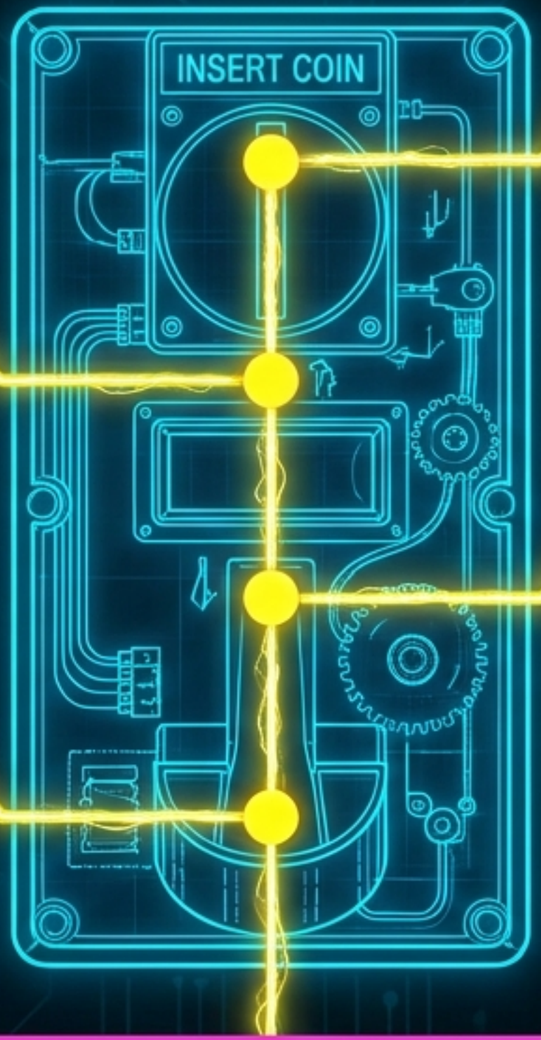
# Foundations of Game Design & Gaming History

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# The Coin-Op Core & The Arcade Phenomenon




## 1961 | University Mainframes

**Spacewar!** (Steve Russell, MIT). The first interactive computer game, isolated to elite research labs.

## 1971 | The First Arcade

**Computer Space** (Nolan Bushnell). Attempting to bring the ivory tower to the masses.

## 1972 | The Commercial Spark

Pong (Atari). The ultimate constraint: use paddle to avoid missing ball. Easy to learn, impossible to master.

## 1980/1981 | The Character Era

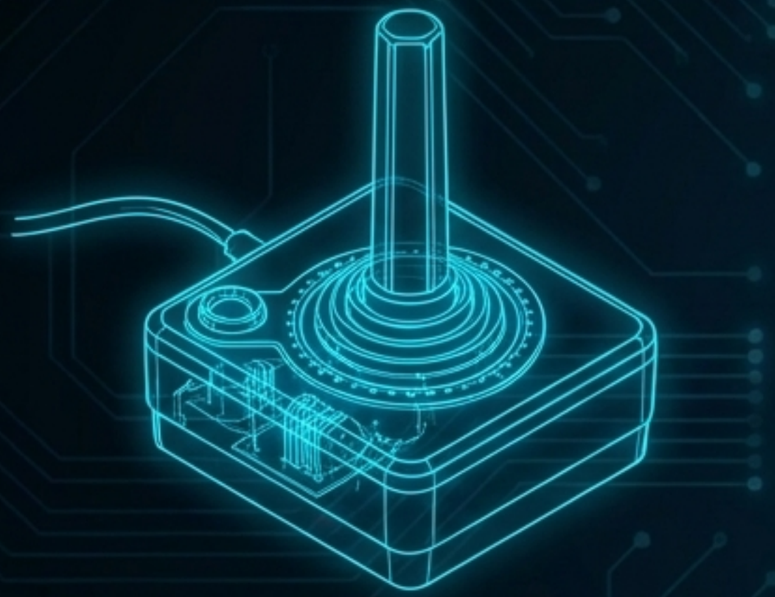
Pac-Man & Donkey Kong. Shifting from abstract shooting to recognizable protagonists and narratives.

