | |
| 64760 | <div><div></div>> Core</div> | OS\Core | 4,315,355 | <div>HS</div> Henry S... | <div>MF</div> Michael... | <div>HB</div> Harv Bh... | |
| 87579 | <div><div></div>> WE</div> | OS\WE | 579,347 | <div>JJ</div> Jeff John... | <div>EG</div> Evan Gol... | <div>CF</div> Chuck Fr... | |
| 76490 | <div><div><div>> XBOX</div><div>> OSGS</div><div>> Surface</div><div>> XBOX</div></div></div> | <div>OS\XBOX</div> <div>OSGS</div> <div>Surface</div> <div>XBOX</div> | <div>6,331</div> <div>1,614,773</div> <div>1,110</div> <div>1,512,474</div> | <div></div> Louis Ka... | <div></div> Louis Ka... | <div></div> Louis Ka... | |

Feedback

OS

WorkItem Distribution across children

FINDING FILES AND OWNERS

OS

Dashboards

Code

Work

Build and Release

Test

Analytics

os

Files

Commits

Pushes

Branches

Tags

Pull Requests

CodeHub

Gitbit

Ownership

Search code in this project

Feedback

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

Zoran Dimov OS\Core\Fundamentals\WaaS Flying

Phase 2: Generate INC files with direct file operations -- use the new tool

1763063 official/rs_fun_flight 16335851

Rebecca Tu... OS\Core\ES\STREAM\SCM\Git

Updated placeholder.txt Updated placeholder.txt

507590 official/rs_play 11283943

Karesz Kec... OS\Core\ES\SCALES - Speedy

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 ...

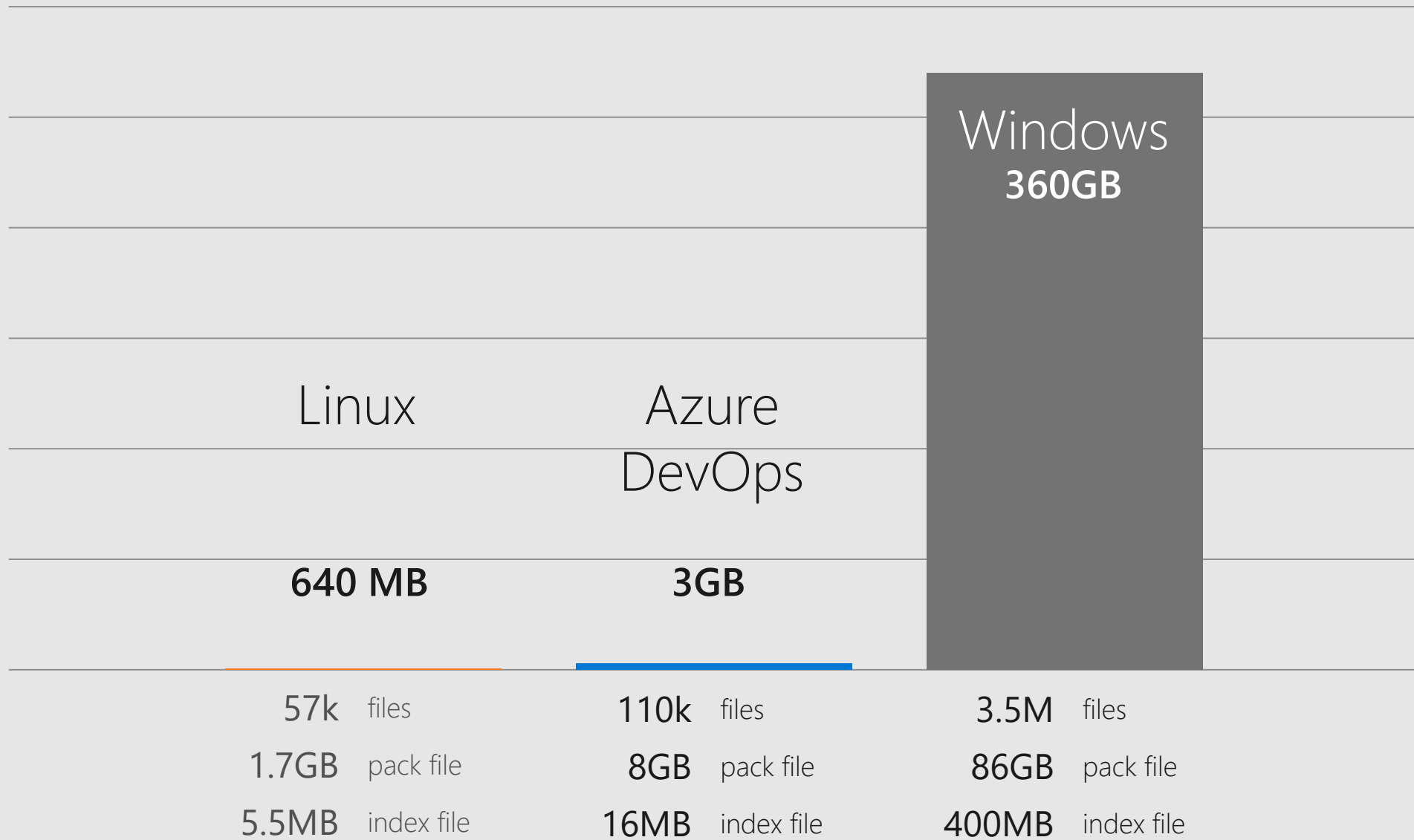
Some of my other favorite data findings!

