



BUNGiE®



# Bungie's Force Multipliers: Production Engineers

Jo King-Yost

# Background

- Before games, I had a varied background that included...





# Overview

- What is a Production Engineer?
- History
- Training & Specializations
- Day-to-Day
  - Developer Support
  - Content Creation
  - Force Multiplication projects
- Hiring a Production Engineer
- Conclusion & Takeaways

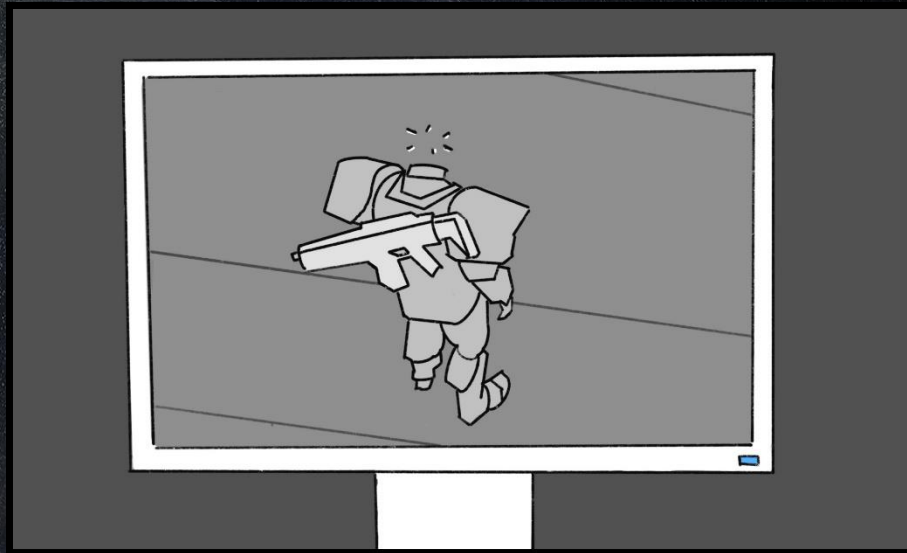


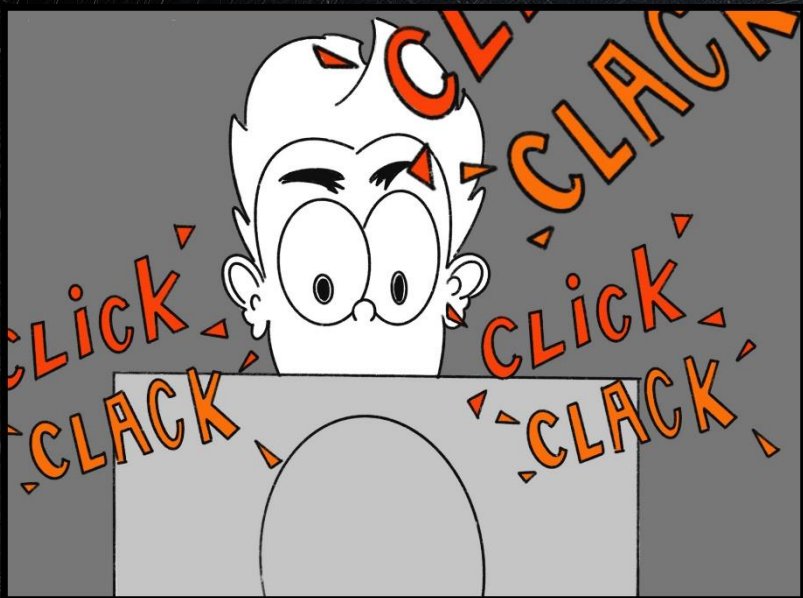