**The coin-op model birthed the primary design constraint: cycle players quickly through fast, progressively punishing gameplay.**

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# The Living Room Revolution & Hardware Divergence

## The Console Route



- **Hardware:** Atari VCS/2600 (1977), ColecoVision, NES
- **Interface:** Joysticks, directional pads, single buttons
- **Genre Impact:** Fast, reflex-based action, platforming, and arcade ports

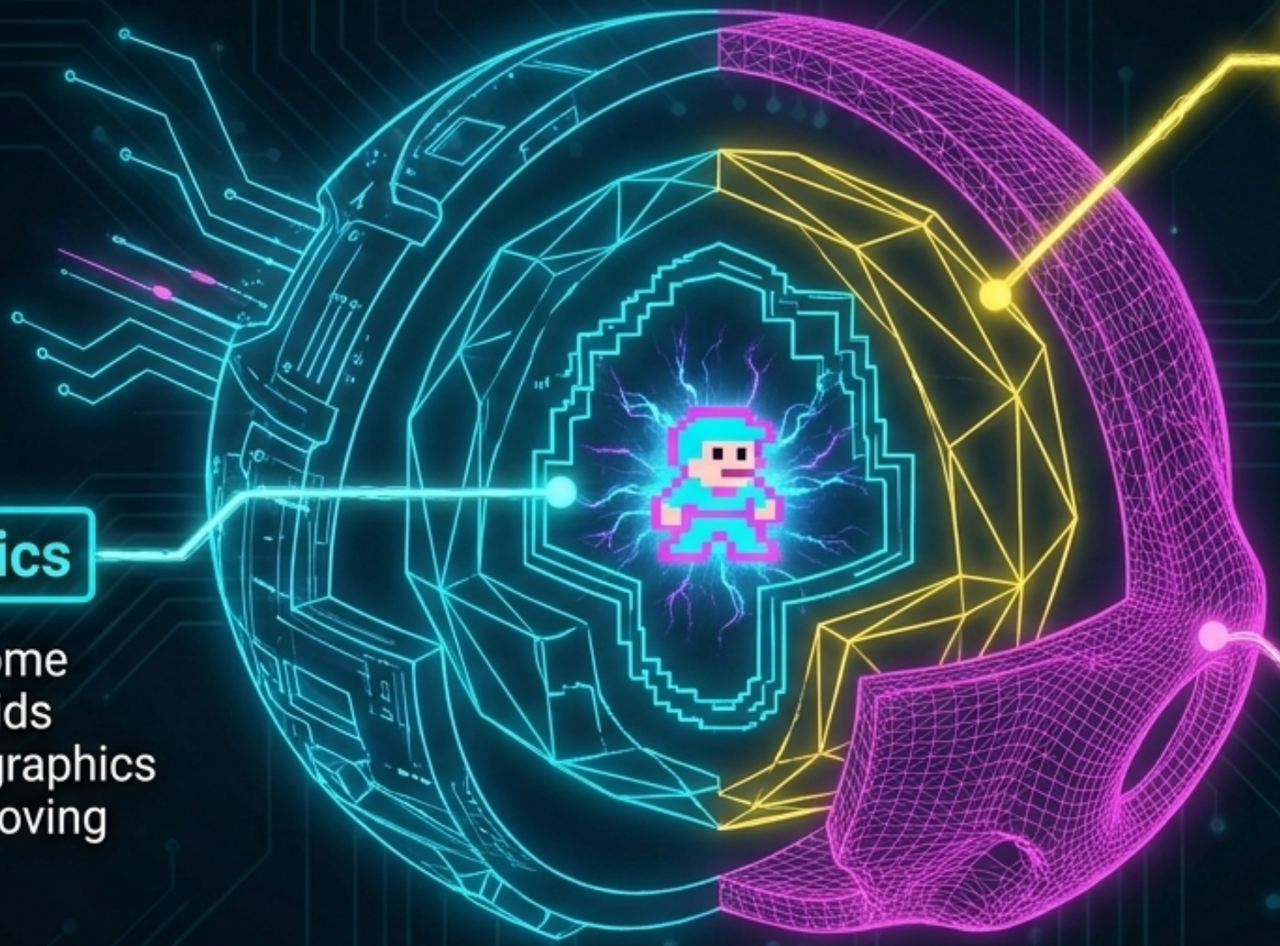
## The Computer Route




- **Hardware:** Apple II, Commodore 64 (1982)
- **Interface:** The QWERTY Keyboard
- **Interface:** The QWERTY Keyboard
- **Genre Impact:** Text adventures, deep RPGs, and strategy. Relied on two-word text commands and saved states.

