# Deadlight: Survival After Dark

Deliverable 1: Project Proposal

**Group 16**

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# Contents

# Executive Summary

This proposal presents **Deadlight: Survival After Dark**, a 2D top-down zombie survival game built in Unity. The game combines wave-based survival gameplay with two key features: a **day/night cycle** that creates distinct preparation and combat phases, and an **adaptive zombie mutation system** that changes enemy behavior based on how players approach challenges.

The player's goal is to survive 5 increasingly difficult nights. Each night, zombie waves attack, and the player must hold out until dawn to advance. Surviving all 5 nights constitutes a full victory. Between runs, randomized loot placement, zombie spawns, and mutation timing ensure that no two playthroughs feel the same. Players can also choose from three difficulty modes (Easy, Normal, and Hard) to tailor the experience to their skill level.

Our implementation follows a phased development plan. For the March 25 mid-project report (Deliverable 2), we will deliver a working Unity prototype with core survival mechanics, day/night pacing, level design with clear player guidance, resource management, and progression systems. Advanced features like the mutation system and crafting will be added in the final deliverable (Deliverable 3).

The design applies established game design principles from our coursework. We used the **MDA framework** to design from player experience backward to mechanics. **Bartle's player types** helped us target multiple player motivations, focusing primarily on Achievers who enjoy mastery and progression, while also engaging Explorers who like discovery and Killers who seek combat challenges. Our day/night cycle manages player engagement by alternating between lower-intensity preparation and higher-intensity survival, keeping players in an optimal challenge zone that prevents both boredom and frustration.

We began with structured brainstorming to identify our core concept, then built a paper prototype to test our ideas before coding. Playtesting the prototype revealed what worked (the day/night rhythm, resource decisions) and what needed adjustment (action point balance, mutation clarity). These findings led to design refinements that strengthened the overall experience.

This document details our complete design process: conceptual foundations, game design theory application, brainstorming and ideation, core mechanics and gameplay loops, paper prototyping and testing, and our implementation roadmap aligned with course deliverables.

# 1. Conceptual Framework

## 1.1 Game Overview

**Deadlight: Survival After Dark** is a 2D top-down zombie survival game built in Unity and set in an abandoned urban town. The game builds on the familiar wave-based survival format but adds two systems that make it more strategic: a **day/night cycle** and **adaptive zombie mutations**.

The game spans **5 nights** of escalating difficulty. During the day, players explore the map to scavenge resources, craft items, and prepare defenses. Zombies are dormant or weakened, making daytime safer for exploration. When night falls, zombie waves attack. Players must survive until dawn using whatever they prepared during the day. Each successive night introduces stronger zombies, new mutation types, and larger waves, culminating in a final boss encounter on Night 5. Surviving all 5 nights is the ultimate victory condition.

While the overall structure of the 5 nights remains consistent across playthroughs, the game features significant **run-to-run randomness**: resource locations, zombie spawn points, and which mutations appear on which nights all vary between runs. This ensures high replayability, as players cannot simply memorize a single winning strategy.

## 1.2 Win Condition and Objective

The player's primary objective is to **survive all 5 nights**. Each night that the player survives until dawn counts as a successful night. If the player is eliminated during any night phase, the run ends and the player's progress (nights survived, score, zombies killed) is recorded. Players are encouraged to attempt new runs to push further, unlock new weapons, complete challenges, and climb the leaderboard.

## 1.3 Target Audience

Our target audience is players aged 16 to 30 who enjoy action-survival games with strategic planning:

- **Casual-to-Core Gamers**: Players who want accessible gameplay with depth. The day phase is lower pressure, while night combat provides intense action. Three difficulty modes (Easy, Normal, Hard) ensure accessibility for all skill levels.
- **Strategy-Minded Players**: Those who enjoy planning and resource management. The day phase rewards smart preparation.
- **Horror/Survival Fans**: Players attracted to tension, atmosphere, and evolving threats.

## 1.4 Genre

Deadlight combines **top-down shooter**, **survival**, and **tower defense** elements. The top-down view provides tactical awareness. Survival elements come from resource scarcity and high stakes. Tower defense aspects emerge through barricades and defensive preparation during daytime.

## 1.5 Player Engagement Strategy

We sustain engagement through three connected approaches:

- **Fun**: Satisfying combat with responsive controls, impactful weapons, and clear visual feedback. Crafting provides creative expression, and mutations introduce variety.
- **Balanced Challenge**: The day/night cycle creates natural rhythm by alternating between calm preparation and intense survival. This prevents both boredom (too easy for too long) and frustration (too hard without breaks). Difficulty increases gradually as players improve, and difficulty modes allow players to self-select their challenge level.
- **Strategic Adaptation**: The mutation system keeps the game challenging. When players develop effective strategies, zombies adapt with counters, encouraging experimentation and growth.

# 2. Application of Game Design Principles

## 2.1 MDA Framework Analysis

We used the MDA (Mechanics, Dynamics, Aesthetics) framework to structure our design. This framework helped us work backward from the player experience we want to create, to the mechanics that produce that experience.

| Layer | Element | Description |
|---|---|---|
| **Mechanics (Rules)** | Day/Night Cycle | Timed phases: daytime for preparation, nighttime for combat across 5 nights |
| | Zombie Mutations | Zombies adapt based on player behavior (camping triggers faster zombies, weapon overuse triggers resistance) |
| | Resource Scavenging | Players collect materials to craft weapons, ammo, and defenses |
| | Points System | Earn points from kills and survival milestones; spend on weapon unlocks, upgrades, and consumables at the shop between nights |
| | Difficulty Modes | Easy, Normal, and Hard modes adjust zombie health, damage, wave sizes, and resource availability |
| **Dynamics (Behavior)** | Emergent Playstyles | The day timer forces a personal risk threshold: cautious players fortify early while aggressive players push into dangerous zones for better loot, creating distinct approaches from the same mechanic |
| | Adaptation Arms Race | Mutations punish repetition, so players who relied on one strategy in Night 2 are forced to improvise by Night 3, creating an escalating back-and-forth between player and game |
| | Resource Tension | Scarce materials make every crafting decision feel consequential; spending scrap on a barricade means not having it for ammo, producing genuine trade-off anxiety |
| **Aesthetics (Experience)** | Challenge | Escalating difficulty across 5 nights tests player skill and mastery |
| | Tension | Approaching night creates anticipation and urgency |
| | Discovery | New zombie types, hidden areas, and crafting recipes reward exploration |
| | Immersion | The day/night rhythm creates an absorbing gameplay loop |

Table 1: MDA Framework applied to Deadlight.