- 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

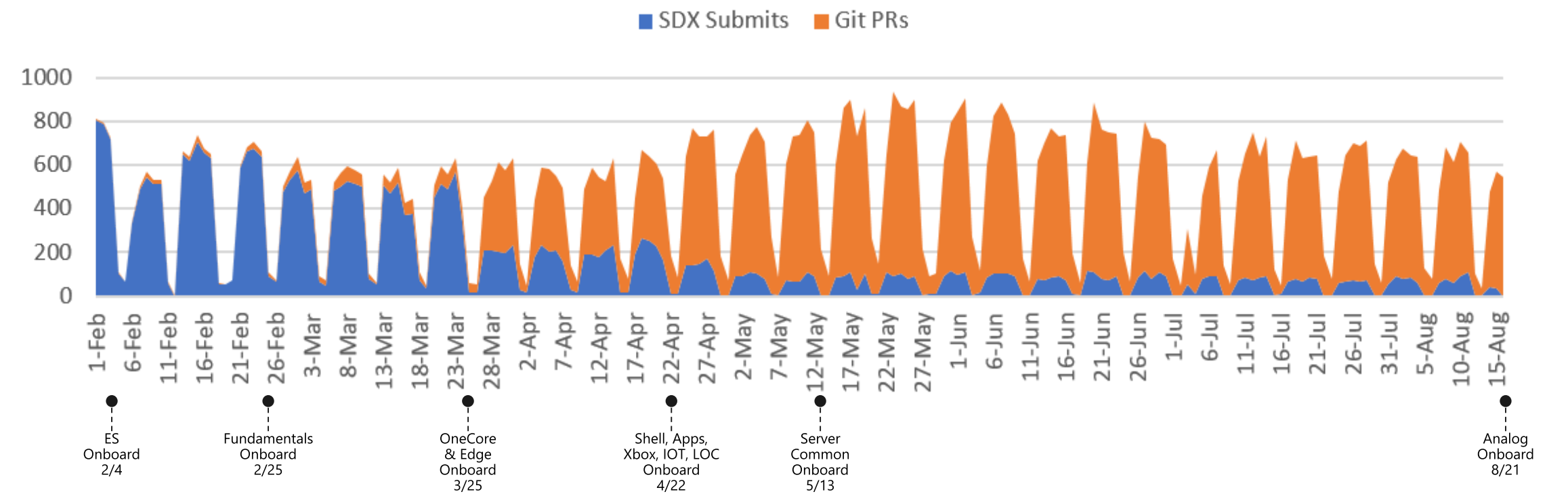
~~3~~ hrs 30 secs checkout

~~8~~ mins 8 secs status

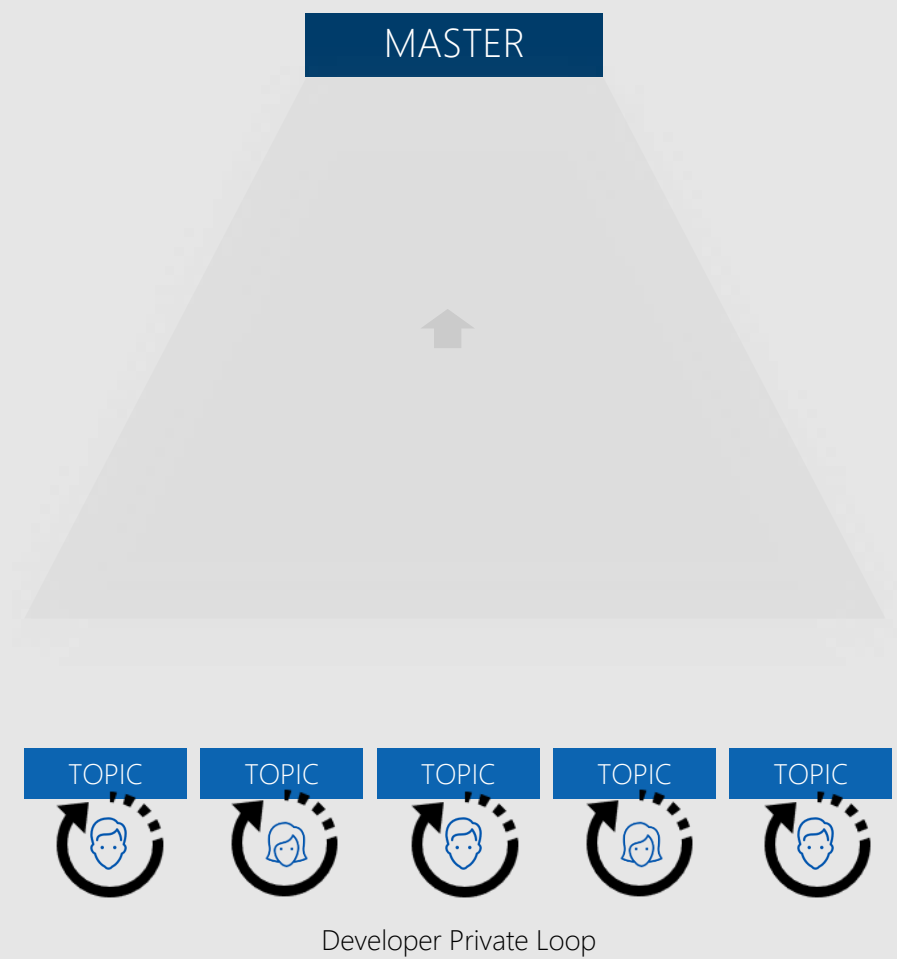
