



# Free-Range AI: *Creating Compelling Characters for Open World Games*

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Lead Programmer



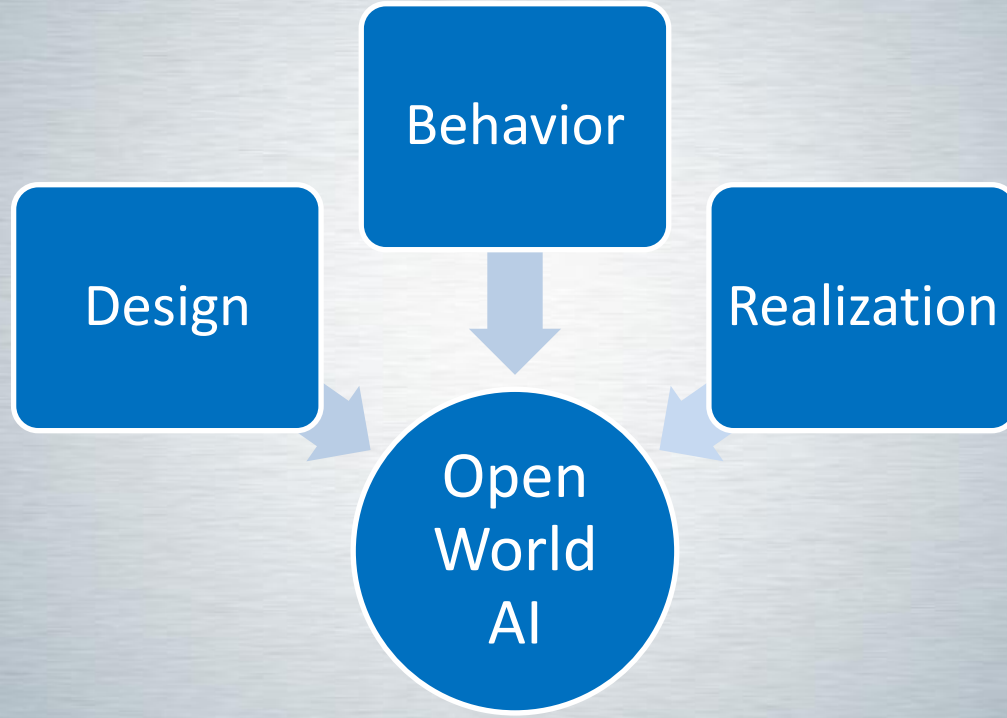
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# Introductions



# The Talk





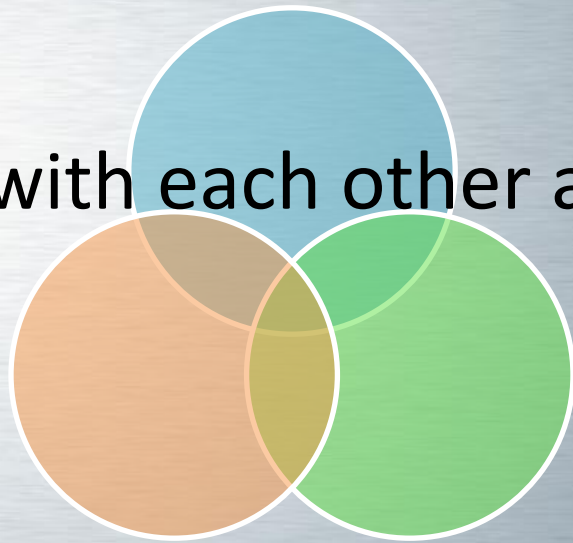
# What makes an open world game?





# The World is a Sandbox

- Open world for us means...
  - Sandbox experience
  - Systems that interact with each other and the player
  - Extend to all contexts



**Sounds great, right?**

**It is!**

**Until somebody pees in your sandbox**



***Giving the player control, means you don't have it!***

# Obvious Challenges for AI

- Adaptable
- Reactive
- Scalable
- Interesting
- Realized





# Maintaining Longevity

- Gameplay loops
- We want variation in our gameplay!
- Challenge:
  - Repetitiveness
  - Motivation