## 2.2 Bartle's Player Types

We analyzed Bartle's four player types to ensure our game appeals to different player motivations:

| Player Type | Motivation | How Deadlight Engages Them |
|---|---|---|
| **Achievers (Primary)** | Mastery, progression, high scores | Weapon unlocks, leaderboard rankings, challenge completions, and increasingly difficult mutations serve as skill benchmarks. Surviving all 5 nights is the ultimate achievement |
| **Explorers (Secondary)** | Discovery, understanding systems | Map exploration reveals hidden areas and rare materials. The mutation system itself is a puzzle to understand. Randomized loot and spawns reward curiosity each run |
| **Killers (Secondary)** | Competition, defeating threats | Night combat offers skill-based action. Weapon variety enables creative combat approaches. Leaderboard competition drives repeat play |
| **Socializers (Tertiary)** | Interaction, collaboration | Future multiplayer potential with divided roles. Single-player includes environmental narrative |

Table 2: Bartle's player types applied to Deadlight.

## 2.3 Managing Player Challenge and Engagement

A key principle in game design is managing the balance between challenge and player skill. When a game is too easy, players become bored. When it is too difficult, they become frustrated and quit. The goal is to keep players in an optimal zone where the challenge matches their growing skill.

Our day/night cycle directly addresses this principle. The day phase operates at lower challenge. Zombies are dormant, and activities like exploration and crafting are low-pressure. This provides recovery time and prevents fatigue from constant intense action. The night phase then increases challenge significantly as zombie waves test the player's preparation and combat ability.

Additionally, three **difficulty modes** allow players to self-select their starting challenge level:

- **Easy**: Zombies have reduced health and damage. Resource spawns are more generous. Waves are smaller. Ideal for learning the game's systems.
- **Normal**: The standard experience with balanced zombie stats, moderate resource availability, and progressively challenging waves.
- **Hard**: Zombies deal increased damage and have more health. Resources are scarcer and harder to find. Waves are larger and mutations appear earlier. Designed for experienced players seeking a serious test.

Critically, the mutation system acts as dynamic difficulty adjustment. As players improve and develop effective strategies, mutations raise the challenge to match. This prevents players from reaching a plateau where the game becomes too easy.

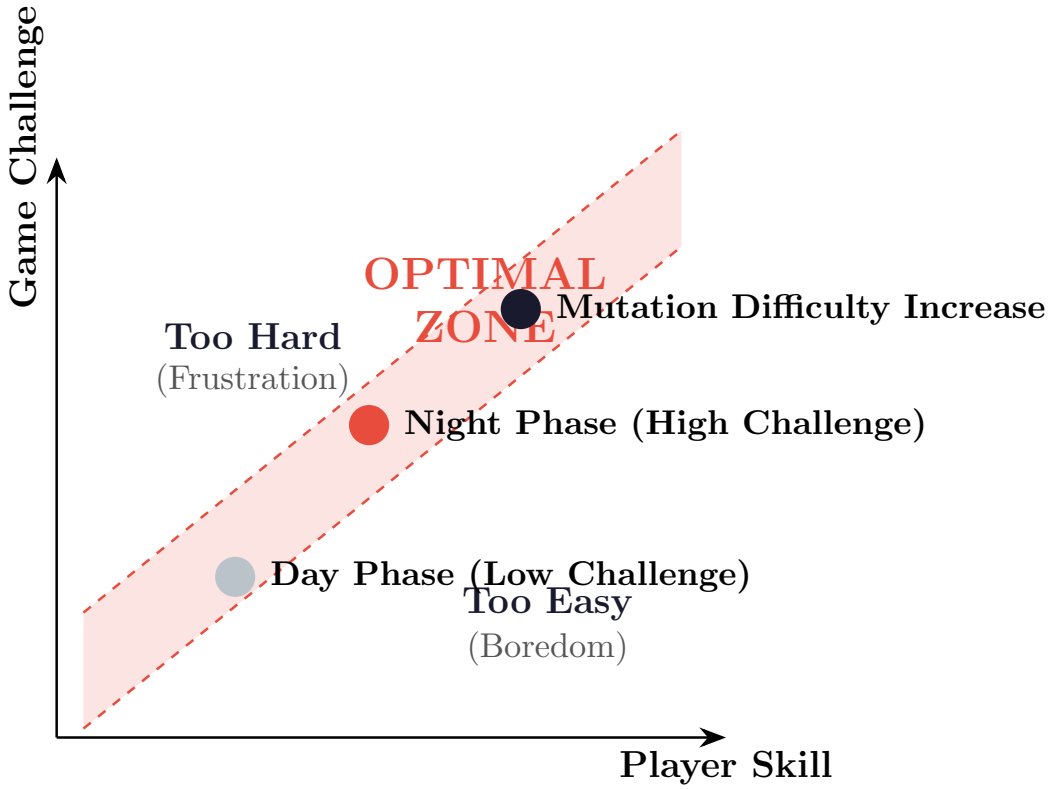


Figure 1: Challenge-skill balance in Deadlight. The day phase provides lower challenge, the night phase increases challenge, and mutations scale difficulty as players improve.