~~30~~ mins 6 secs commit

Git Crossover – Getting Faster Without Pausing

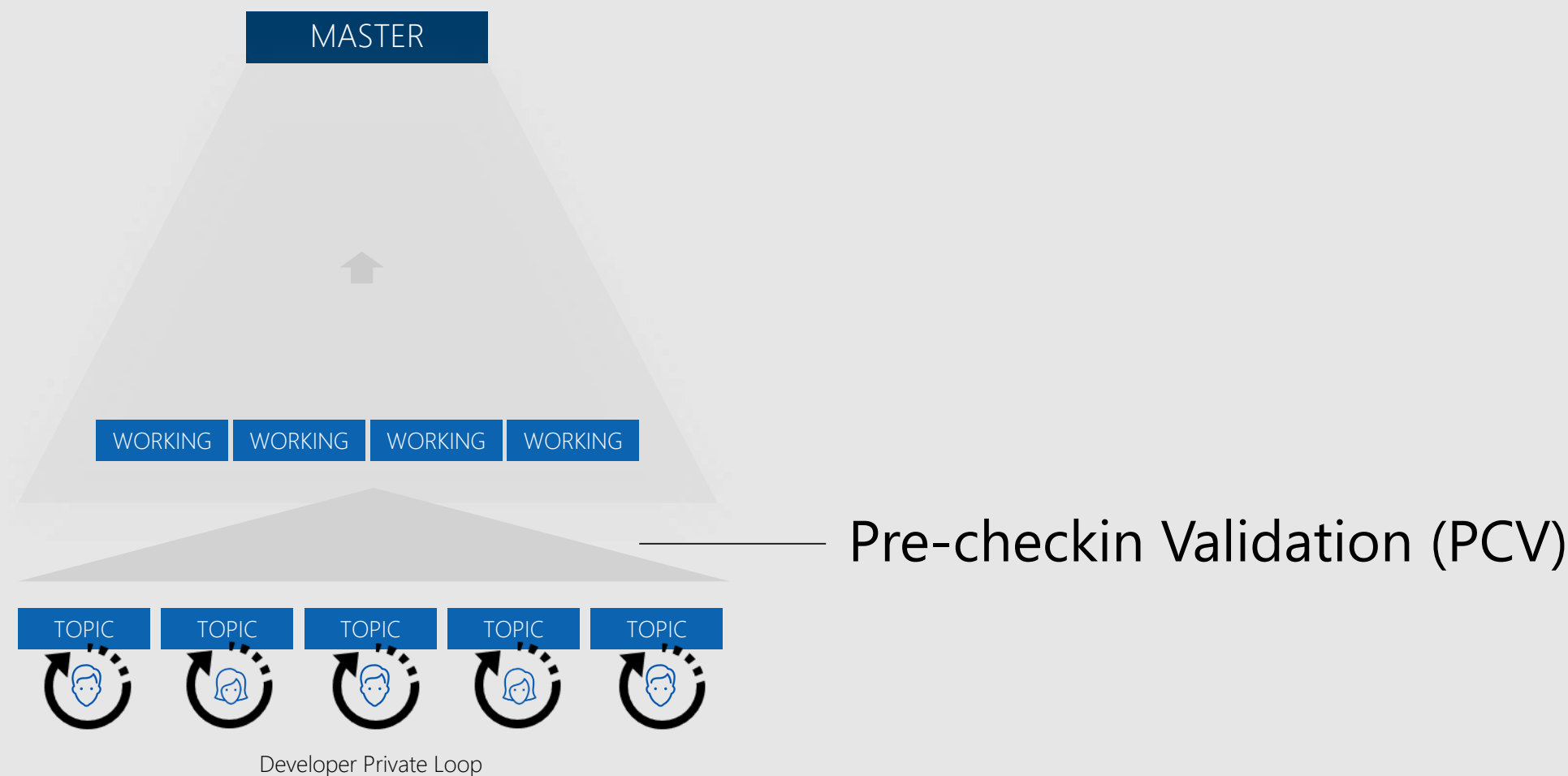
Git Onboarding Schedule & Productivity Impact (Git Pull Request/SDX Submit Measures)