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# The Constraint Crucible



## Maze Loops

Pac-Man relied on looping mazes because early memory banks couldn't store expansive open worlds.

## Vector Graphics

Used sharp, monochrome vector lines for Asteroids (1979) because pixel graphics couldn't handle fast-moving objects cleanly.

## Pallet-Swapping

Reusing the exact same sprite code but changing the color to save RAM while creating new enemies.

**Constraint breeds creativity. Developers leveraged low memory and processing limits to invent entire genres.**

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# Stripping Away the Screen: The Analog Core



## The Purest Form of Play

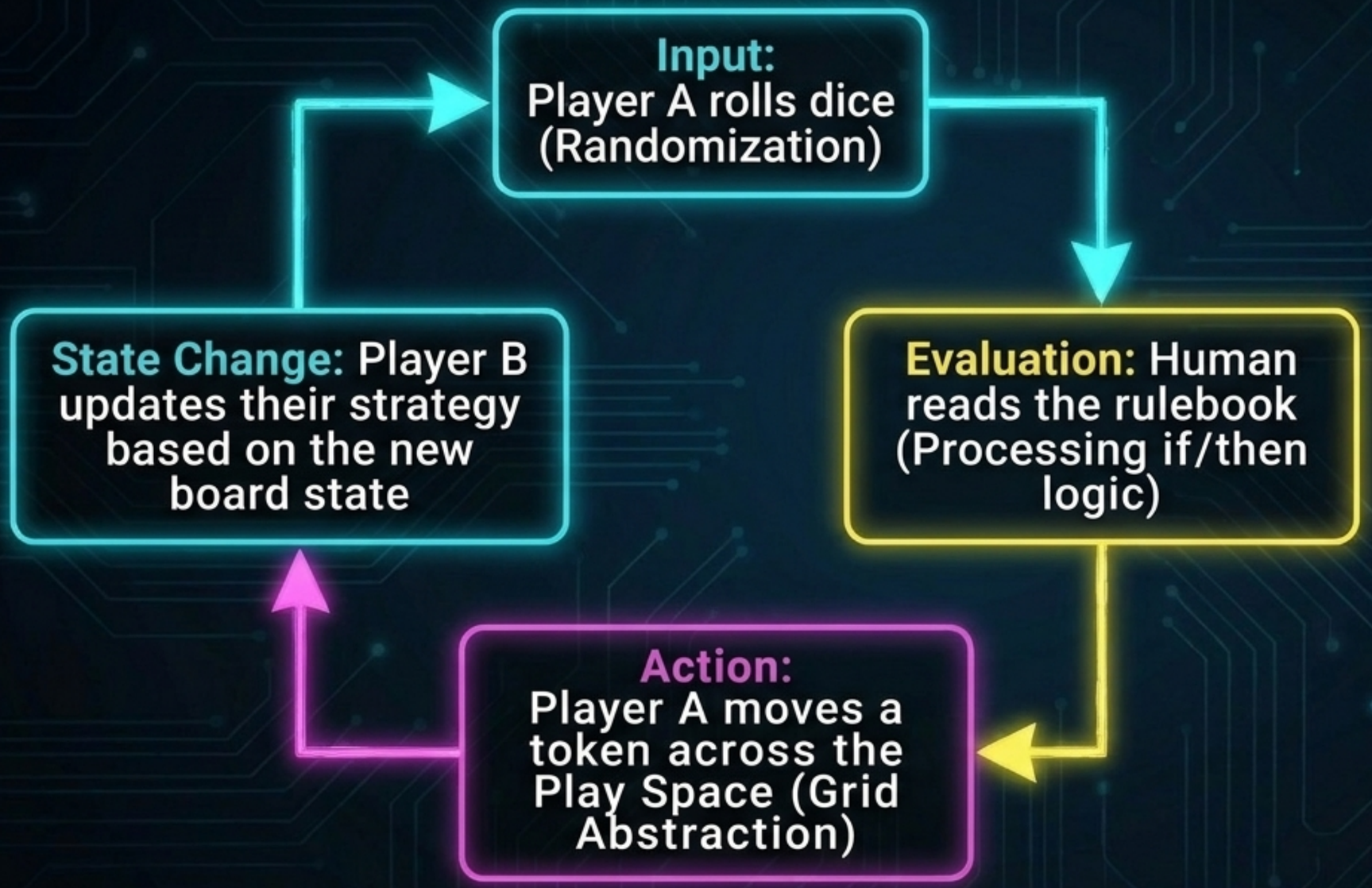
Before polygons and processing power, there was cardboard and pen-and-paper. The engine of any game is actually analog.