# Overview

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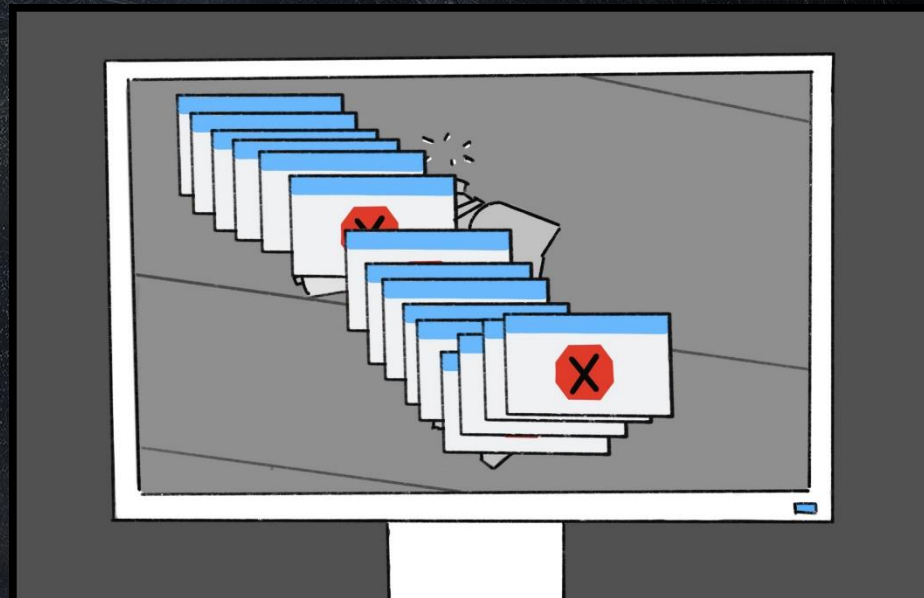






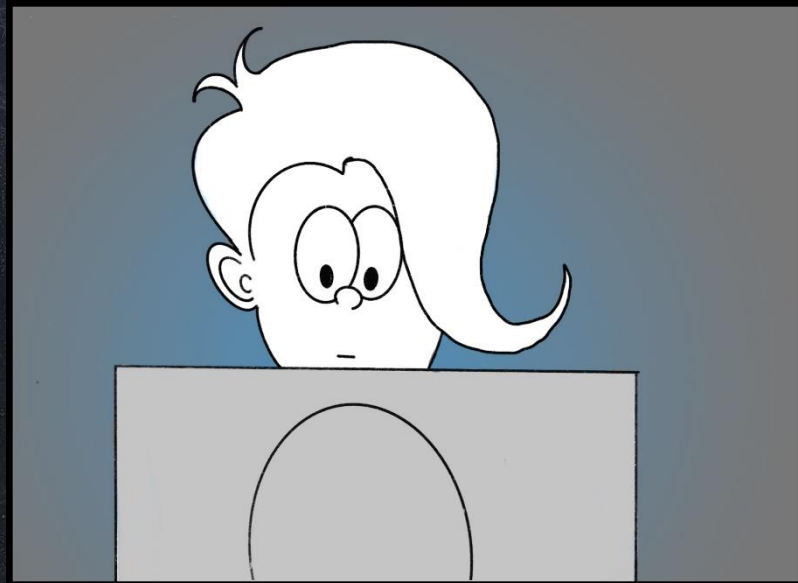


What if I try....



Auughhh!









# Production Engineer

- Skills combine tech art, test, production, engineering
- Top priority is keeping people unblocked and able to work smoothly
- Ultimate mission: be force multipliers



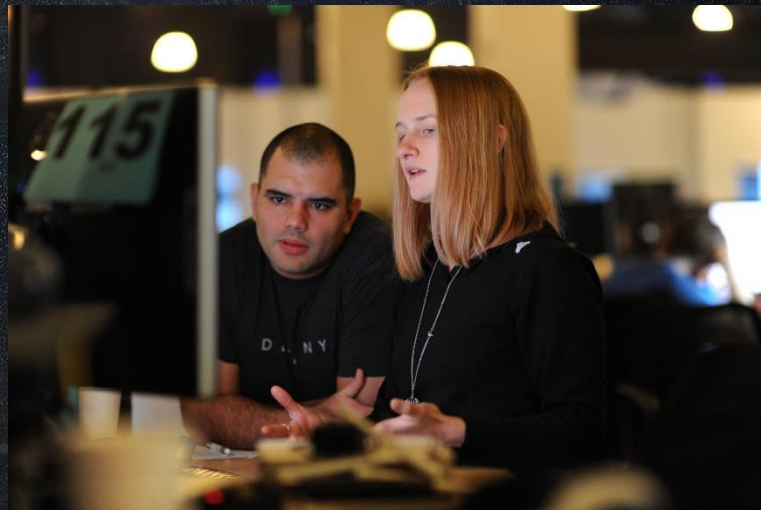
# What is a Force Multiplier?