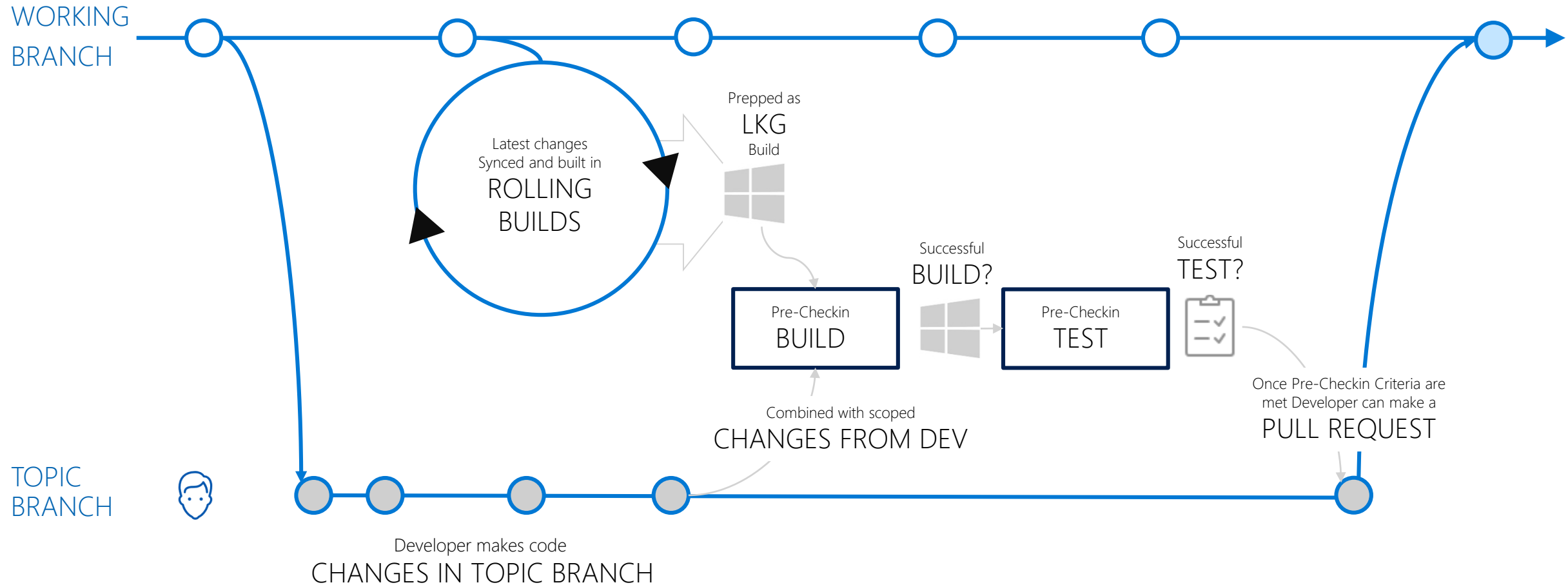
How Do We Flow All That Code?