## The Prototype Protocol

Modern developers use tabletop models to test digital mechanics before writing a single line of code. We must study the analog to master the digital.

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# The Anatomy of a Rule Set

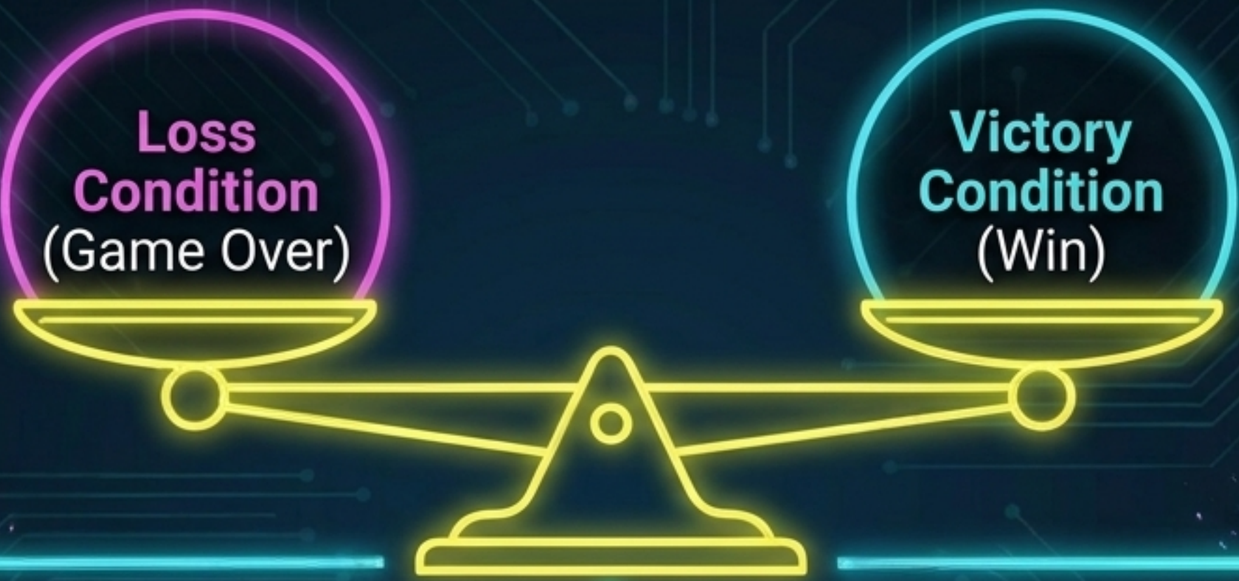



**Definition: Abstraction**

Distilling a complex real-world concept (like warfare or economics) into a manageable set of physical rules, tokens, and turn sequences.

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# Boundaries of Play: Game Theory & Conditions




## Victory & Loss Conditions

A game without explicit win/loss conditions is merely a toy. Experience is defined by the boundaries of failure and success.

## Zero-Sum vs. Non-Zero-Sum

**Zero-Sum:** One winner, one loser (e.g., Chess). Pure competition.

**Non-Zero-Sum:** Cooperative, Tragedy of the Commons, or Prisoner's Dilemma mechanics.

## Challenges

The obstacles placed between the player and the Victory Condition: pattern recognition, resource management, spatial awareness, reaction time.