- Maximize the time and impact of the studio as a whole
- Unblock people immediately
- Uncover the root problems
- Find solutions that prevent pitfalls



# Uncovering Issues through Developer Support

- Preventing accidental pitfalls
- Inefficiencies in workflows
- Automation potential





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Graham

Test

Random stuff  
that needs to  
get done

i.e., gaps

# Gap: No Documentation for Our Tools





Graham

Test

Random stuff  
that needs to  
get done

train content  
creators

unblock  
people

create content

Point-of-contact between  
engineers & content creators

# Early Iteration of PE Core Goal

- Step in and help solve a short-term gap
- Use that experience to identify long-term gaps
- Find solutions



# PE Role grew with Bungie

- 3-4 Production Engineers on *Halo Reach*, 14+ on *Destiny*
- Strive for a 1:20 ratio of PE to non-PE



# PE Role grew with Bungie

- Responsibilities and impact have grown, but core mission remains the same
- **Use our diverse skill sets and knowledge to make our teams more effective**



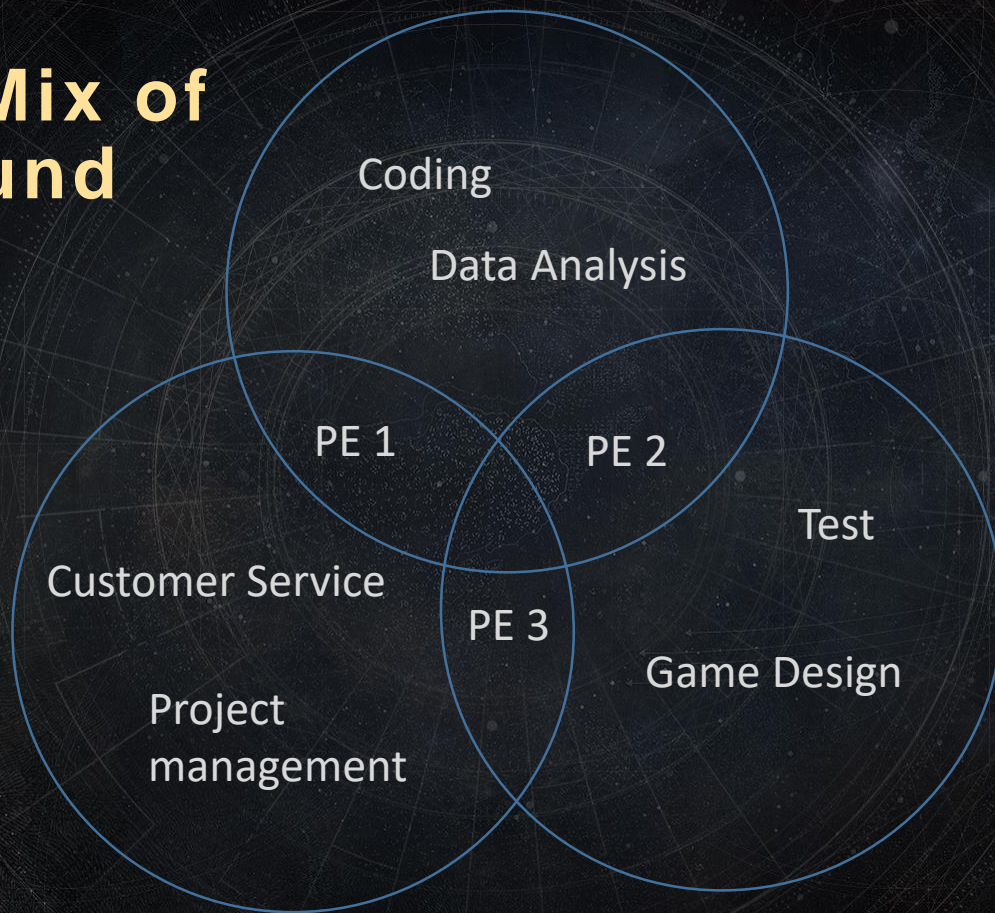


# Unique Experiences

- Graham looked for a mix of skills while hiring into the team, including:
  - Test/QA
  - Customer Service
  - Coding
  - Content Design
- Most important was evidence that the candidate could learn quickly and was service-oriented