Working with Azure Repos on a Windows-Scale PCV

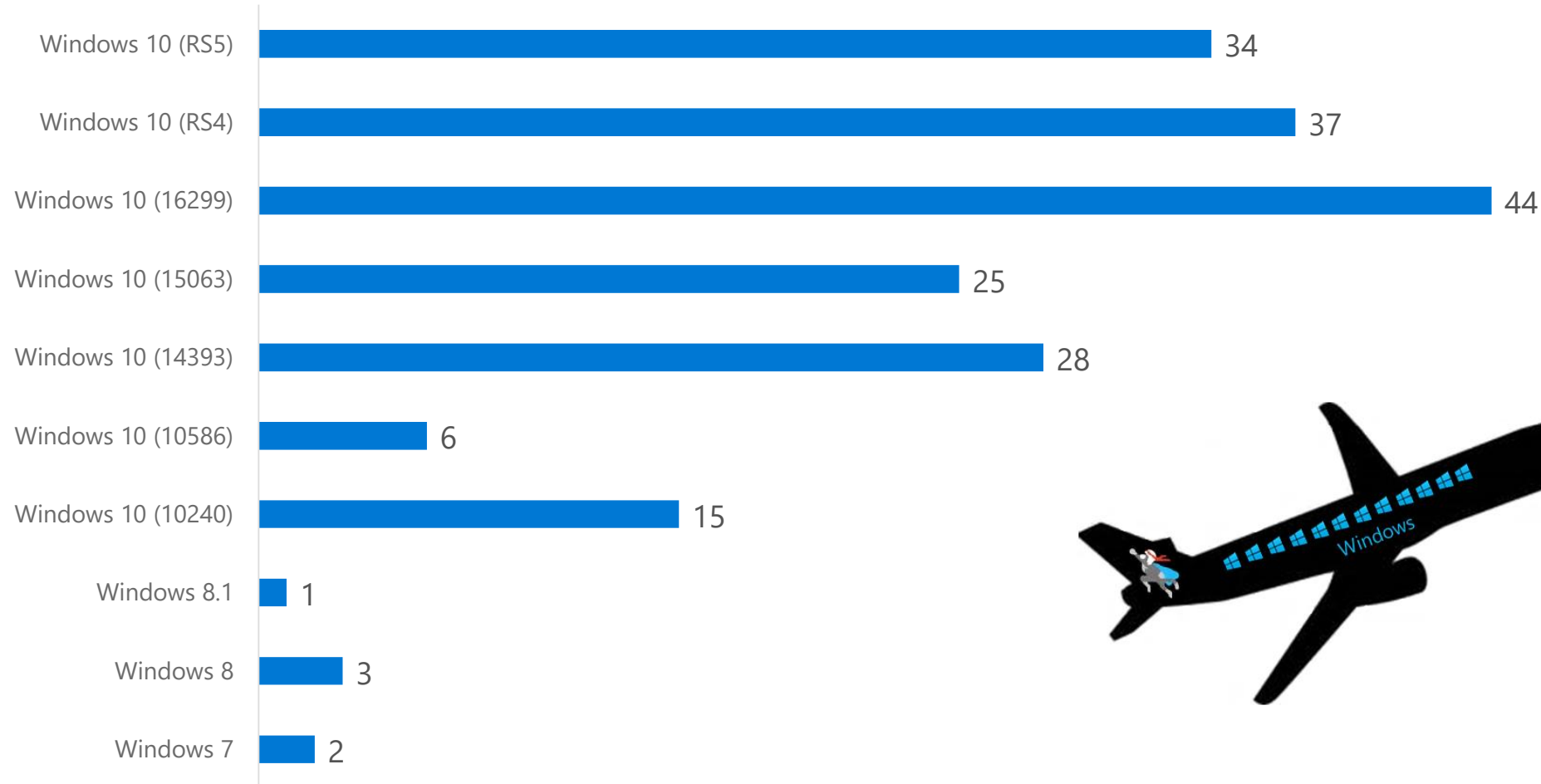


Pre-Checkin Validation



Windows Insiders—Development In The Open

Windows Insiders Public Previews



