

The background of the slide is a dynamic and intense scene from the game Warframe. It depicts a large-scale battle against a massive, multi-limbed boss enemy. The boss is primarily purple and black, with glowing orange and yellow energy emanating from its central body. Several Warframe characters, shown in various poses of combat, are engaged in the battle. The scene is filled with bright orange and yellow fire, explosions, and energy effects, creating a sense of high action and chaos. The overall color palette is dominated by the fiery oranges and yellows of the battle, contrasted with the dark blues and purples of the boss and the Warframes.

# Crafting AI for Epic Boss Battles in Warframe

By Daniel Brewer  
Lead AI Programmer  
Digital Extremes

GDC

AI GAME  
PROGRAMMERS  
GUILD



# Where am I coming from?



- Dark Sector
  - The Darkness II
  - Warframe
- 
- Additionally worked on
  - Bioshock 2 MP
  - Halo 4 DLC

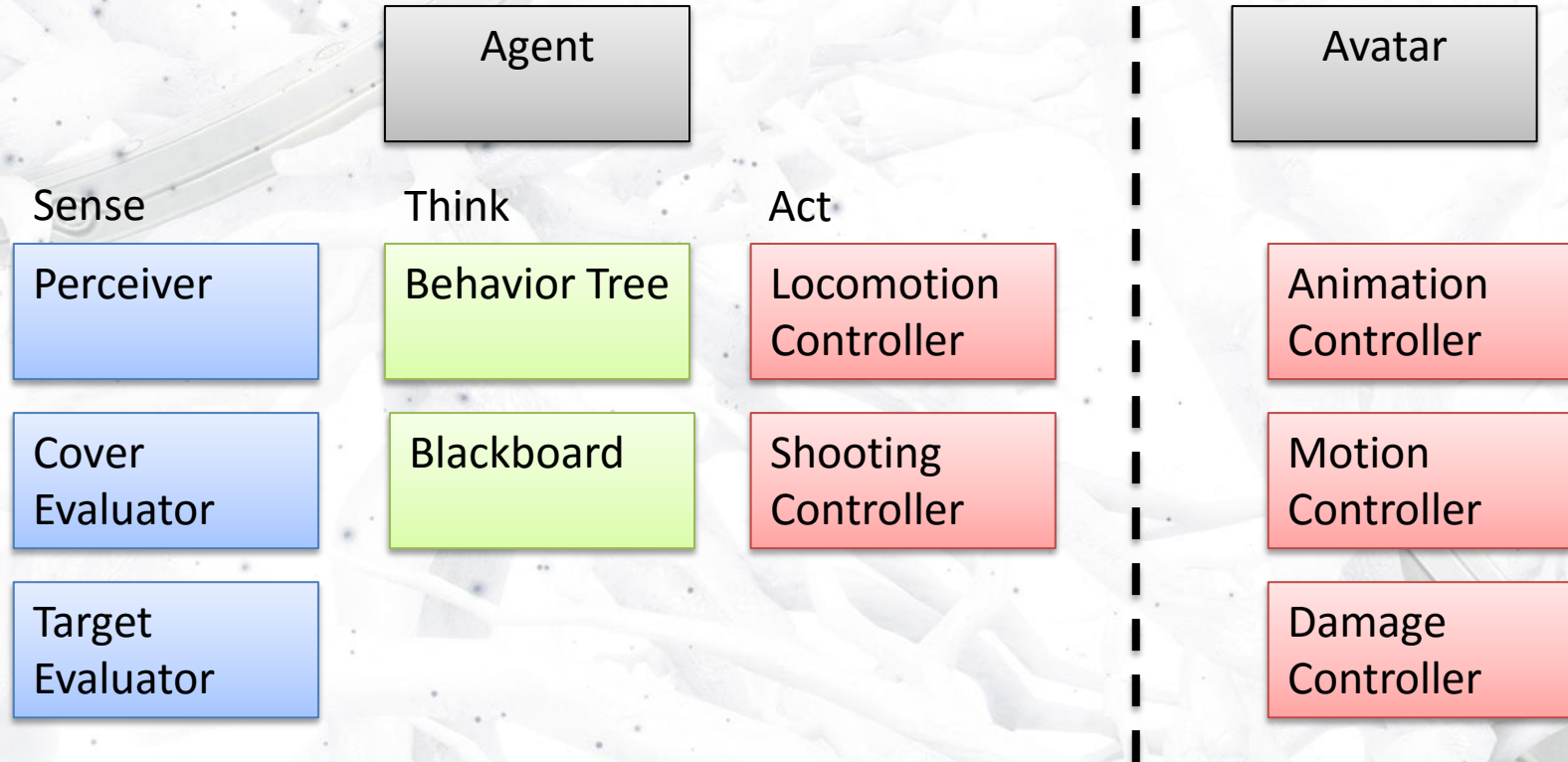


# What is a boss fight?

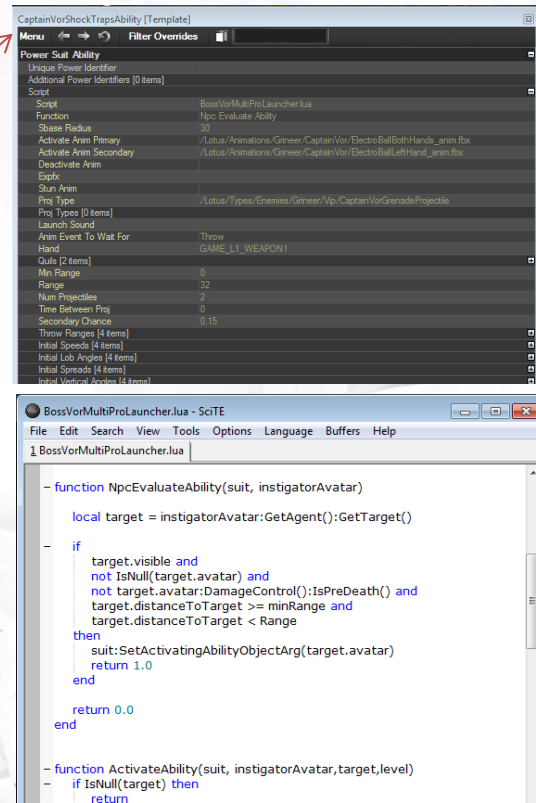