# Diverse Mix of Background Skills

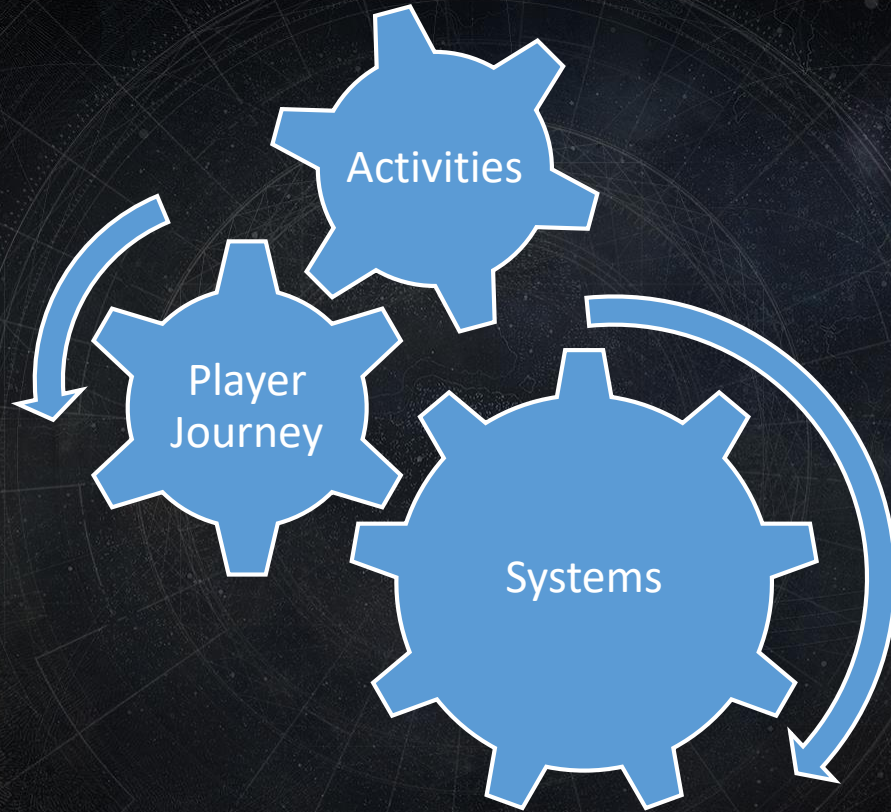




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# PE Training





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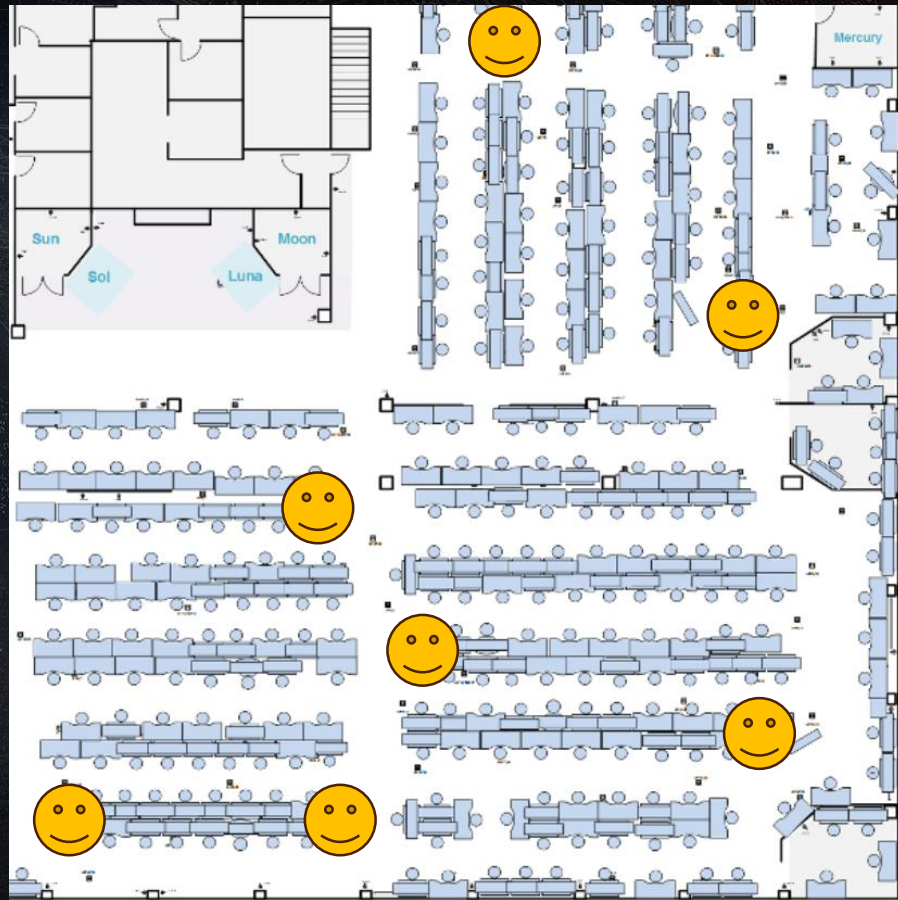
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# Strategic Seating