This alternating pattern (low challenge, high challenge, low challenge) keeps players engaged by continuously rebalancing difficulty with growing skill.

# 3. Ideation and Brainstorming

## 3.1 Brainstorming Process

Our design process moved from broad exploration to focused refinement:

**Phase 1: Open Ideation.** Each team member pitched game concepts. Ideas ranged from puzzle platformers to multiplayer strategy games. A common theme was survival mechanics and resource scarcity. We identified shared interest in zombie survival, particularly wave-based gameplay.

**Phase 2: Reference Analysis.** We studied existing zombie survival games to identify strengths and weaknesses. Classic wave-based modes have addictive gameplay but become repetitive. This became our design challenge: how do we keep the addictive core while adding variety?

**Phase 3: Feature Brainstorming.** We brainstormed features that would differentiate our game. Ideas included crafting, environmental hazards, NPC allies, vehicles, and base-building. Through voting and feasibility analysis, two concepts emerged: the **day/night cycle** (natural pacing, dual gameplay phases) and **adaptive mutations** (solving repetition by making enemies respond to player strategies).

**Rejected Ideas and Why:**

- **Co-op Multiplayer**: Would add replayability but undermines the isolation and tension that drive the survival aesthetic. It also doubles the scope of networking, balancing, and testing, unrealistic for a 2-month timeline.
- **Procedurally Generated Maps**: Would maximize randomness but sacrifices level design quality. Handcrafted maps with randomized loot let us control sightlines, choke-points, and resource zone placement while still varying each run.
- **Persistent Cross-Run Progression**: We considered letting weapon unlocks carry between runs, but this creates a power gap where experienced players start stronger, undermining the skill-based design. Fresh runs keep every attempt fair and keep the leaderboard meaningful.

**Phase 4: Synthesis.** We combined these two features with the proven wave-based foundation. The day/night cycle creates preparation and combat phases. Mutations prevent any single strategy from dominating long-term.

## 3.2 Theme and Setting

The game takes place in a small, abandoned urban town overrun by zombies. This setting offers several advantages: manageable scope with diverse environments (streets, buildings, shops); logical resource placement (hardware store for materials, gun shop for weapons); and confined space that creates natural tension as players venture into dangerous territory for better supplies.

**Narrative Context:** The player is a lone survivor separated from an evacuation convoy.

Radio transmissions indicate a rescue helicopter will arrive at dawn on the fifth day if the landing zone remains clear. Each night, the infected grow stronger, culminating in a massive mutated boss on Night 5 attempting to overwhelm the survivor before rescue arrives.

## 3.3 Design Goals

From brainstorming, we established three guiding principles:

- **Accessible but Deep**: Easy to learn (intuitive controls, clear visual cues) but rewarding to master (mutation patterns, optimal routes, crafting synergies). Difficulty modes further ensure accessibility for newcomers while providing a real challenge for veterans.
- **Variety**: Adaptive mutations, randomized resource placement, randomized zombie spawns, and varying mutation timing ensure no two runs follow the same pattern.
- **Meaningful Choices**: Players constantly make decisions about where to explore, what to craft, when to fortify, how to counter mutations, and how to spend their earned points.

# 4. Core Mechanics and Gameplay Loops

## 4.1 Core Mechanics

The game is built on four interconnected core mechanics that work together to create the complete experience:

### Movement and Combat

Players control a character from a top-down view using WASD for movement and mouse for aiming and shooting. Combat feels responsive with clear visual and audio feedback. Different weapons have distinct characteristics: pistols are accurate and efficient, shotguns deliver powerful short-range damage, and automatic weapons handle crowds but consume ammunition quickly.

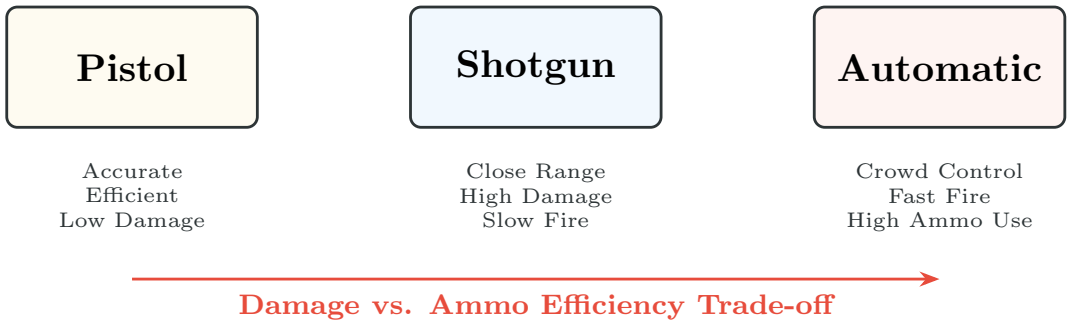


Figure 3: Weapon variety creates strategic choices based on situation and available resources.

### Day/Night Cycle

The game consists of 5 day/night cycles. Each cycle has a day phase and a night phase. During the day, zombies are dormant or weakened. Players scavenge materials, explore new areas, craft items, and build defenses. A visible timer and environmental cues (changing light, setting sun) warn when night approaches.

When night falls, zombie waves attack. Players must survive until dawn. Surviving until dawn completes that night and advances the player to the next cycle.

**Why 5 Nights?** Each cycle lasts 6 to 7 minutes (3-minute day, 3.5-minute night), totaling 30 to 35 minutes per run. This is long enough to feel meaningful, short enough to encourage replays. Players can pause anytime. Five nights provide a three-act structure: Night 1 as tutorial, Nights 2 to 4 as escalation, and Night 5 as climax with a boss fight.

