Sprint 1: Project Proposal

Procedurally Generated 2D Roguelike RPG

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Normative and Dynamic Virtual Worlds

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What We're Building

The Vision:

- Top-down 2D roguelike RPG with infinite replayability
- Every playthrough = unique dungeon
- Checkpoint-based progression

Core Challenge:

- Algorithmically generate dungeons that are:
  - Always playable
  - Fair and balanced
  - Meaningfully different

Inspiration:

- *Enter the Gungeon*
- *Spelunky 1 & 2*
- *Binding of Isaac*
- *Dead Cells*
- *Hades*

Why Roguelikes?

- Perfect testbed for PCG
- Each run validates algorithms
- High replay value
- No manual level design needed

Game Flow & Structure

Three-Stage Journey with Checkpoints

Progression System:

- Three dungeon sections
- Each dungeon culminates in a boss fight
- Checkpoints after defeating each boss

Death Mechanic:

- Return to last checkpoint
- Current dungeon regenerates completely
- New layout, new challenges

Visual Variety:

- Each section has a distinct theme
  1. Volcanic chambers
  2. Overgrown ruins
  3. Crystalline caverns
- Different layout styles

Design Philosophy:

- Respect player's time
- Permanent progress via checkpoints
- Endless variety via regeneration

Procedural Content Generation (PCG)

The Heart of Our Project

Algorithm 1: Cellular Automata

- Creates organic, cave-like dungeons
- Rule-based iteration
- Natural-looking environments

How it works:

1. Start with random noise
2. Each cell checks neighbors
3. Apply rules: wall or floor
4. Repeat until stable

Algorithm 2: Binary Space Partitioning

- Structured room-and-corridor layouts
- Recursive space division
- Architectural feel

How it works:

1. Recursively split space
2. Place rooms in leaf nodes
3. Connect with corridors
4. Ensures connectivity

Two algorithms = Variety in dungeon styles

Validation & Quality Control

The Challenge:

- Random $\neq$ Playable
- Need intelligent validation
- Ensure fair gameplay

Connectivity Check:

- All rooms reachable?
- Pathfinding validation
- No isolated areas

Pacing Validation:

- Appropriate enemy spacing
- Difficulty curve
- Not too easy/hard

Fairness Check:

- Room for player movement
- Avoidable enemy encounters
- No impossible situations

Validation transforms random generation into reliable, fun gameplay

Experimental Feature: Dynamic Narrative Generation

LLM-Driven Lore and Storytelling

The Idea:

- LLM-generated contextual story snippets
- Integrated through NPC dialogues or collectible items

Inputs:

- Current game state:
  - Progress
  - Bosses defeated
  - Area theme

Simple Approach:

- Generate multiple options
- Select the most coherent
- Bind narrative state to checkpoints

Scope:

- Remains **secondary** to the primary goal $\rightarrow$ Robust procedural dungeon generation

Development Strategy

Technology Stack:

- Unity 2D
- C# for implementation
- Focus on PCG algorithms

Team Structure:

- **Manager**: Oriol Miró
- **AI Designer**: Dániel Mácsai
- **AI Tech**: Jean Dié, Bruno Sánchez

Primary Goal: Robust procedural generation that creates engaging, fair, and varied dungeons every time

Secondary (Optional) Goal: LLM-driven dynamic narrative elements to enhance immersion

Conclusion

- Building a **2D roguelike RPG** powered by procedural generation
- **Core challenge**: Algorithmically generating playable, varied dungeons
- **Two algorithms**: Cellular Automata + Binary Space Partitioning
- **Validation systems** ensure quality and fairness

Demonstrating how AI-driven procedural content generation creates infinite replayability while maintaining quality

Q & A

Thank you for your attention!

Any questions?