DES214 – Level Design Methods

Procedural Generation

DigiPen Institute of Technology

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Procedural Generation

What is Procedural Generation and how to leverage it?

Procedural Generation

Procedural Generation (PCG)

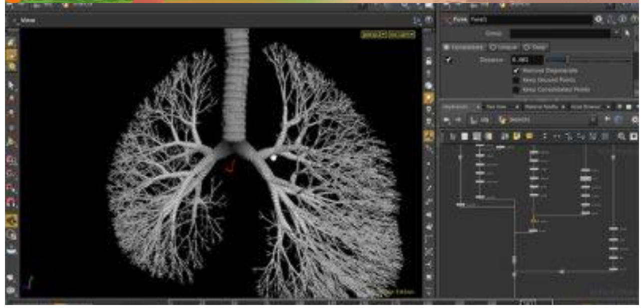
A collection of techniques used to generate data algorithmically.

Instead of building content manually, we teach the computer to build it for us.

Procedural Generation

PCG Applications

- Games
- Movies
- Images
- Music
- Poetry
- Fashion
- Medical Simulations
- Military Simulations



PCG Benefits

Procedural Generation

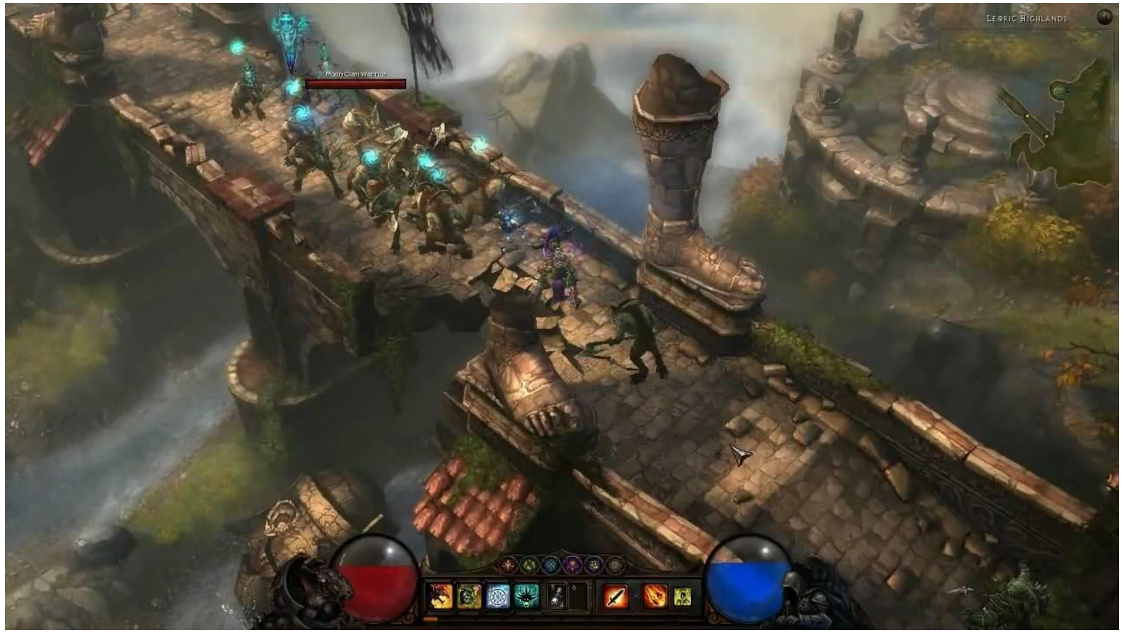
Scalability

Once implemented*, generating 10 levels is as easy as 1000.

Procedural Generation

Replayability

It gives players the promise of nearly infinite variety of content.