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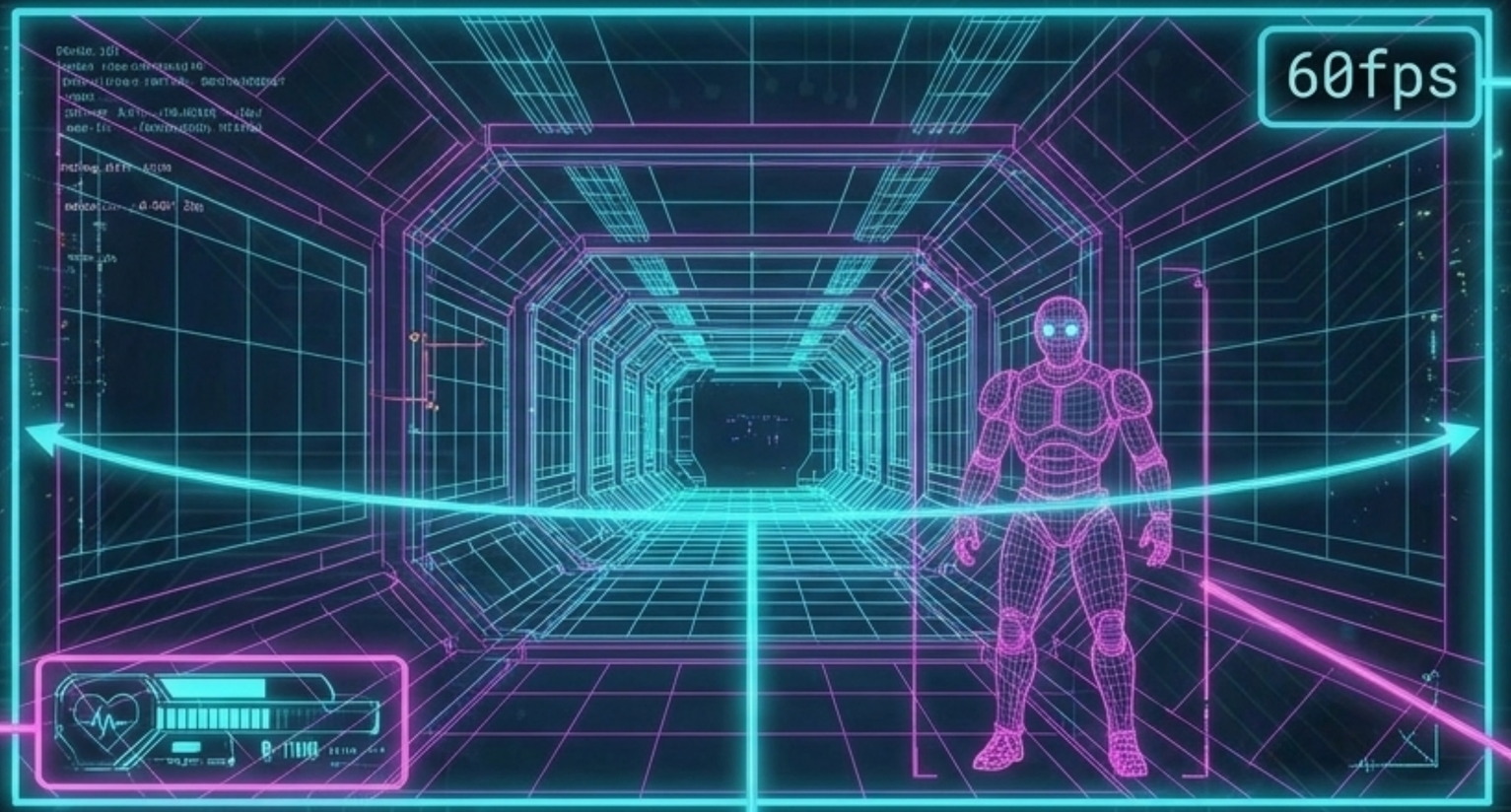
# Automating the Rules: The Core Digital Loop




How do developers talk about systems processing analog rules at lightning speed? Enter the digital lexicon.