The following table outlines what each night introduces and how difficulty escalates. Each night is designed to feel like a distinct level with its own identity:

| Night | Zombie Stats | What's New This Night | Milestone Unlock (at Dawn) |
|---|---|---|---|
| **1** | Base stats | Tutorial night; small waves (5 to 10) of basic zombies only. Players learn core mechanics | Shotgun unlocked in shop; barricade crafting recipe |
| **2** | +25% HP, +15% DMG | Medium waves (10 to 18); zombies from multiple directions. First mutation type activates (randomized per run) | Automatic rifle available; trap crafting unlocked |
| **3** | +50% HP, +30% DMG | Large waves (15 to 25); Runner and Exploder zombies introduced. Multiple mutations active | Grenade launcher and plasma cutter unlocked; new map zone opens |
| **4** | +75% HP, +50% DMG | Heavy waves (20 to 30); elite (Tank) zombies appear. All base mutation types possible; coordinated attacks | Flamethrower unlocked; advanced barricade upgrades; explosive ammo; full shop inventory |
| **5** | +100% HP, +100% DMG | **Final Night.** Waves of unique enemy types not seen in earlier nights, culminating in a **single large boss** (see below) | Victory screen; final score recorded; run completion badge |

Table 3: Night-by-night progression showing what each night introduces and what players unlock at dawn. Night 5 serves as the climax with unique monsters and a boss fight.

**Night 5 Boss Encounter:** The final wave of Night 5 spawns a single large boss that appears alone. The boss has three phases: (1) charges at the player with telegraphed rushes, (2) summons a wave of minions while retreating, and (3) enrages with faster attacks and reduced telegraph windows. It is primarily a DPS check. The player must have accumulated enough firepower and resources across the run to burn through its massive health pool before dawn.


Figure 4: Day/night cycle creates alternating phases of preparation and survival. This cycle repeats across 5 nights with escalating difficulty.

### Dawn Phase (Between Nights)

When the player survives until dawn, the game transitions to the **Dawn Phase**, a player-paced between-night screen (no time limit, typically 30 to 60 seconds) with two parts:

1. **Summary & Shop**: View statistics and spend points on ammo, health, traps, and stat boosts
2. **Loadout & Preview**: Select equipment and see next night's warnings (e.g., "Night 5: Flanker mutation detected")

### Resource and Crafting

Materials are obtained from two sources: **fixed loot zones** during day (hardware stores contain scrap/wood, pharmacies contain chemicals, with randomized quantities each run) and **zombie drops** during night (basic zombies approximately 15% drop rate, elite enemies approximately 40 to 50%). This creates risk-reward: aggressive play yields resources but exposes danger.

The four material types are scrap metal, wood, chemicals, and electronics. Players craft items at any time during the day phase using a crafting menu with visible recipes. All recipes are available from the start (there is no recipe discovery), so the constraint is always about having enough materials, not knowledge.