# Adding Constraints

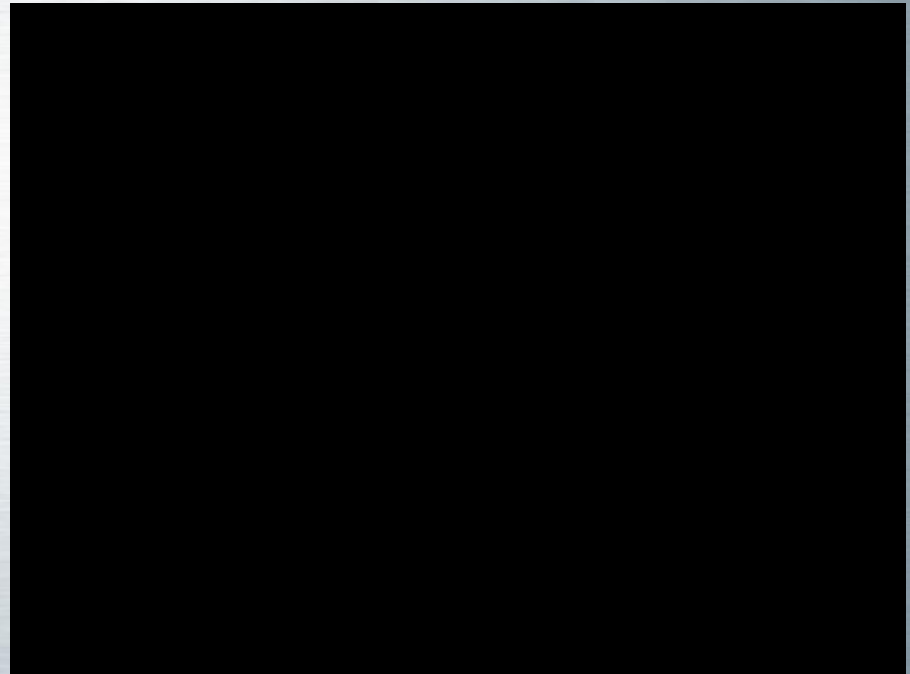
- Environments
- Time limits
- Amount of enemies

Might work!



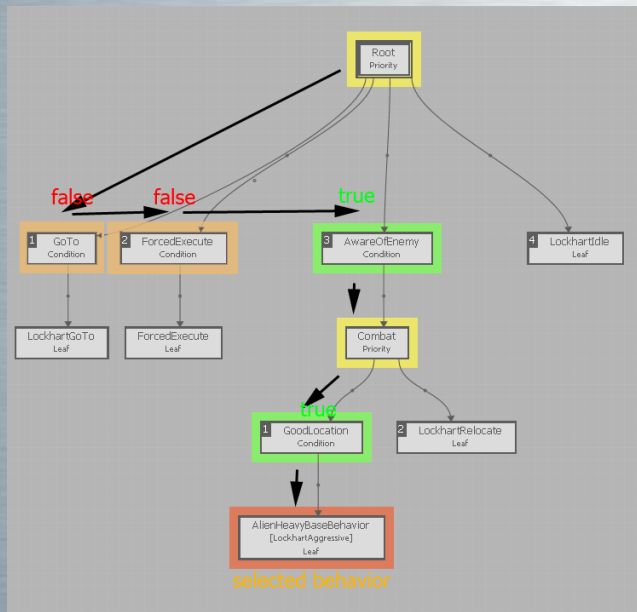
# Scripted Gameplay

- Works well for linear games
- Open world:
  - Low replay
  - Lack of discovery




# Player Behaviors

Easy to represent!



What motivates change?

Can we communicate it to the player?