Procedural Generation

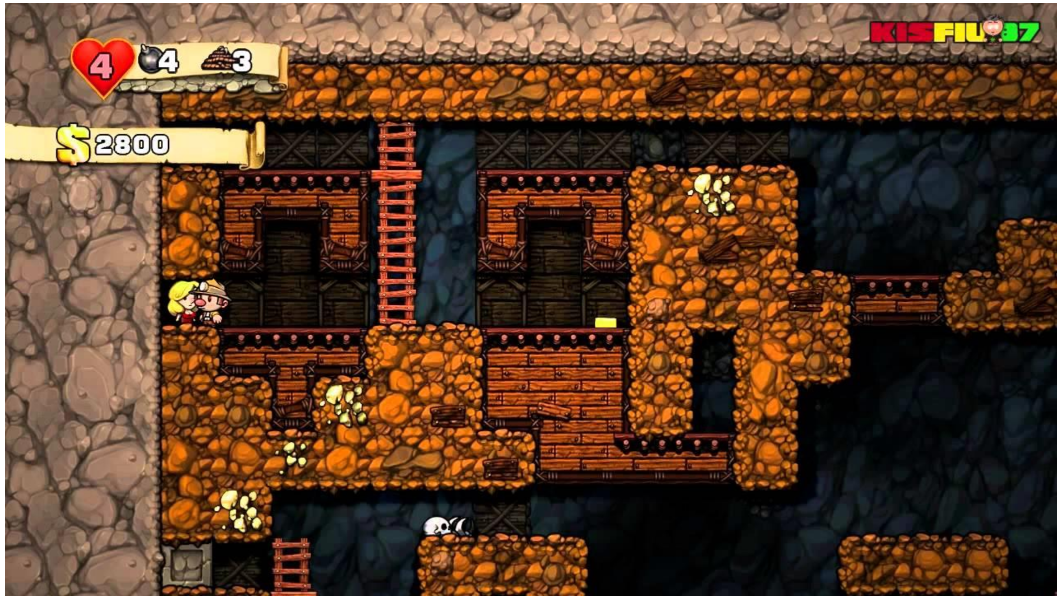
Novelty

Recombining elements enables surprising emergent scenarios.

Procedural Generation

Uniqueness

Prevents players from memorizing game content through repetition.



PCG Drawbacks

Procedural Generation

Less Directed

Reduced authorial control stymies a specific coherent experience.

Procedural Generation

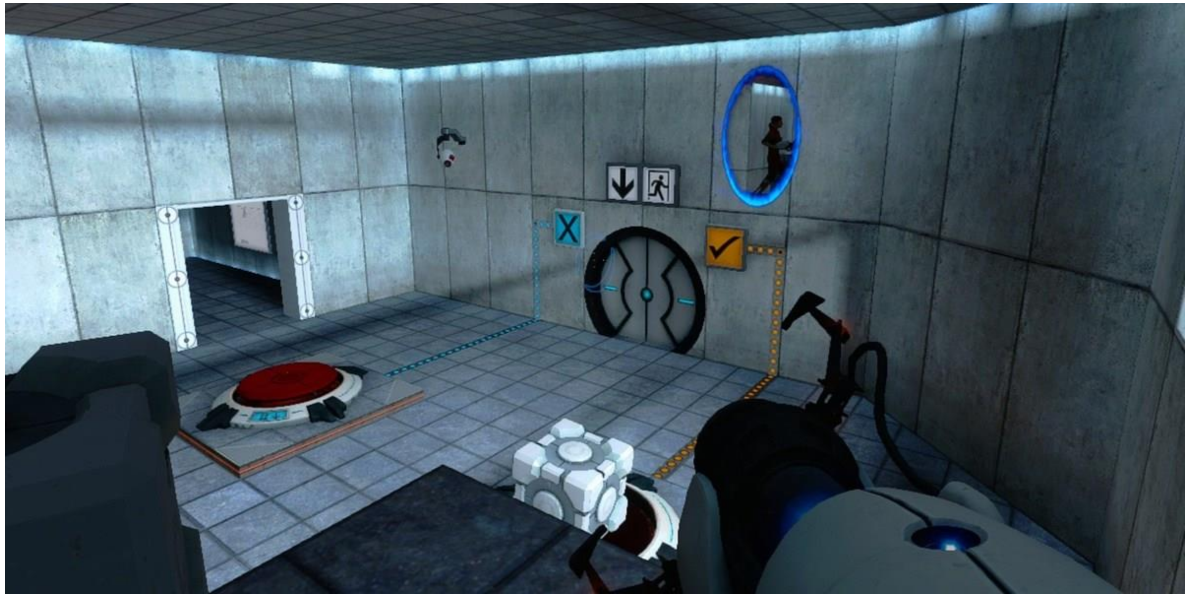
Repetitive

Lots of mathematical combinations, but not meaningful.

Procedural Generation

Long Setup Time

If only a little content is needed, it might be faster to handcraft.



Procedural Generation

Harder Execution

Takes more time to experiment, tweak and test.