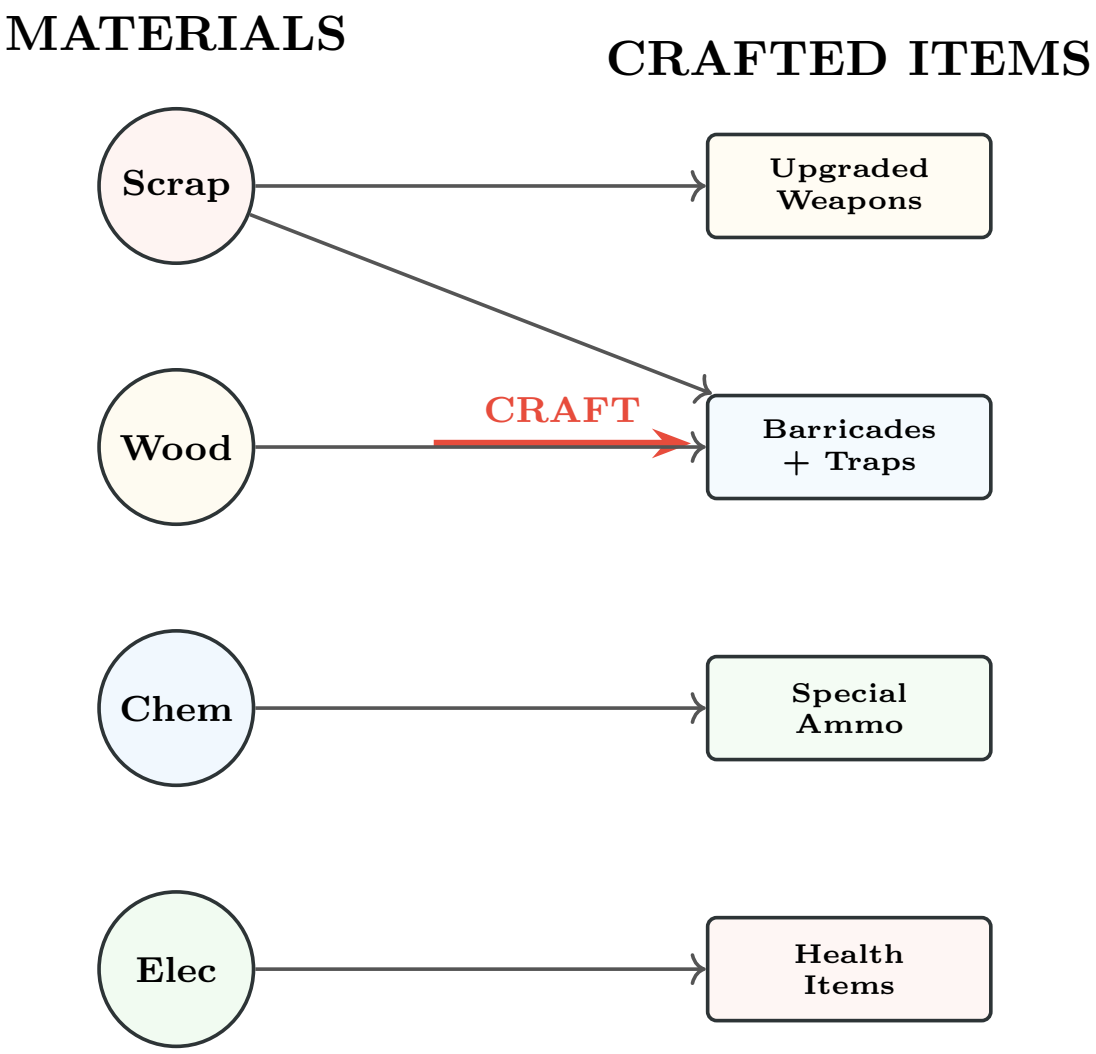


Figure 5: Resource collection and crafting system showing how materials are combined to create items for offense or defense.

| Item | Recipe | Effect |
|---|---|---|
| **Barricade** | 2 Scrap + 1 Wood | Blocks a doorway or path; absorbs zombie damage until destroyed |
| **Spike Trap** | 1 Scrap + 1 Wood | Placed on ground; damages zombies that walk over it |
| **Health Kit** | 2 Chemicals + 1 Electronics | Restores a large portion of player health |
| **Incendiary Ammo** | 2 Chemicals + 1 Scrap | Applies burn damage over time to hit zombies |
| **Explosive Ammo** | 2 Chemicals + 2 Scrap | Area-of-effect damage on impact (unlocked Night 4) |
| **EMP Trap** | 2 Electronics + 1 Chemicals | Slows all zombies in an area for several seconds |

Table 4: Core crafting recipes. All recipes are visible from the start; the constraint is material availability, not knowledge.

Limited resources force decisions each cycle: offensive upgrades (special ammo, traps) or defensive investments (barricades, healing). Because zombie drops are randomized, players who run low on materials during the day can attempt to recover some through aggressive night combat, but at considerable risk.

**Points System and Progression**

Players earn points through zombie kills, surviving nights, discovering hidden areas, and completing optional challenges (e.g., "Survive Night 5 without using barricades"). Points serve as the game's currency and progression driver:

- **Weapon Unlocks**: Points can be spent to unlock new weapons such as the grenade launcher, plasma cutter, and flamethrower at the Dawn Phase shop. Weapons unlock progressively within each run as the player survives more nights and earns more points. Every new run starts from scratch with the base loadout.
- **Upgrade Purchases**: Between nights, players can spend points at a shop to purchase ammo refills, health kits, trap components, and temporary stat boosts (e.g., increased movement speed or reload speed for the next night).
- **Challenge Rewards**: Completing specific in-game challenges (e.g., "Kill 50 zombies in one night," "Survive 3 nights on Hard without healing") awards bonus points.
- **Leaderboard**: The leaderboard is active from the moment the player starts a run. There is no progression gate or minimum night requirement. Every run is automatically recorded. To differentiate player performance and encourage replayability, the leaderboard uses a scoring multiplier system: a difficulty multiplier (Hard 1.5x, Normal 1.0x, Easy 0.75x) and a time bonus (clearing nights faster awards additional points, reward-

ing efficient play and map knowledge). This means two players who both complete all 5 nights can have very different leaderboard scores depending on difficulty and speed. Combined with 3 selectable maps, this creates meaningful variety and competition across the leaderboard.

### Adaptive Mutations

The mutation system is our core innovation. The game tracks player behavior: preferred weapons, movement patterns (stationary vs. mobile), frequently visited areas, and strategies. Based on this data, zombies evolve mutations that counter dominant strategies:

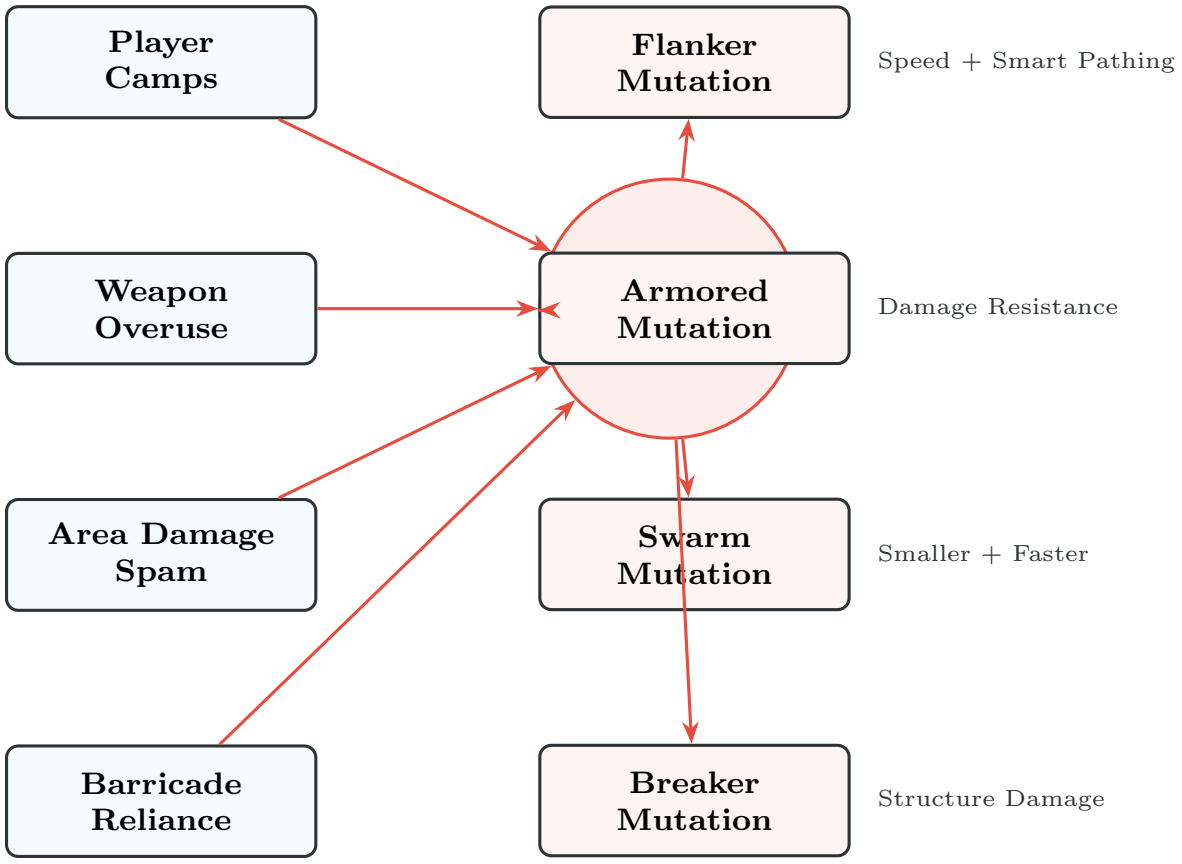


Figure 6: Adaptive mutation system tracks player behavior and generates countering zombie types to prevent dominant strategies.

- **Armored**: If players rely heavily on one weapon, zombies develop resistance to that damage type
- **Flanker**: If players camp in one location, zombies gain speed and smart pathfinding to attack from unexpected angles
- **Swarm**: If players use area-damage weapons, zombies become smaller and faster, harder to hit in groups
- **Breaker**: If players rely on barricades, zombies gain enhanced structure-destroying abilities

## 4.2 Maps, Randomness, and Replayability

Before starting a run, the player selects one of three maps, each with a distinct layout and strategic profile:

- **Town Center**: Streets, shops, and open plazas. A balanced layout with moderate cover and diverse resource zones. Good for learning the game.
- **Industrial District**: Warehouses, narrow corridors, and tight chokepoints. Favors defensive and barricade-heavy strategies but limits escape routes.
- **Suburban Outskirts**: Houses, yards, and wide open spaces. Rewards mobile playstyles but offers less natural cover against large waves.

Each of the three maps serves as a persistent arena across all 5 nights. The map layout remains constant, but zombie difficulty, wave composition, and available resources escalate with each night, creating 5 distinct difficulty stages within the same physical space.

Within each map, the 5-night structure remains consistent, but each run features significant randomness:

- **Resource Placement**: The locations where materials spawn are randomized each run. A gun shop may have plentiful ammo one run and be nearly empty the next, forcing players to adapt their scavenging routes.
- **Zombie Spawns**: Spawn points and wave compositions vary between runs. Players cannot memorize where enemies will come from.
- **Mutation Timing**: Which mutations appear and on which nights differs each playthrough. One run might see Flankers on Night 3 while another introduces Swarms first.
- **Loot Quality**: The rarity and type of discoverable items changes, meaning players must work with whatever resources are available rather than following a fixed optimal path.

Three maps, three difficulty modes, and per-run randomness combine to give the game strong replayability. Each session feels distinct even when the player has mastered the core mechanics.

## 4.3 Core Loop (Single Cycle)

The core loop represents one complete day/night cycle:

| Phase | Action | Player Experience |
|---|---|---|
| **DAY** | Scavenge materials from the map | Exploration, discovery, risk assessment |
| **DAY** | Craft weapons, traps, and barricades | Planning, creative problem-solving |
| **DAY** | Fortify defensive positions | Preparation, anticipation |
| **TRANSITI** | Night approaches (visual/audio cues) | Rising tension, urgency |
| **NIGHT** | Survive zombie waves until dawn | Intense action, skill expression |
| **NIGHT** | Earn points; observe mutations | Reward, learning, adaptation |
| **DAWN** | Survive until dawn; view summary | Relief, satisfaction, review performance |
| **DAWN** | Visit shop; spend points | Strategic investment, trade-off decisions |
| **DAWN** | Select loadout; preview threats | Planning, anticipation, preparation |

Table 5: Core gameplay loop phases. This loop repeats across all 5 nights.

## 4.4 Long-Term Loop (Multiple Cycles)

The long-term loop spans all 5 day/night cycles and across multiple runs:

- **Night Milestones**: Each survived night rewards the player with a specific unlock during the Dawn Phase (see Table 3). These milestones give each night a distinct purpose. Players are not just surviving, they are progressing toward concrete rewards.
- **Escalation**: Zombie waves grow larger, zombie stats increase, and mutations compound. Night 1 features basic zombies; by Night 3, players face multiple mutation types simultaneously; Night 5 features unique enemy types and concludes with a single large boss that serves as a final DPS check, testing whether the player has accumulated enough firepower and resources across the run.
- **Ongoing Adaptation**: The mutation system responds to player behavior, requiring continuous strategy evolution. Mastery means understanding and anticipating the mutation system.
- **Fresh Runs**: Every run starts from scratch with base loadout (no cross-run persistence), ensuring fair competition based on skill, not grinding.
- **Leaderboard and Challenges**: The leaderboard is active from the first run. Every attempt is recorded, with scores scaled by difficulty multiplier (Hard 1.5x, Normal 1.0x, Easy 0.75x) and time bonuses. Three maps provide distinct leaderboard competition.

Optional challenges provide additional goals beyond the main campaign.