- Seating is spread out amongst studio so one of us is always in walking distance





# Seated within Teams

- Allows us to shoulder-surf and be proactive about finding issues
- Builds personal relationships



# What about when there is no PE around?

- PE away helping someone else...
- You don't have a PE directly supporting your area (e.g., an engineer)



# BADASS Distribution List

- “Bungie Anyone Deskside ASSistance” – available to engineers, producers, content creators... anyone





# BADASS

- Each email creates a Jira ticket tracked by the PE Team
- Emails are usually followed up with an in-person visit to help with debugging



# BADASS Paired Rotations

- Paired, weekly rotations prevent entire PE team from being randomized



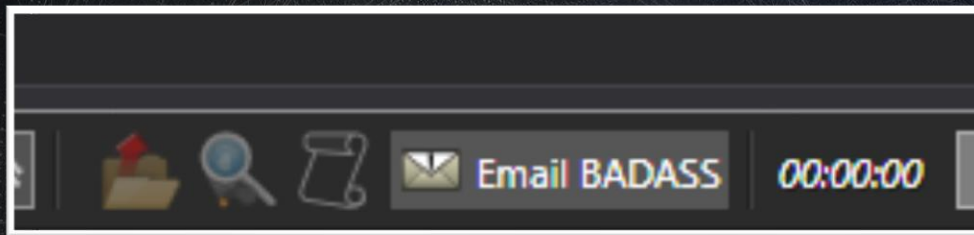
# BADASS JIRA

- PE Team accountable for each ticket
- Prioritization based on timing, severity
- Notifications to all PEs if a ticket goes unassigned too long
- If the queue gets too overwhelming, more PEs step in to help

[illegible]



# Access to BADASS through Tools





**Sent:** Monday, March 26, 2018 8:27 AM

**To:** Badass

**Subject:** BADASS REQUEST : 08:23:38

Hi,

After a crash last Friday, I can't seem to load my map anymore. I've even reverted all the relevant map data, but it still seems to hang on the loading screen. Any ideas how I can resolve this?

Thanks!

### **DETAILS**

MACHINE: [REDACTED]

PROJECT (BRANCH): [REDACTED]

GAME VERSION: 54191

SYNC MODE: ManualSync



▷ Jeff Wade; Adam Wilson

I broke my P4 depot mapping

Looking into this!



▷ Michel Lowrance; Eamon McKe...

won't start. Help!

indicates 'wait operation timed



# BADASS

- Not only made up of PEs, but everyone else's participation is completely voluntary
- PEs act as frontline support, preventing randomization of engineers and other subject matter experts



# Beyond BADASS

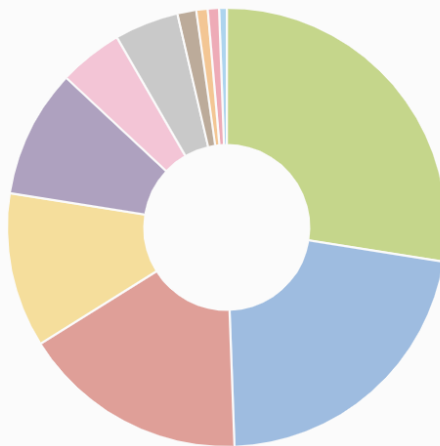
- Usually the PE is able to figure out what's going on
- If we're stumped, we know the right person to talk to
- Only about 15% of issues need to be escalated beyond the PE team