Now Sharing with the World

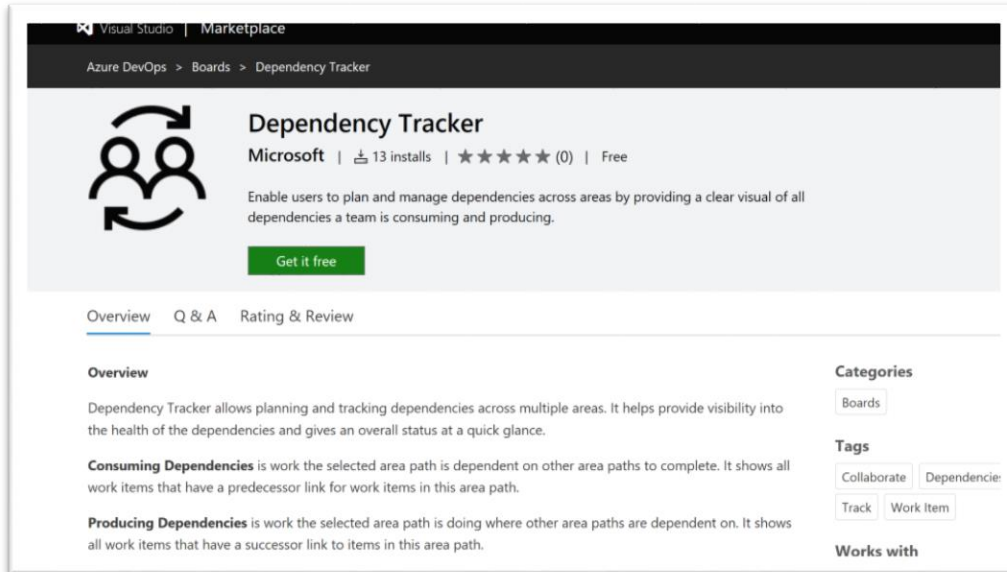


<http://Aka.ms/WorkItemOneClick>

<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.