*Trust the player to create variation  
through interaction with the  
systems*

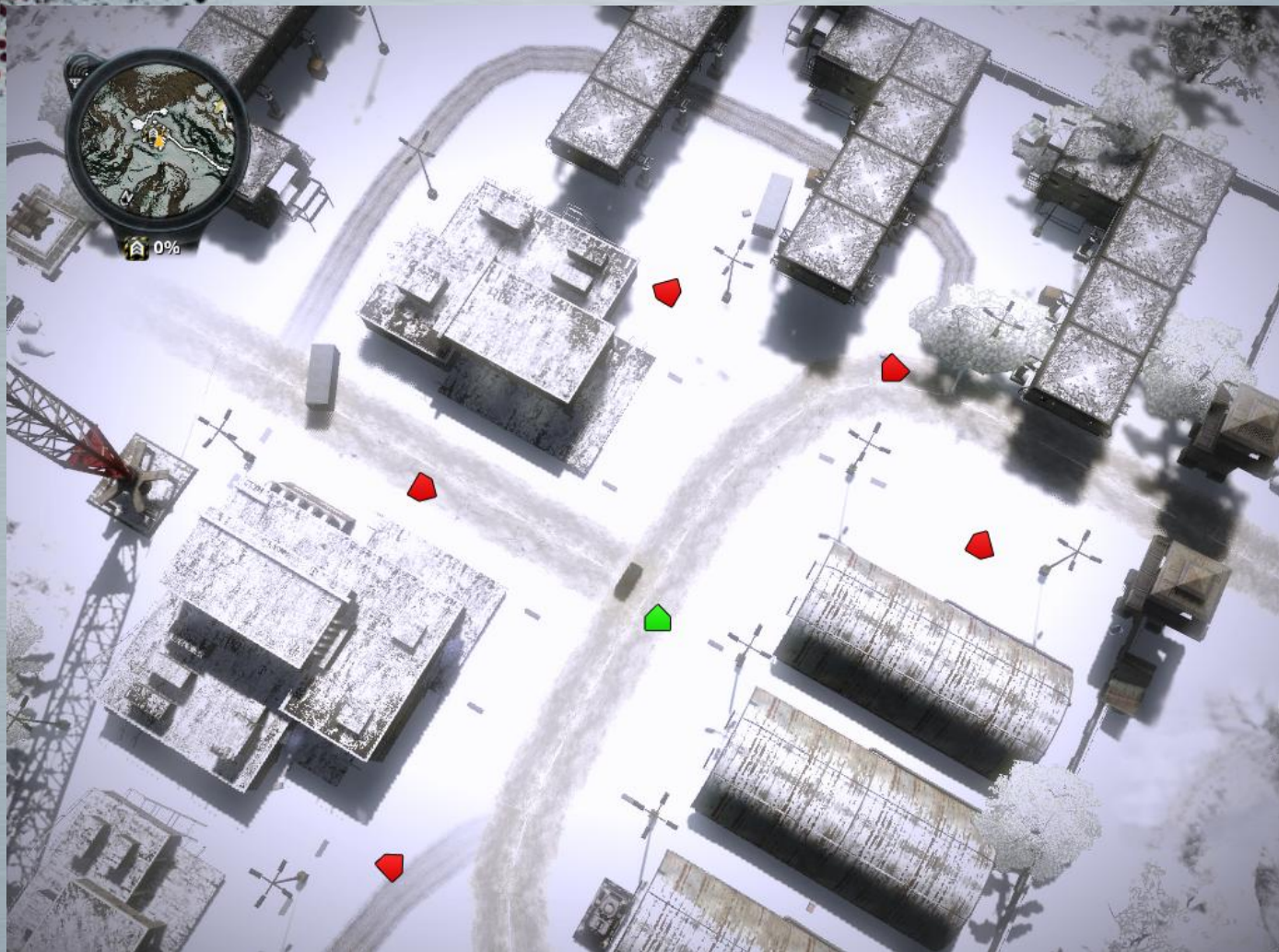




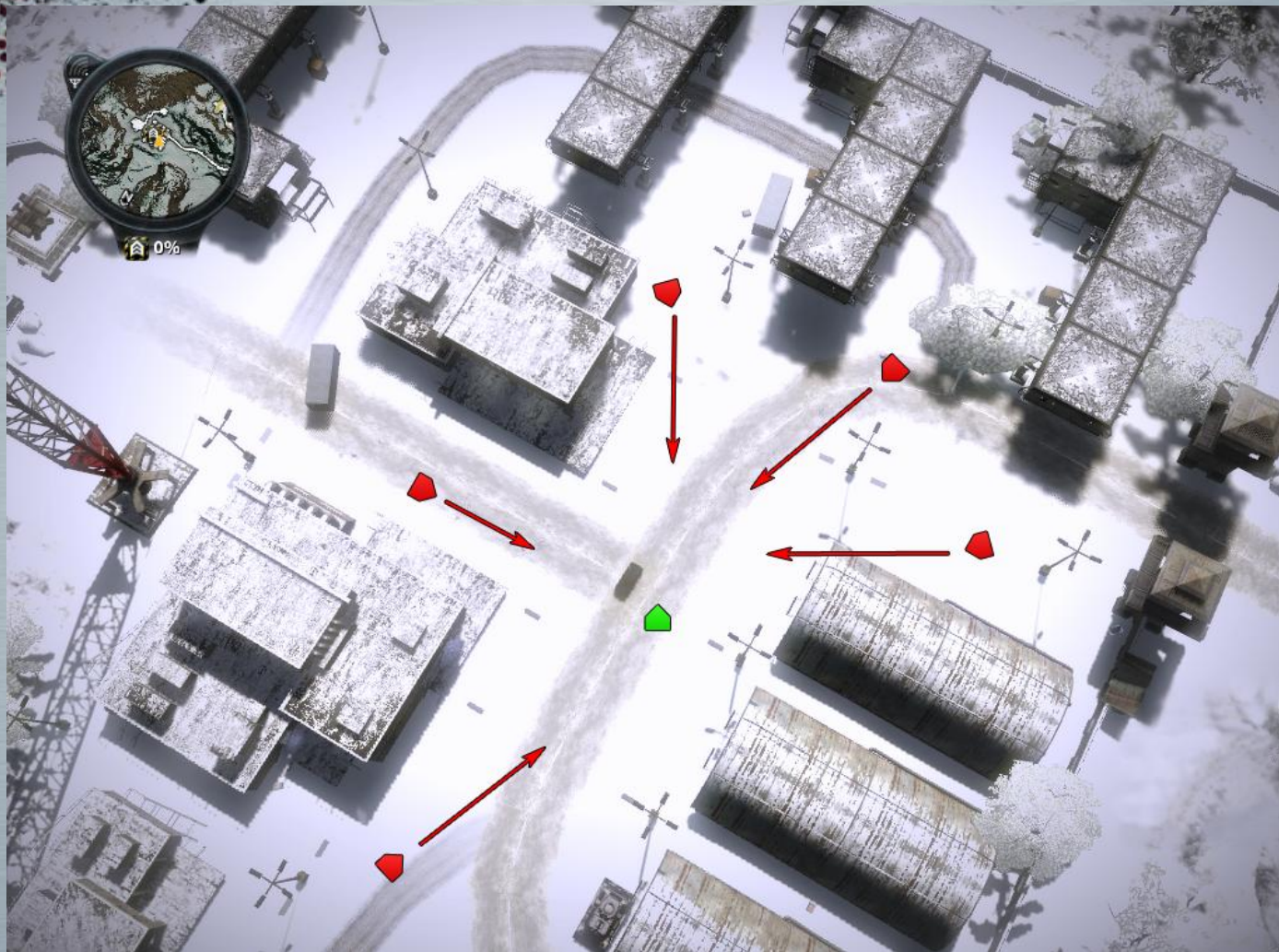