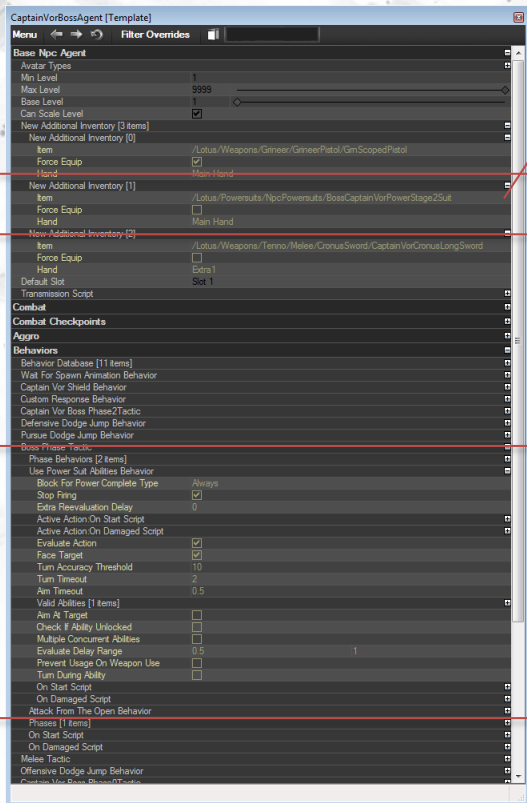
- Epic Spectacle
- Skill Challenge
- Gatekeeper
- Progression Blocker
- Goal
- Reward
- Story Arc Bookend



# Modular Framework



# Gear and Unique Abilities



# The Good, The Bad and the Ugly





# Mistake: Who's the Boss?

- Scaled up grunt with extra powers
- Tempting for early access, but don't do it
- Sets a precedent that you're stuck with



# Tip: Make the Boss Stand Out

- Visually distinct
- Instantly recognizable
- Make him intimidating



If your boss looks huge and intimidating, players will anticipate the satisfaction of defeating him.



# Lech Krill

- Intimidating
- Multi Stage Ice and Fire
- Aiming and Agility challenge
- Weak-Spot on Back



# Mistake: Obscure Mechanics

- Weak Spot not clear
- No clear cause & effect
- No external play-testing



# Tip: Make Mechanics Clear

- Vulnerable weak-spots should be easy to identify
- Clear cause and effect
- Get external play-testers



Make your mechanics easy to discover but challenging to execute.