Procedural Generation

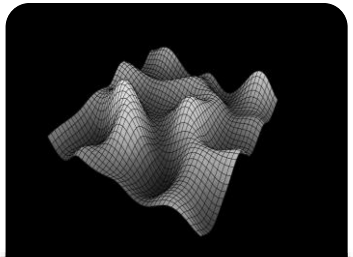
PCG Benefits	PCG Drawbacks
Scalability	Less Directed
Replayability	Repetitive
Novelty	Long Setup Time
Uniqueness	Harder Execution

Procedural Generation

Procedural Generation Techniques

Tiles

Grammars



Distribution

Parametric

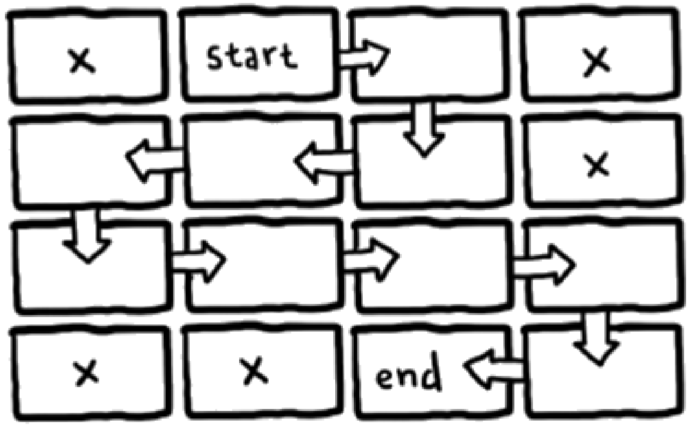
PCG Techniques: Tiles

Procedural Generation

Tile

A discrete chunk of handcrafted game content.

- Scope
- Variety
- Context
- Randomness
- Granularity
- Additive vs Subtractive

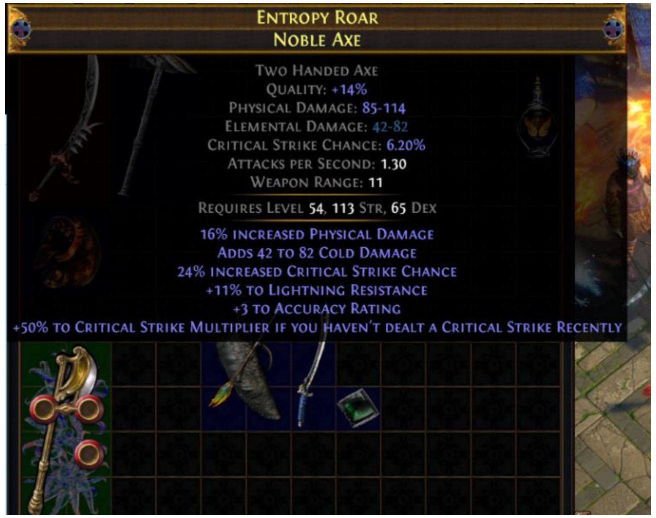


Procedural Generation

Scope

Which and how many elements will be procedurally generated? How are they combined? What parts will be handcrafted?

- Levels
- Characters
- Items
- Quests
- Story
- Etc



ENTROPY ROAR
NOBLE AXE

TWO HANDED AXE
QUALITY: +14%
PHYSICAL DAMAGE: 85-114
ELEMENTAL DAMAGE: 42-82
CRITICAL STRIKE CHANCE: 6.20%
ATTACKS PER SECOND: 1.30
WEAPON RANGE: 11

REQUIRES LEVEL 54, 113 STR, 65 DEX

16% INCREASED PHYSICAL DAMAGE
ADDS 42 TO 82 COLD DAMAGE
24% INCREASED CRITICAL STRIKE CHANCE
+11% TO LIGHTNING RESISTANCE
+3 TO ACCURACY RATING
+50% TO CRITICAL STRIKE MULTIPLIER IF YOU HAVEN'T DEALT A CRITICAL STRIKE RECENTLY