# JIRA Stats

- Average ticket rates:
  - Daily: 5-12
  - Weekly: 30
  - Monthly: 130
  - Yearly: 1900

Pie Chart: BADASS last 3 months



## Resolution

Total Issues: 360

Local Workaround	99
Question Answered	79
Escalated to Other	60
Bug Filed	41
Content Fix	34
Cannot Reproduce	17
User Error	17
Escalated to Shield	5
Unresolved	3
Duplicate	2
Other...	3



# PE Follow-Through

- PEs always track BADASS issues through resolution; JIRA helps us do that
- We don't just hand off an issue and assume the requester will get helped



# Developer Support: Difference between PE and Tech Artist?

- There is some overlap:
  - help art team
  - perform some desk-side triage
  - care about QOL
  - try to make things better



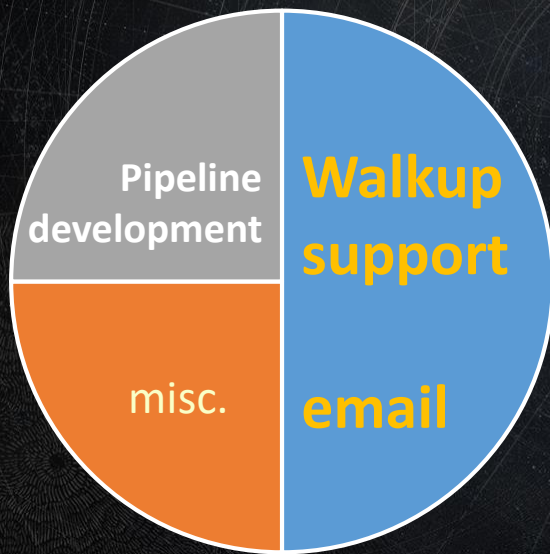
# Developer Support: Difference between PE and Tech Artist?

- TAs can focus on tools creation instead of front-line support
- PEs take care of generic tools issues and basic diagnostic of issues; we involve a TA when their specialized knowledge is needed
- TAs focus on Art, PEs support all teams
- We work together!

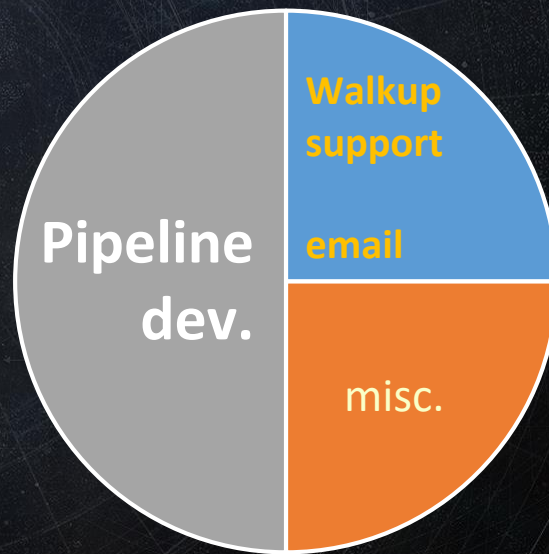


# A Tech Artist's Time

Without PEs



With PEs





# BADASS and the PE Mission

- Frontline support provides immediate help for short-term issues
- Gives PEs a pulse on studio health, especially in relation to workflows



# BADASS and the PE Mission

- Developer Support fuels our core goal of identifying deeper, root problems





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# Analyzing why a PE is needed

- Temporary
- Not intended to be long-term content creators
- We use these opportunities to observe and uncover problems



# Finding Underlying Problems

- What about this workflow is slowing down the team?
- Technical or process roadblocks?
- Short-staffed?



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# Identifying Problems

- Developer support and occasional content creation gives us visibility into gaps and problems in the studio's workflows, **across all disciplines and projects**





# Types of Issues PEs Projects Solve

- Mid or low severity, but wide scope and impact
- Not blocking, workarounds exist, but costs a little time each time a creator uses the workflow



# Types of Issues PEs Projects Solve

- Issues that become invisible to people who've been using a workflow for a long time: "It's just the way it is, there's no use in complaining..."