# Captain Vor

- Strong Leader
- Summons reinforcements
- Clear stage breaks
- Escallation with additional special attacks



# Mistake: Dull Downtime

- Reinforcements were easy to dispatch
- Players wait too long for end of Invulnerable stages
- Ineffective challenge scaling



# Tip: Keep The Players Occupied

- Make waiting around interesting
- Change up the challenge or targets
- No 'dead time'



Always give the players something to do.



# Foreshadowing

- A Boss is fight coming up
- This is the boss
- Why is he a target?
- Show his personality
- Potential clues



# Foreshadowing

- In-game transmissions
- Messages or Recordings
- Level environment
- Remember Chekhov's gun



# Dramatic Pacing

- Introduction
- Crank things up
- Satisfying finale





# Mini-Boss vs Boss

## Mini-Boss



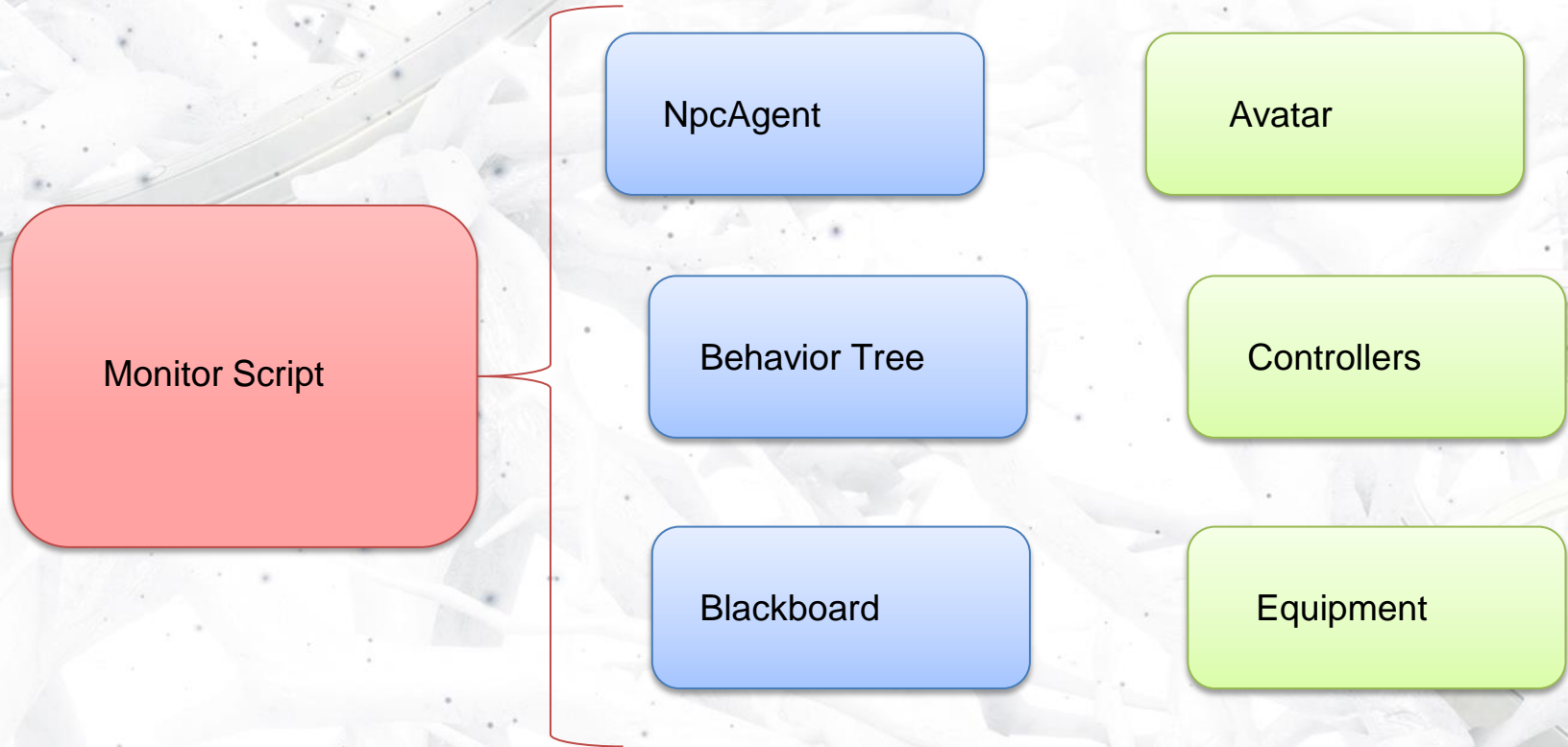
- One trick pony
- No escalation
- Spice up standard gameplay