# Variable Gameplay Challenges

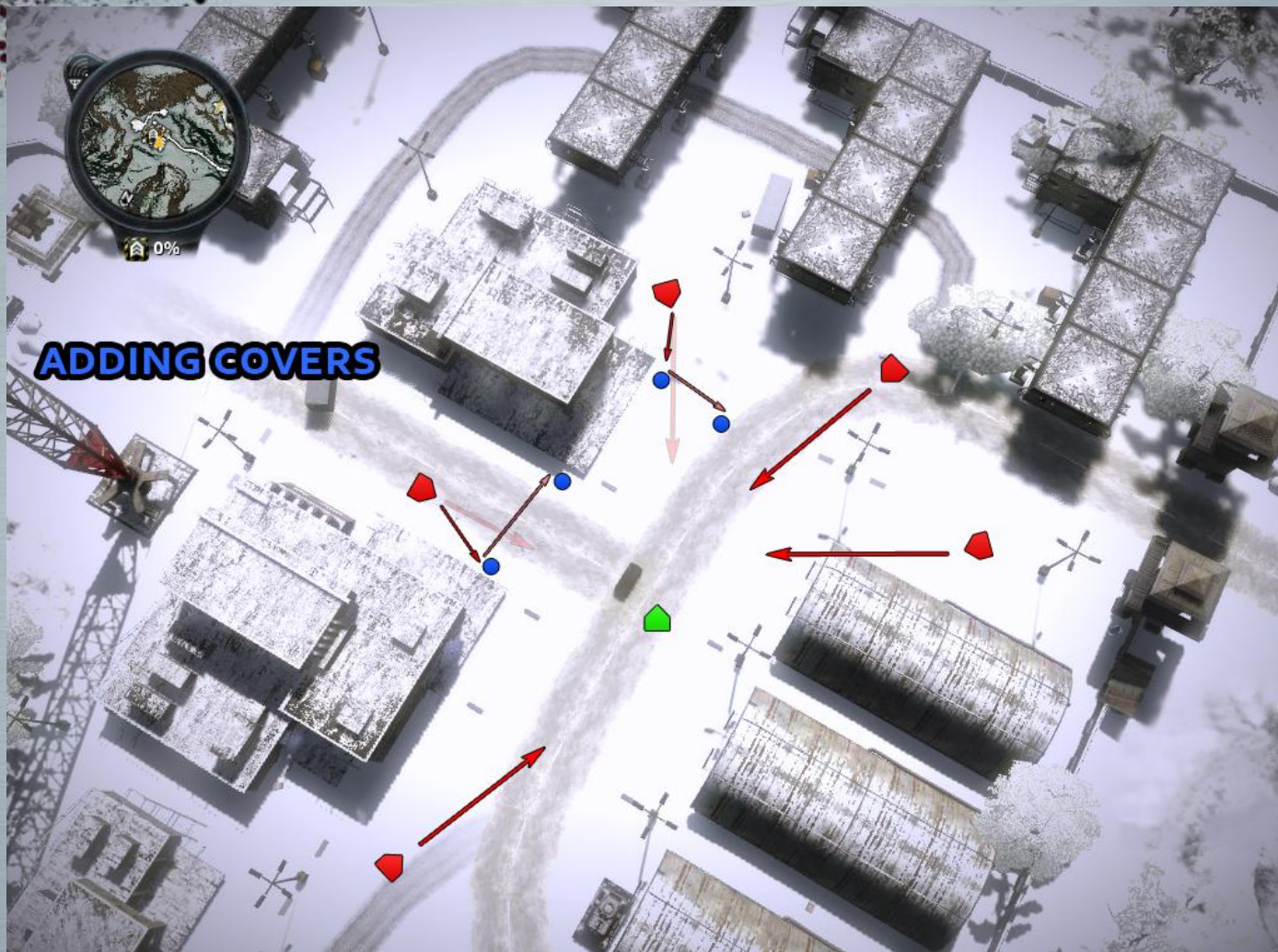
- Staging
- Positioning
- Pacing
- Consistent Player Experience