# Types of Issues PEs Projects Solve

- Low short-term cost, but high long-term cost the longer the issue is ignored
- Tech debt
- PEs have a personal stake in fixing these issues



# Self-Directed and Autonomous

- Not tasked by anyone
- Taken on autonomously
- Expectation is that a PE is spending ~20% of their time on this type of project
- Often executed by an individual PE, sometimes by a strike team of self-organized PEs



# Accountability

- PEs in constant communication with producers and product owners
- Data metrics for project impact
- Senior PEs provide mentoring for time management



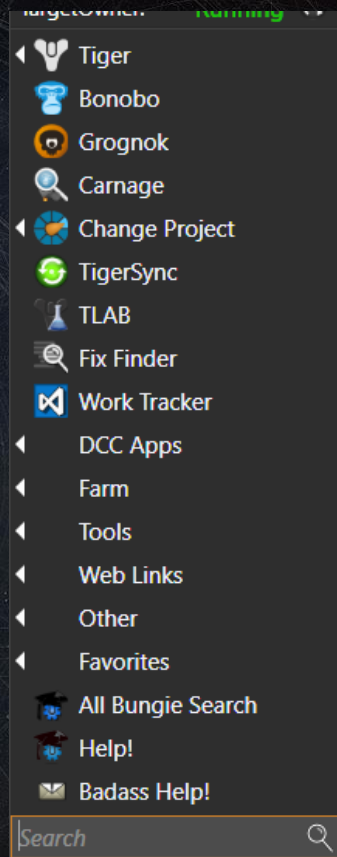
# Example: BungieLauncher

- A PE saw a gap in how the studio was working across multiple branches/build versions with the same tools



# BungieLauncher

- Internal Tool “start menu”
- Allows people to easily move between branches/projects without confusion





# Example: Content Cleanup Project

- Effort to audit and remove old, unused content
- Ignoring this built up more and more tech debt—the problem became bigger over time
- Great example of low severity: high impact



# Content Cleanup Project

- Combined effort between two PEs
- Split the responsibilities of the project between each other based on skill set and time
- Removed over 240,000 orphaned content files
- Reduced the branch size by 7%



# Other Examples

- One-button tool to create complex placeholder items
- Tool to optimize cinematics encoding
- Nightly animation audits



# Documentation

- Documentation is a shared responsibility
- PEs have documentation as part of our job description, and time reserved to work on it



# Again: Self-Directed

- Not tasked by anyone, taken on autonomously
- As a team, we identify issues, then individuals or strike teams decide to pursue solutions



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# What We Look for When We Hire

- Mix of hard and soft skills
  - Good with people
  - Service-oriented attitude
  - Learns quickly
  - Ability to identify root of complex problems
  - Technical background



# What We Look for When We Hire

Someone who can

1. be patient and empathetic with frustrated users
2. come up with ideas for how to fix the users' problems based on their diverse knowledge





# Non-Traditional Candidates

- This is a good role for non-traditional game applicants to enter and diversify our industry



Conor

Narrative Designer  
↑  
Production Engineer

Quetzy

Engineer  
↑  
Production Engineer  
↑  
Tester

Nick

Technical Product  
Owner  
↑  
PE Lead  
↑  
Senior PE  
↑  
BVT Test Lead  
↑  
BVT Tester



## Graham

Senior PE Lead  
↑  
PE Lead  
↑  
Senior PE  
↑  
Production Engineer  
↑  
Production Assistant  
↑  
General Tester

## Jeremiah

PE Lead  
↑  
Senior PE  
↑  
Production Engineer  
↑  
String Content  
Manager



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# Why I Love being a PE



Bungie PE Team



# Summary

- PE role grew out of gaps in Bungie processes; now we proactively seek out those gaps
- We have diverse skillsets and backgrounds
- We act as frontline developer support and sometimes-content creators
- Our experiences help us identify long-term problems
- We have autonomy to solve those problems



# Takeaway: Production Engineers are Force Multipliers

- We identify issues and figure out solutions
- Maximize game creators' time
- Do anything in our power to make the studio more effective



**Thanks for coming!**



# Questions?

Contact info:

Jo King-Yost [jkingyost@gmail.com](mailto:jkingyost@gmail.com)

<http://www.linkedin.com/in/jkingyost>





Thanks to:

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