## 4.5 Feedback and Rewards

Our feedback systems keep players informed and motivated:

- **Immediate Feedback**: Hit markers, damage numbers, kill confirmations, and weapon sounds provide instant clarity on combat effectiveness
- **Environmental Feedback**: Sky color, lighting, and audio cues communicate time of day and transitions
- **Mutation Warnings**: At night start, a warning displays active mutations, allowing strategic adjustment
- **End-of-Night Summary**: During the Dawn Phase, players see detailed statistics: zombies killed, resources used, mutations faced, points earned, and any new unlocks or challenge completions
- **Points Display**: A persistent HUD element shows current points during gameplay. The Dawn Phase shop interface clearly displays available purchases, their costs, and which items are newly unlocked at this milestone

## 4.6 Death and Retry

When the player's health reaches zero during any night phase, the run ends immediately. The game transitions to a Game Over screen that displays the run's full statistics: night reached, total zombies killed, points earned, mutations faced, and challenges completed during the run. The run is automatically submitted to the leaderboard regardless of how far the player progressed.

From the Game Over screen, the player can choose to retry immediately (starting a completely fresh run from Night 1 with the base loadout) or return to the main menu. No progress carries between runs. Every attempt starts from scratch.

# 5. Paper Prototype and Playtesting

## 5.1 Paper Prototype Description

Before coding, we built a tabletop paper prototype to test our core mechanics. The prototype tested three hypotheses: (1) day/night pacing feels engaging, (2) resource decisions are meaningful, and (3) mutations add variety without frustration.

**Components:**

- **Map & Tokens**: 10×10 grid with labeled zones; player token with stat card; color-coded zombie tokens
- **Cards**: Resource cards (materials), Wave cards (zombie spawn), Mutation cards (behavior modifiers), Crafting sheet (recipes)
- **Dice**: Combat resolution and random generation

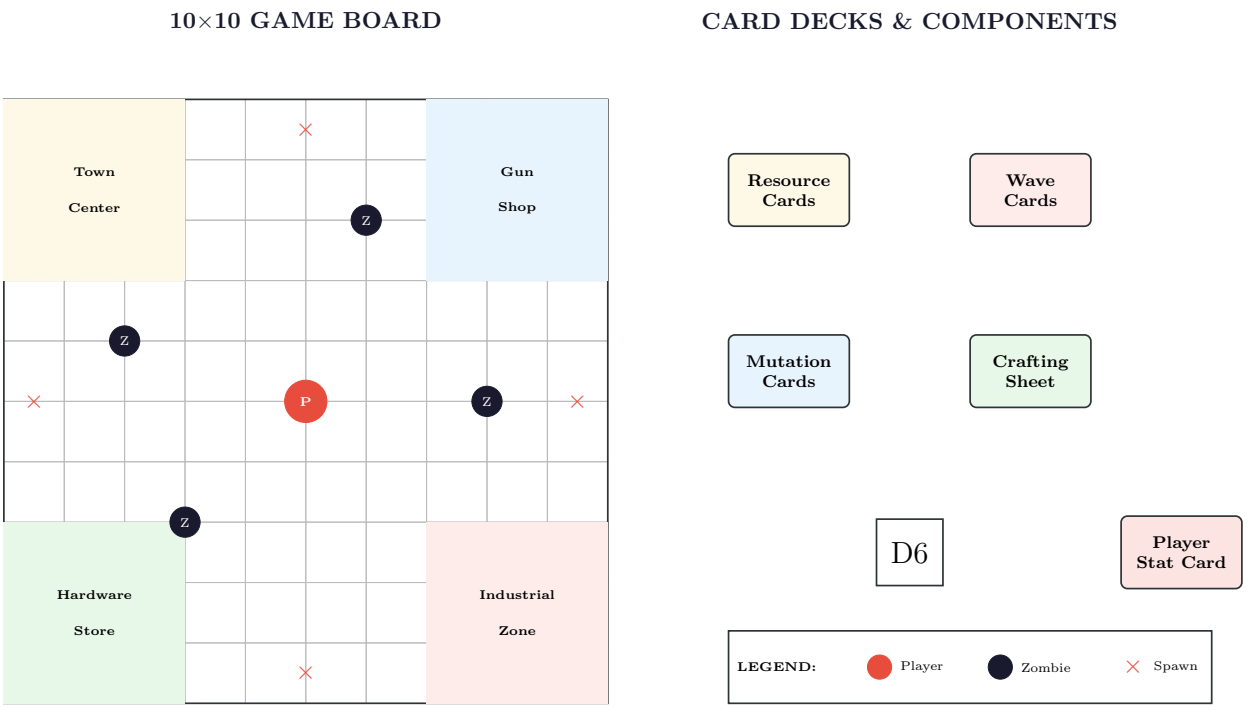


Figure 7: Paper prototype components: 10×10 grid board with labeled zones, tokens, and card decks.

**Turn Structure:**

Each round has a day phase (7 action points for movement, scavenging, or crafting) and a night phase (zombies advance, combat resolved with dice). The action point limit forces prioritization, mirroring the digital version's time pressure.

## 5.2 Playtesting Process

We conducted 3 playtesting sessions over 5 days with a total of 8 unique participants (4 internal team members in Session 1, then 4 external classmates split across Sessions 2 and 3). External participants were chosen because they had no prior knowledge of our design intent, providing unbiased reactions. Each session lasted 30 to 45 minutes and covered 3 to 5 day/night cycles.