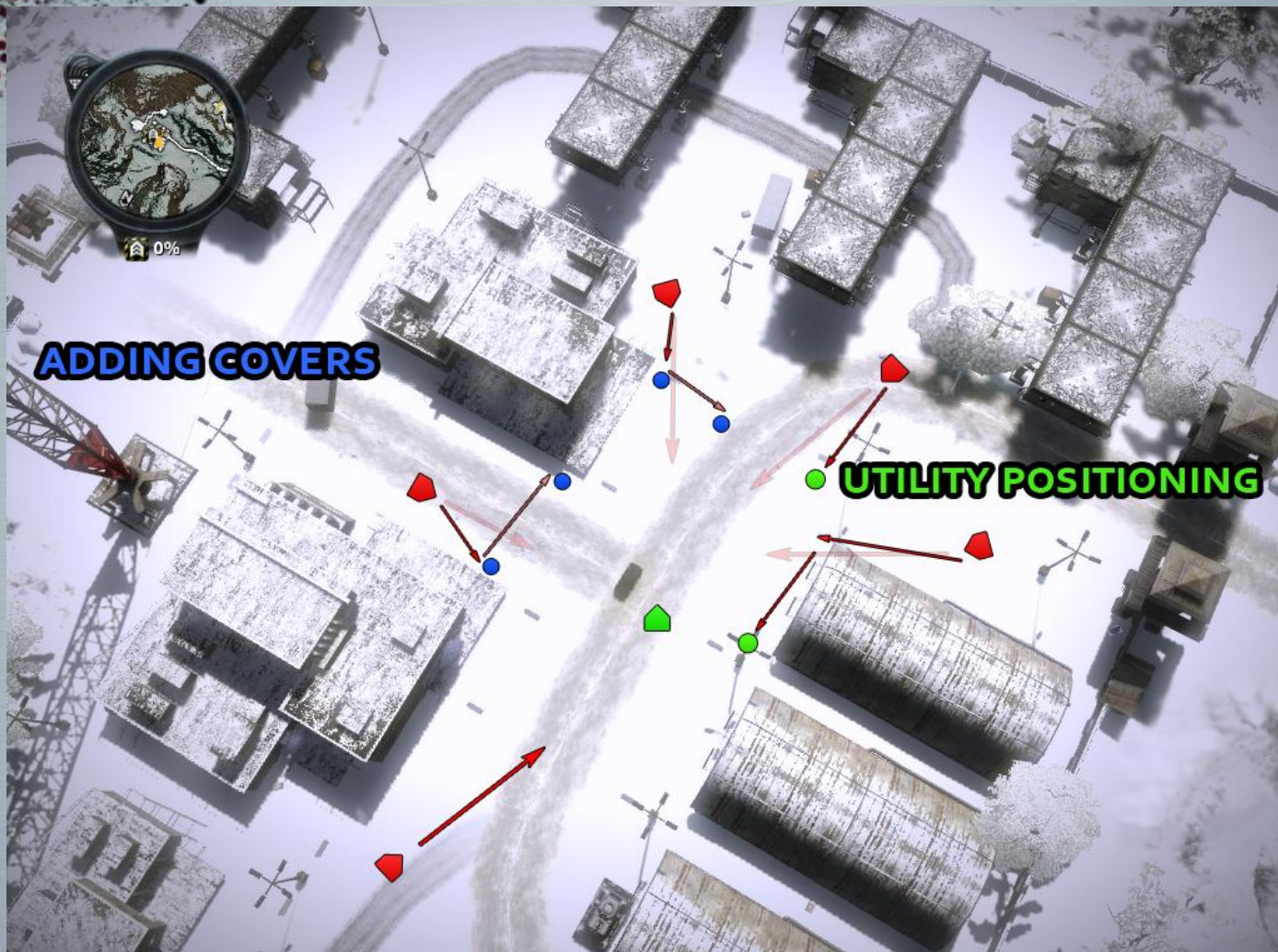




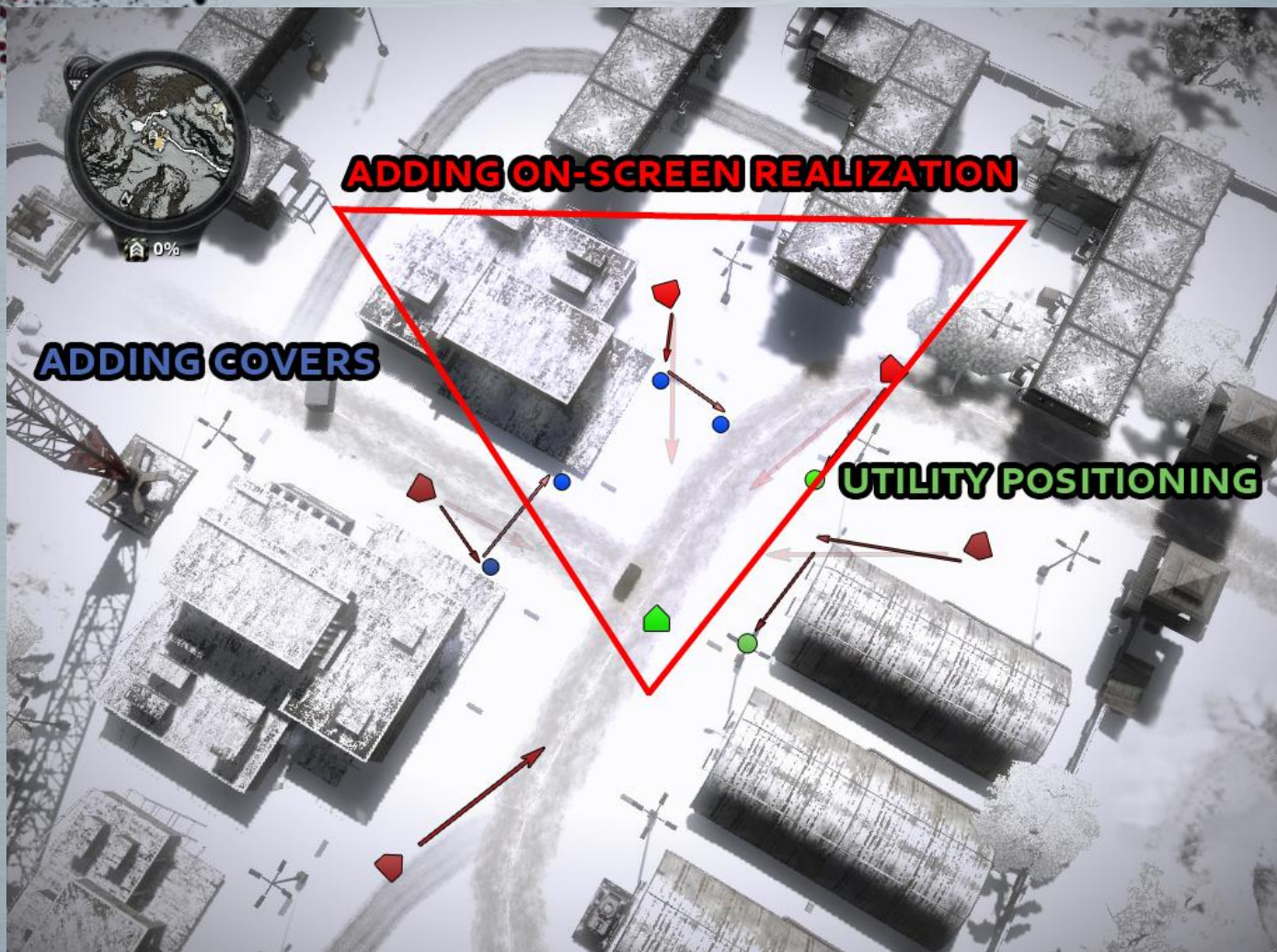




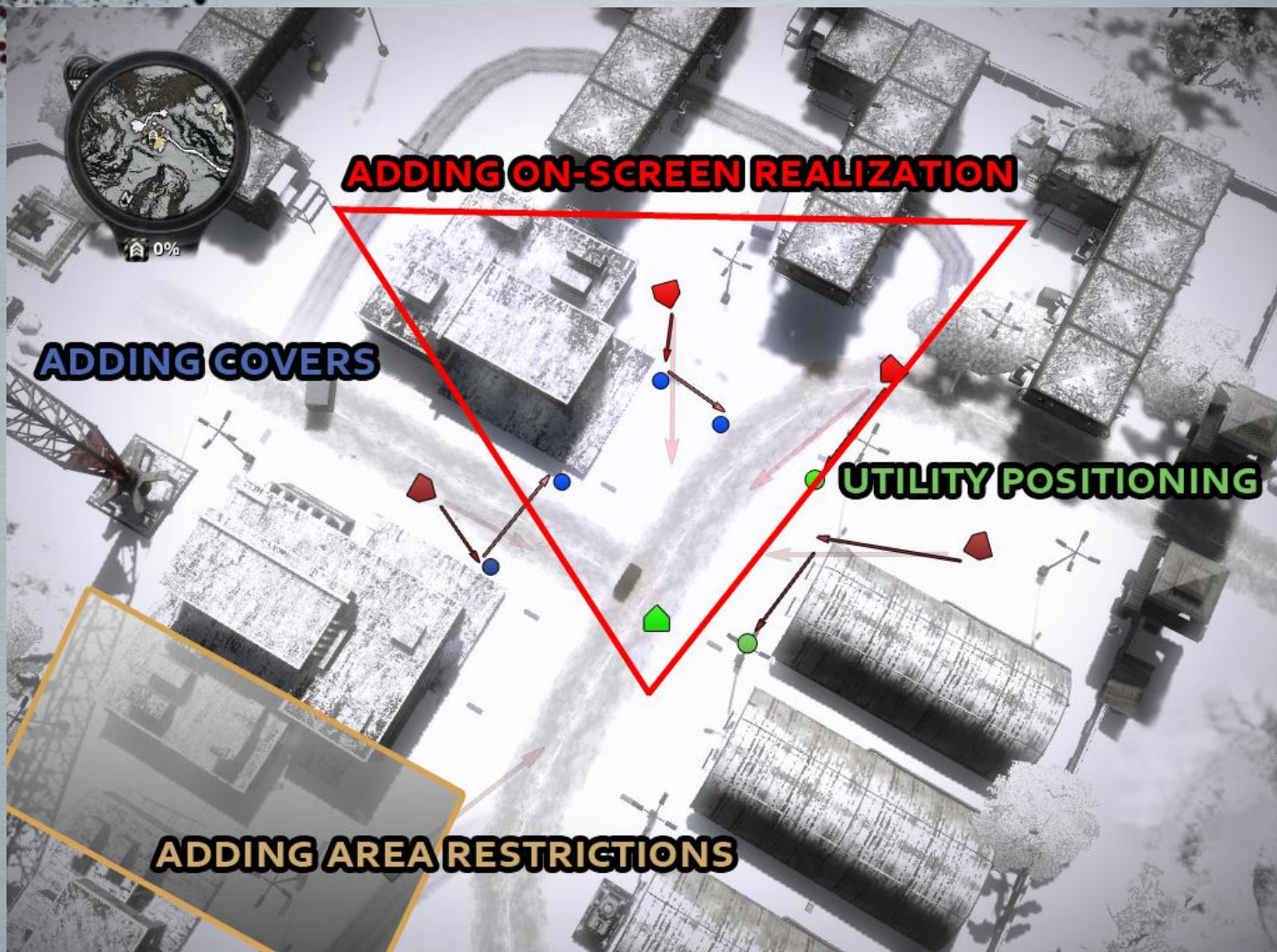












# Focus on Player XP

*Build Systems not Moments*







# Behavior Representation

- Annotated world
- Reduce complexity
- Easy to understand



# Behavior Trees

- Visual scripting
- Designer friendly
- Easier to understand and debug
- Realization control



# Behavior Trees

- Set of **core** behaviors that are deterministic
- Deals with scale and realization costs
- Makes behavior obvious to the player

*If the player doesn't understand what's happening, it isn't!*



# Layered Architecture

- Easier to:
  - Pseudo-scripting
  - Event handling
    - Maintaining context
    - Improves realization





# Sub Behaviors

- Dealing with interruption
- Realization variety
  - Smaller cost
  - Reusable



Global  
Blackboard



I am  
going to  
move to  
cover!





Global  
Blackboard



I am  
going to  
move to  
cover!



Play animation  
one-off to ask him  
to move!





# External Behavior Trees

- Drive behavior through data
- Game Objects + Environment
- Examples:
  - Contextual Actions
  - Cover Objects