## Boss



- More complex mechanics
- Multiple Escalation Stages
- Stand-alone Encounter

# Monitor Script

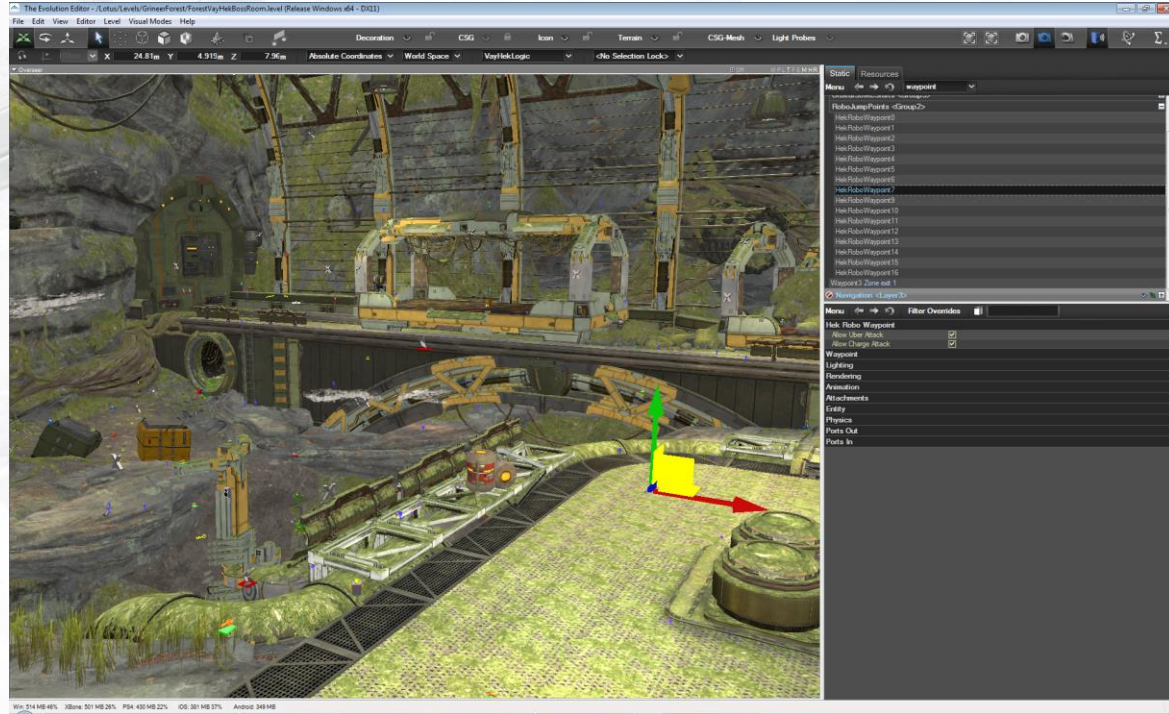


# Boss Specific Arena





# Hints Direct the Boss



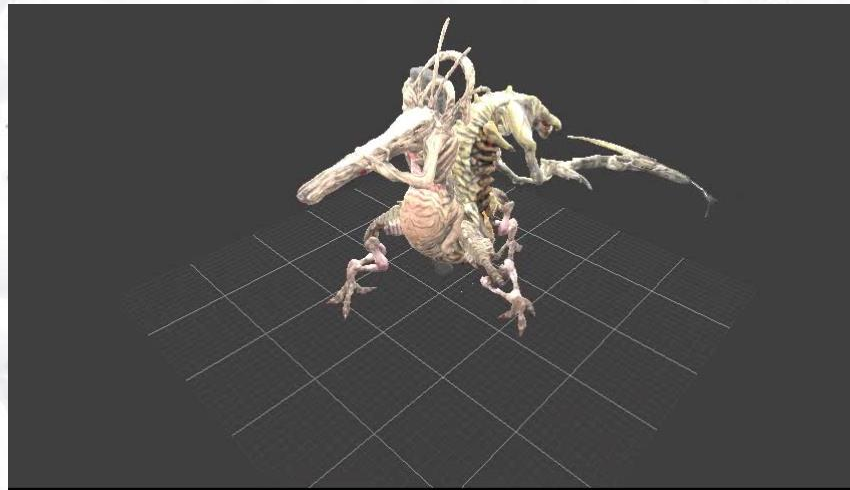
# Lephantis

- Gigantic 3 legged monster
- 3 heads and attack-forms
- Independently engages targets surrounding it
- Coordinate attacks and animation between heads
- Heads can be destroyed



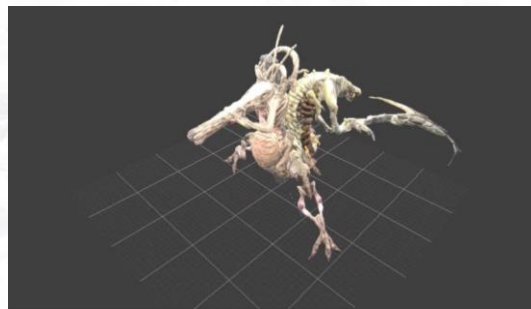
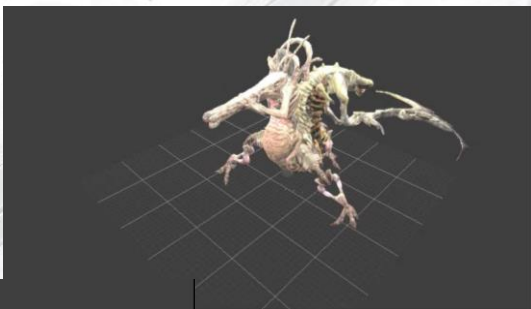
# Locomotion Animation

- Tri-legged gait
- Unnatural and unbalanced
- Needs to convey size and weight





# Locomotion Animation



# Locomotion Animation



- IK for foot placement – important due to size
- 5 joint legs - particle IK system

Real-time Motion Retargeting to Highly Varied User-Created Morphologies  
by Chris Hecker et al

# Other animation issues

- Additive Layers
- Each head animates independently
- Additive aim poses for gun head
- Blends on top of full body locomotion
- Full body melee attacks





# Other animation issues

- Risk vs Reward
- Exposing weak spots during attacks
- Aiming challenge
- Timing challenge
- Lots of anticipation built into attack animations
- Audio queues for attacks