**Testing Methods:**

- **Observation**: A dedicated team member watched each session without intervening, recording decision patterns, points of confusion, and emotional reactions (frustration, excitement, hesitation)
- **Think-Aloud**: Players verbalized their thought process during play, revealing how they weighed trade-offs and what information they felt they lacked
- **Post-Session Questionnaire**: After playing, participants rated pacing, clarity, enjoyment, and difficulty on a 1 to 5 scale and answered open-ended questions about their most and least enjoyable moments

## 5.3 Findings and Adjustments

The following table maps each key finding directly to the design change it prompted:

| Finding | Evidence | Design Change |
|---|---|---|
| Day phase felt too short | 6/8 players could not explore and craft in one day (5 action points). Average questionnaire score for pacing: 2.1/5 | Increased from 5 to 7 action points. Added fast-travel: discovered zones cost 1 point to revisit |
| Mutation cards were confusing | 4/8 players required mid-game rule clarification. Think-aloud revealed players guessing at effects | Rewrote all mutation cards with explicit numerical effects. Added a mutation reference sheet visible throughout play |
| Combat felt too random | Players expressed frustration at miss streaks (5+ required on d6). 3/8 rated combat fairness below 2/5 | Lowered hit threshold from 5+ to 4+ for basic zombies, making hits more consistent while keeping tougher zombies harder |
| No sense of time pressure | Players lost track of remaining day turns. Observation showed no urgency in early day turns | Added a visible day/night countdown timer, creating tangible urgency in the final turns |

Table 6: Playtesting findings mapped to specific design changes. Each change was implemented and re-tested in subsequent sessions.

**What Worked Well (Validated):**

- **Day/Night Rhythm**: 7/8 players rated pacing variety positively after adjustments. The day phase provided a "breather" that made night phases feel more impactful
- **Mutations**: Players actively discussed counter-strategies during think-aloud, confirming the system adds variety without feeling arbitrary
- **Resource Decisions**: Observation showed genuine deliberation at crafting moments. Players debated aloud whether to save materials or spend immediately, confirming meaningful trade-offs

# 6. Organization and Reflection

## 6.1 Design Journey

Our process followed iterative game development: theory application (MDA, Bartle's), paper prototyping validation, and data-driven refinement. The MDA framework identified target emotions and guided mechanic design. Bartle's player types shaped audience focus. Paper prototyping revealed calibration issues, driving three iterations to achieve balance.

## 6.2 Challenges and Key Tradeoffs

**Scoping Down (10 to 5 Nights):** Playtesting revealed 10 nights was too long. Players lost focus after 30 minutes. Cutting to 5 nights meant discarding designed content but resulted in a tighter experience where every night has clear identity and purpose.

**Fresh Runs vs. Persistent Progression:** We chose fresh runs over cross-run persistence to maintain leaderboard fairness. This sacrifices a retention hook but ensures competitive integrity where skill, not time invested, determines ranking.

**Mutation System Complexity:** The adaptive system is our core differentiator but technically challenging. We accepted it may not ship fully in Deliverable 2, planning it for Deliverable 3 (final). We mitigated risk by ensuring the base game has sufficient variety (3 maps, randomized loot, 5 distinct nights) to stand alone.

## 6.3 Key Lessons

- **Theory vs. Practice**: Frameworks provided direction, but playtesting revealed divergent player behavior. Both were essential.
- **Constraints Breed Creativity**: The day/night structure solved three problems (pacing, resources, difficulty) simultaneously.
- **Scope Discipline**: Cutting features was painful but always improved the design. We learned to ask "does this strengthen the core loop?"
- **Team Alignment**: Shared frameworks created common vocabulary. Playtesting evidence resolved disagreements faster than debate.

## 6.4 Implementation Plan

**Phase 1: Deliverable 2 (February 11 to March 25)**

We will deliver a working Unity prototype with:

**Core Features:**

- WASD movement, mouse-aimed shooting, responsive controls
- Basic zombie AI with pathfinding and aggression states
- Day/night cycle (3-minute day, 3.5-minute night) with lighting transitions

- Wave spawning with progressive difficulty (5 to 30+ zombies) across 5 nights
- Three distinct maps (Town Center, Industrial District, Suburban Outskirts) with clear navigation
- Resource management (health packs, ammo pickups, risk-reward placement)
- Points system with between-night shop for upgrades and unlocks
- Score tracking, wave progression, leaderboard, and personal records
- Three difficulty modes (Easy, Normal, Hard)
- Narrative context (radio transmissions, environmental details) and atmospheric audio
- Essential UI (health, ammo, timer, wave counter, points display, shop interface)

**Development Plan:**

- Weeks 1 to 3: Core systems (player, AI, day/night, UI)
- Weeks 3 to 5: Integration (level design, resources, progression, points/shop)
- Weeks 5 to 6: Polish (narrative, playtesting, difficulty tuning, Windows build)

**Team Division:** Player systems (Simranjeet), AI systems (Abdelrahman), Level design (Koroush), UI and audio (Ashraf)

### Phase 2: Advanced Systems (Deliverable 3, Final)

For the final deliverable:

- Advanced crafting system (4 materials, 7 to 10 craftable items with complex recipes)
- Full adaptive mutation system (behavior tracking, 4 mutation types with stat variations)
- Additional zombie types (Tank, Runner, Exploder) with unique behaviors
- Expanded challenge system and leaderboard features
- Enhanced narrative (discoverable lore, multiple radio transmissions) and audio polish

**Rationale:** This approach validates core gameplay first, then adds complexity. By focusing Phase 1 on fundamental survival mechanics, we ensure Deliverable 2 is complete and polished rather than partially implemented.

# 7. Conclusion

This proposal presents Deadlight: Survival After Dark, a 2D zombie survival game combining wave-based gameplay with day/night pacing and adaptive mutations across 5 escalating nights.

For Deliverable 2 (March 25), we commit to a working Unity prototype with core survival mechanics, three maps, three difficulty modes, points/shop progression, and leaderboard support. The mutation and advanced crafting systems are planned for Deliverable 3 (final), ensuring we deliver quality over quantity at each milestone.

Our design applies MDA and Bartle's frameworks, manages challenge through alternating phase intensities, and was validated through paper prototyping. This iterative approach demonstrates understanding of game design principles while showcasing original thinking through our day/night cycle and adaptive systems.