# Making Characters Believable

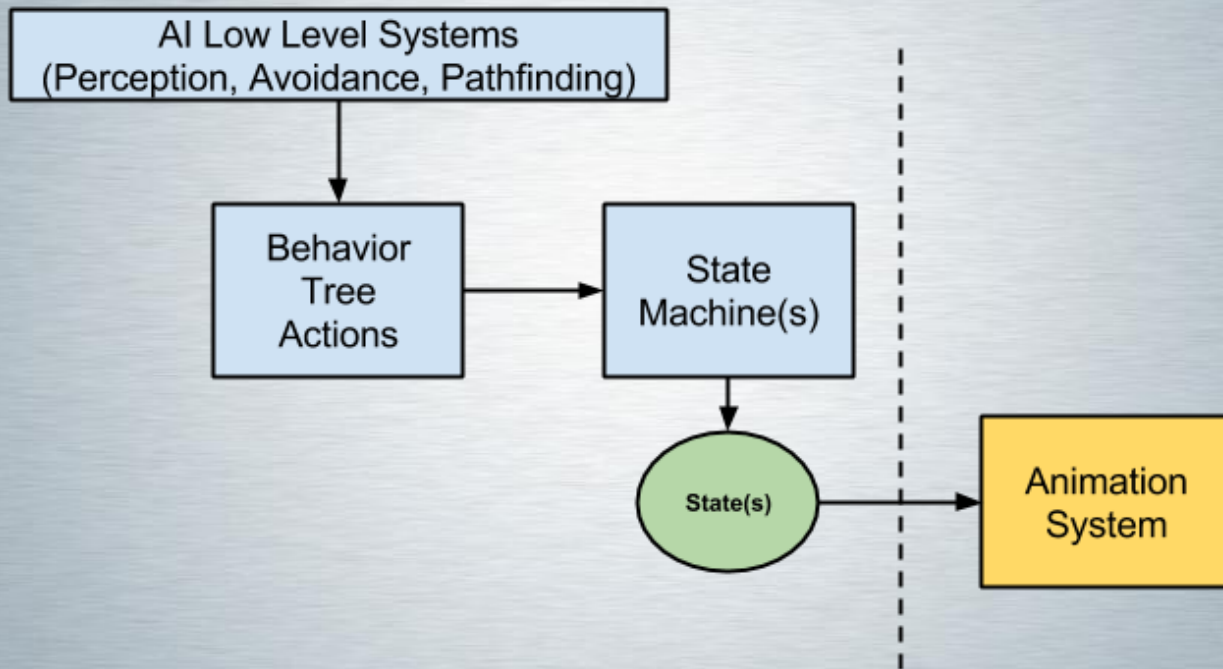
- Realization:
  - The secret sauce
- Challenge:
  - Maintaining fidelity
  - Memory



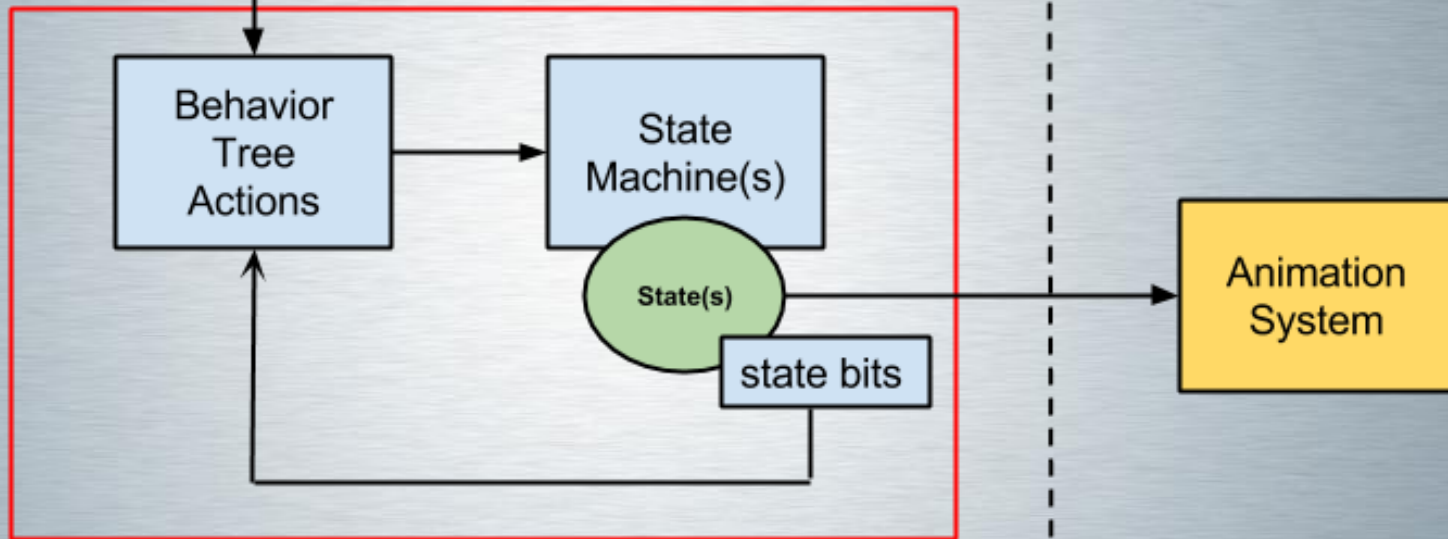
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# Behaviors and Animation



AI Low Level Systems  
(Perception, Avoidance, Pathfinding)





# Data Driving Characters

- Previously used controllers
  - Cumbersome
  - Bug prone
- State Tasks
  - Code snippets
  - Component based
  - Much cleaner + easier to script

# External State Machines

- Similar to external behavior trees
- Added on to “extend” the original state machine
- Specifies a default animation set
- Game objects can override animation sets
- Loaded in when needed



# In Summary

- Player centric + systemic solutions
- Use and take advantage of layering behaviors and animation
- Data drive as much as possible!

# Thanks

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## We're Hiring!