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# The World & The Lens: Environmental Terminology




## Frame Rate

The exact speed at which the game calculates the rules and loops. Not just visual smoothness.

## HUD (Heads-Up Display)

The UI elements overlaying the screen. The bridge between system logic and the player.

## FOV (Field of View)

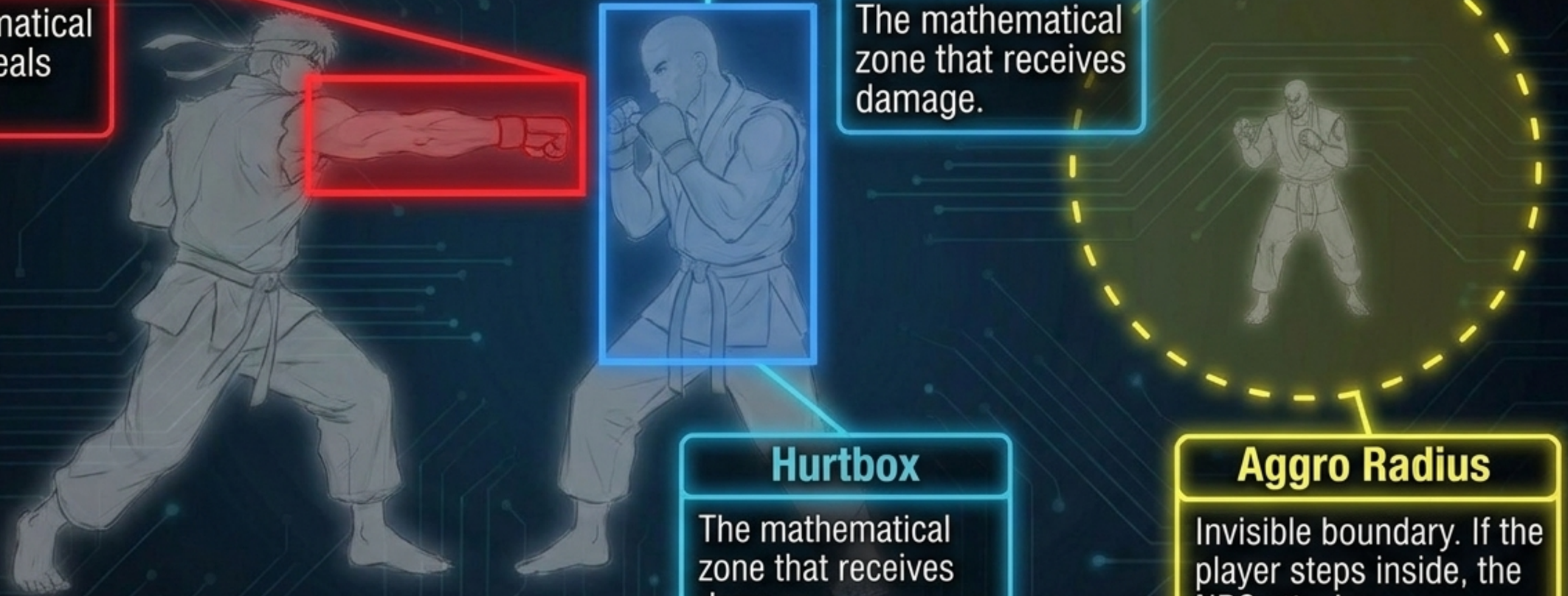
The angle of observable game world visible on screen.

## NPC (Non-Player Character)

The AI-controlled entity navigating the environment.

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# Anatomy of an Encounter: Invisible Geometry



**Hitbox**

The mathematical zone that deals damage.

**Hurtbox**

The mathematical zone that receives damage.

**Hurtbox**

The mathematical zone that receives damage.

**Aggro Radius**

Invisible boundary. If the player steps inside, the NPC attacks.

## You do not play the art. You play the invisible math.

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# The Balancing Act: Combat & Economy Mechanics

## Weapon_Stats_Inspector

### ① DPS (Damage Per Second)

120.5 DPS

The mathematical average of damage output over time.