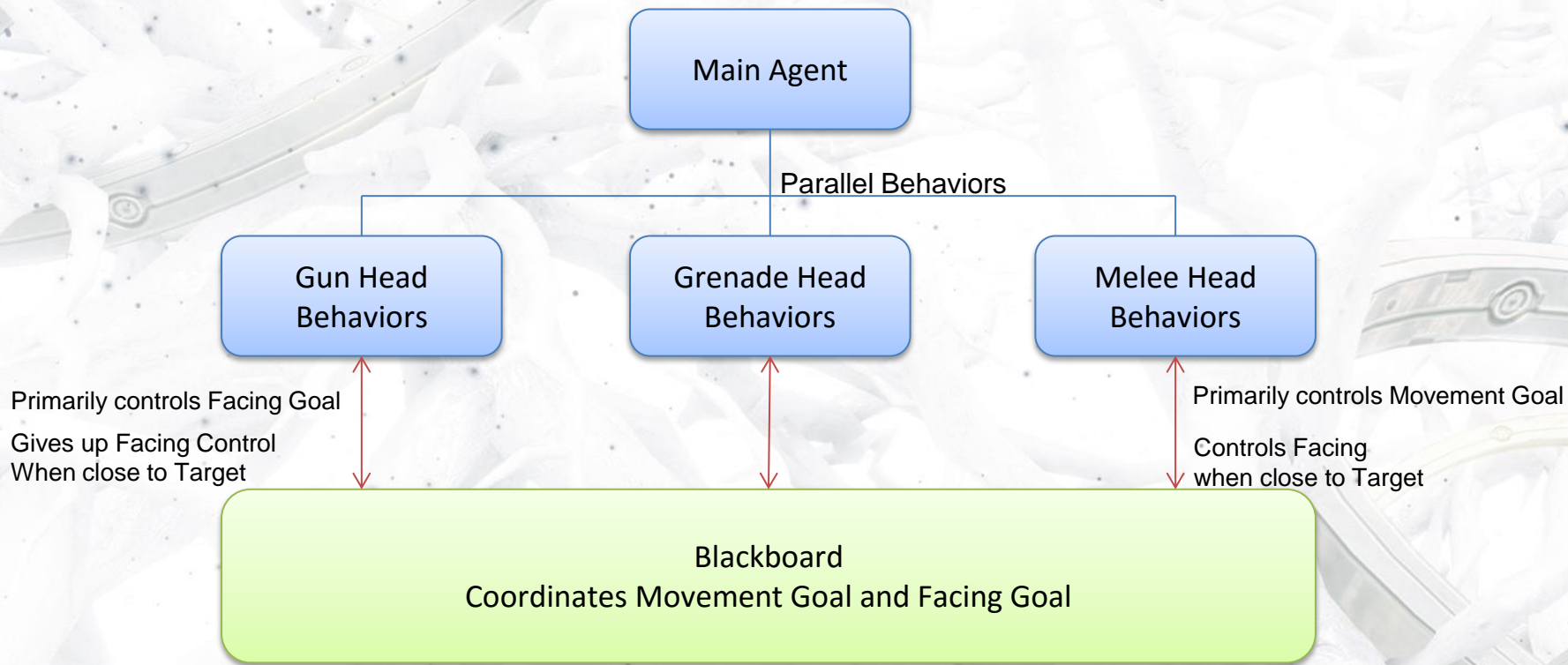


# Destructible Parts

- Track damage to each head separately
- Hide destroyed head
- Cover with stub
- Hide swap with visual fx



# Head Coordination





# Physics & Collision Issues

- Can't use simple upright cylinder
- Need to run underneath it, but should collide with the legs
- Collision proxies attached to legs



# No Safe Place

- Heads cannot attack below boss
- Needed new special attack
- Allow damage to other infested
- Cool option to deal with mobs



# Lephantis In Action





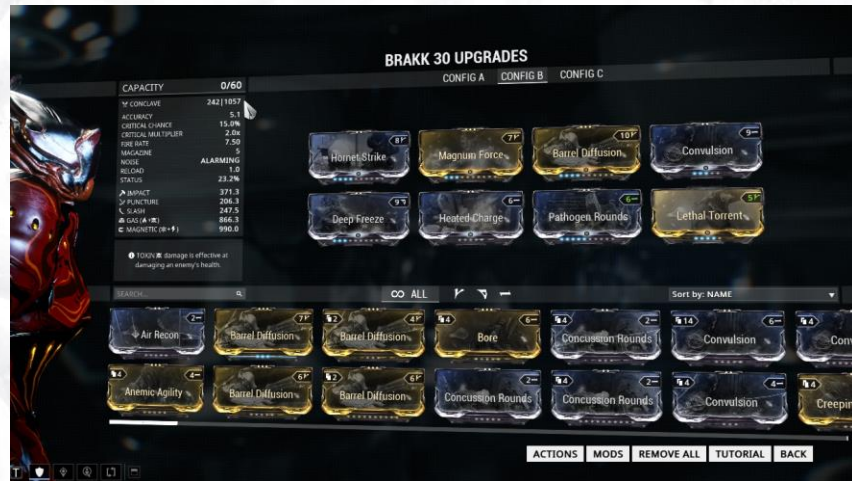
# Balance and Scaling

- Need to support 1-4 players
- First timers and veterans
- Vastly different power levels



# Balance and Scaling

- Score each item of player's loadout
- Scale Boss toughness and damage
- Gear still needs to matter
- Switching to more real-time, adaptive scaling



# Introducing Trials

- 4-8 player missions
- Balanced towards hard-core veterans
- Multiple simultaneous goals
- Multiple roles to perform
- Diversify play-styles and loadouts





# Questions?



[daniel.brewer@digitalectremes.com](mailto:daniel.brewer@digitalectremes.com)