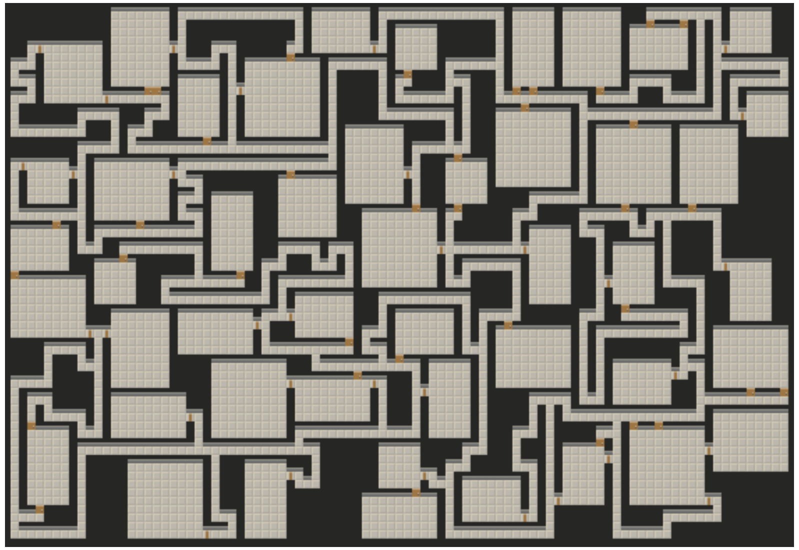
Procedural Generation

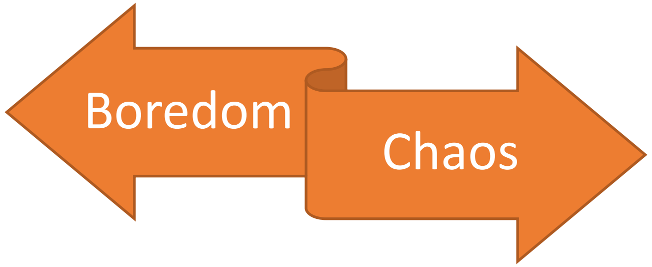
Variety

How distinct is each tile from others?

What are the bounds that tiles cannot cross?

Suggestion: Create different tile pools depending on usage.





Boredom

Chaos

Procedural Generation

Context

Are tiles aware of other tiles around it?

How are they modified to account for it?

Is your PCG system allowed to go back steps?

Procedural Generation

Randomness

How will randomness factor into your system? Dice Roll? Deck Random? Weighted Randomness?

Procedural Generation

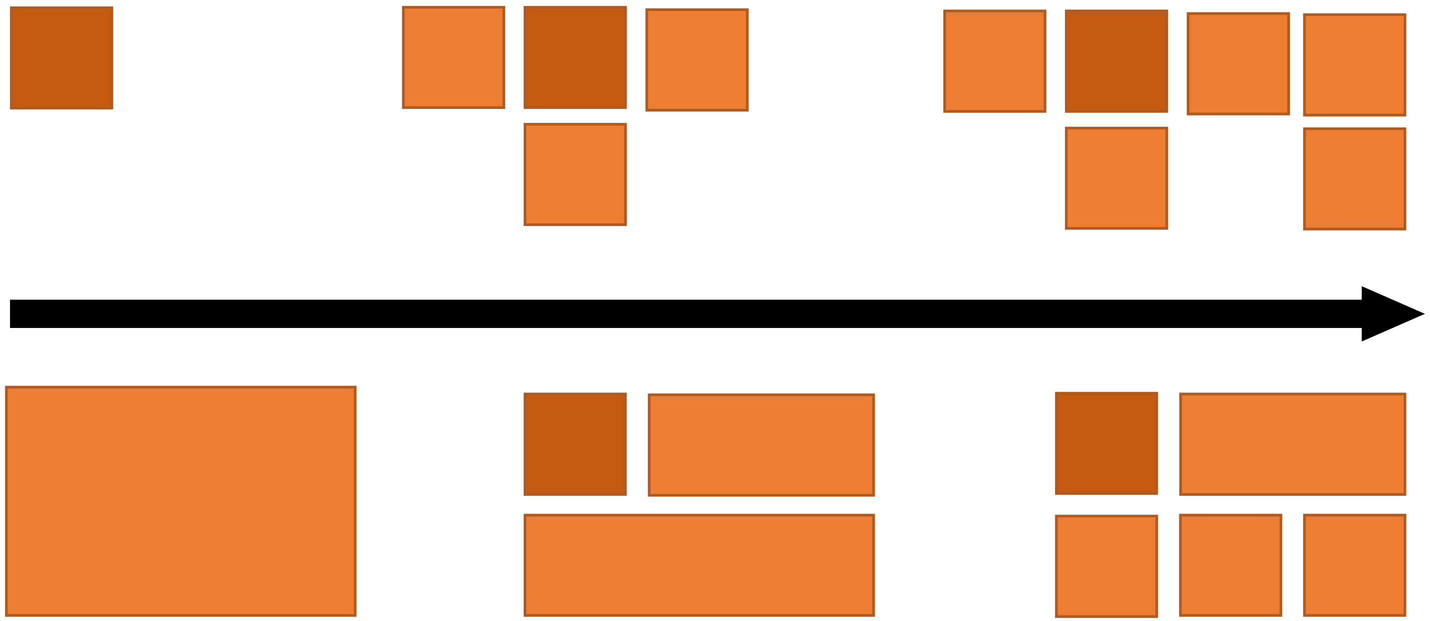
Granularity

How many layers of procedural generation will be used? How small is an individual tile allowed to be?

Procedural Generation

Additive vs Subtractive

Will you use and additive or subtractive approach?



Procedural Generation

In PCG you must teach the computer to design the content in the way you would

Procedural Generation

Extra Material

Practical Procedural Generation for Everyone

Procedural Generation

Extra Material

How (and Why) Spelunky Makes its Own Levels

Thank You!

Questions?

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