Value: 120.5



### ② Cooldown

3.00s

The enforced time delay before an action can be used again (a digital turn-limiter).

Value: 3.00s



### ③ Nerf & Buff Variables

Multiplier: 1.2x

Status: BUFFED

Increasing a mechanic's power to maintain static/dynamic balance.

Status: NERFED

Multiplier: 0.8x

Decreasing a mechanic's power to prevent dominant strategies.

System Status: All systems online. Data visualization active.

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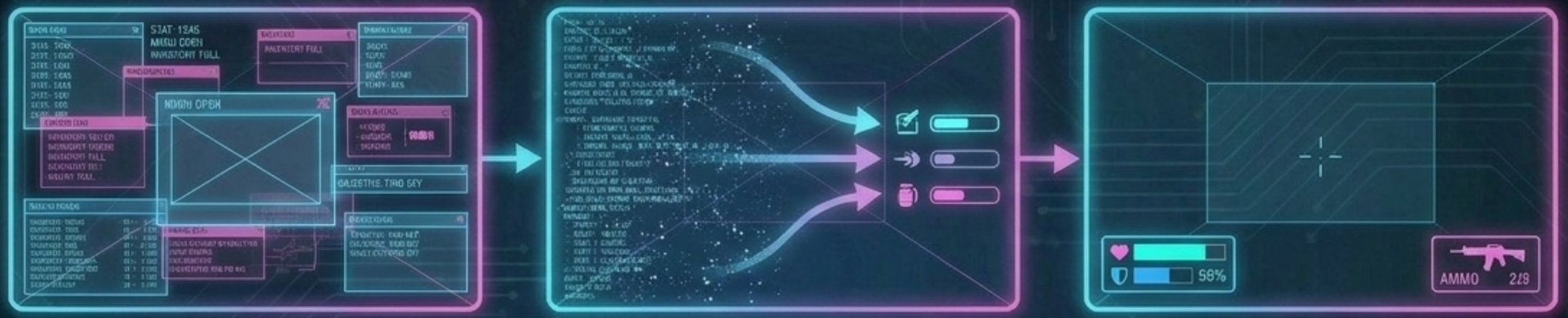
# Synthesis: Video Games Are Automated Board Games

| Analog Root (Tabletop) | Digital Branch (Code) |
| --- | --- |
| Game Master (GM) | Game Engine & AI Logic |
| Turn Sequence | Frame Rate (e.g., 60 turns evaluated every second) |
| Board Spaces / Grid | Hitboxes & Collision Detection |
| Dice Roll / Card Draw | RNG (Random Number Generation) |
| Rulebook | Source Code |

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# Usability & Player Experience (UX)

## Weapon_Stats_Inspector




**Cognitive Overload** → **Intuitive HUD**

### Bridging the Gap

The interface is the only translator between the computer's deep system logic and the player's brain.

### Affordances

Visual cues that intuitively explain rules without text (e.g., red barrels explode, spiked floors hurt).

### Onboarding

Teaching invisible rules (hitboxes, cooldowns, aggro) through natural gameplay pacing rather than manuals.

System Status: All systems online. UX principles applied for optimal interaction.

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# The Project: Mechanics Deconstruction & Evolution

## Physical Deconstruction (Analog)



## Digital Evolution (Code)

```
int playerHealth = 100;
bool isTurn = false;

// player Health
bool isTurn = false;
```

```
RNG.Generate(1, 6);
```

```
RNG.Generate(1, 6);
```

## The Assignment:

1. Tear Down: Select a traditional non-digital game (board or card).
2. Document: Map out its core mechanics, turn structures, and victory conditions.
3. Evolve: Write a comparative essay pitching how to evolve this analog system into a digital game,  utilizing industry acronyms (RNG, Hitbox, Cooldown, HUD).

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# The Developer's Lens

> INSERT COIN / PRESS START_

"A game is a series of interesting choices."
— Sid Meier

You hold the blueprint. You can now see the rules beneath the cardboard, and the hitboxes beneath the pixels. It is time to build.

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