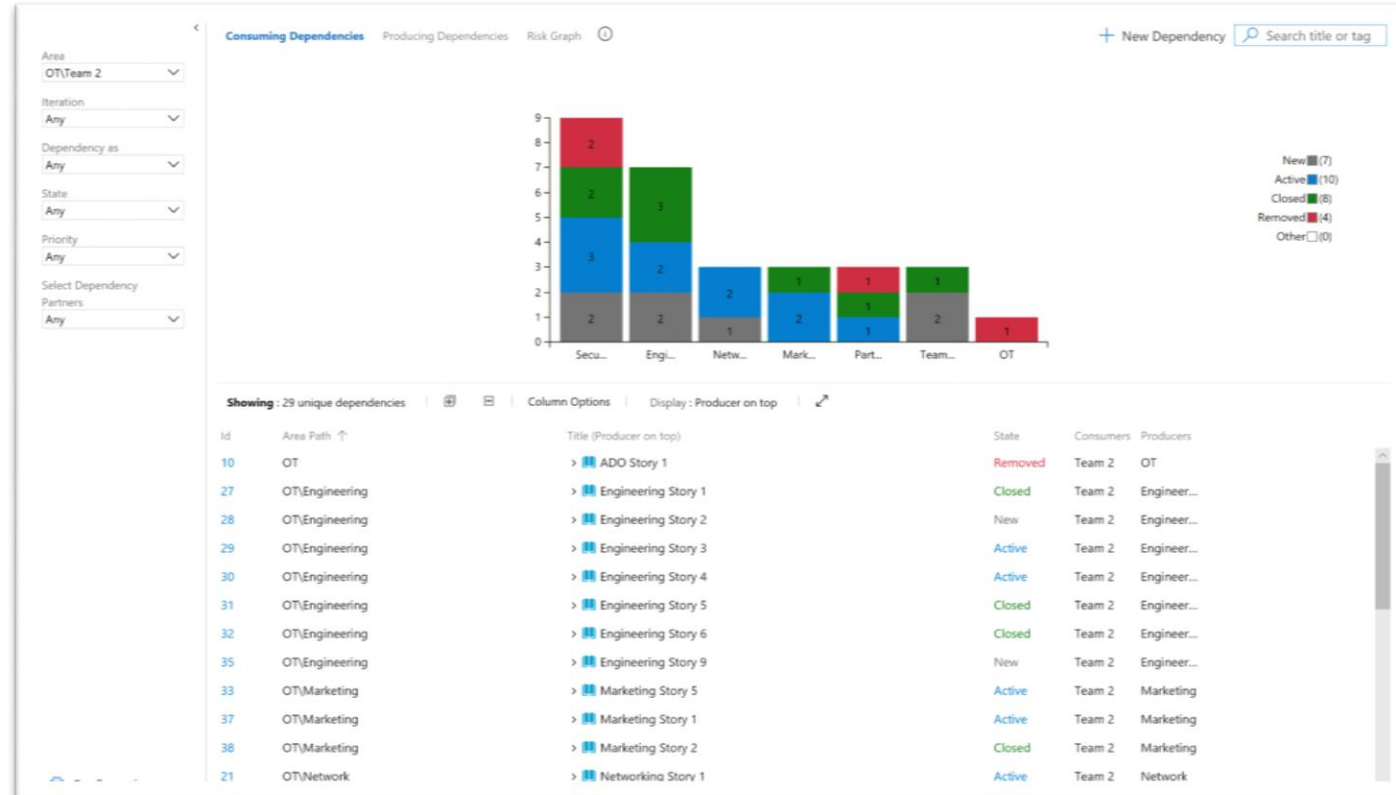
Categories

[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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