Technical Design Document

Section 1 – List of Features Captured from GDD

1.1 List of Features Based on the Game Design Document:

- Third person
- Game world, including
  - 3D objects
  - Characters
  - Weapons
  - Buildings with walls, corridors, doors, stairs, rooms
- Windows platform deployed
- Background story
- Opening scene
- Different levels:
  - Varying difficulty
  - Varying challenge
  - New levels introduce new weapons
- Multiplayer
- Different destructible weapons
- Audio and sound effects
- Variety of enemies (two types of zombies)
- Realistic AI of zombies
- Scoring system
- Comprehensive/informative HUD
- Menus
- Lighting effects
- Interactive objects
  - Staff ID cards
  - Vending machines

Section 2 – Choice of Game Engine

The game engine that has been chosen is Unreal Development Kit (UDK). UDK is a development tool set, which implements the Unreal engine for the users to edit and manipulate. Some of the features that UDK possesses are:

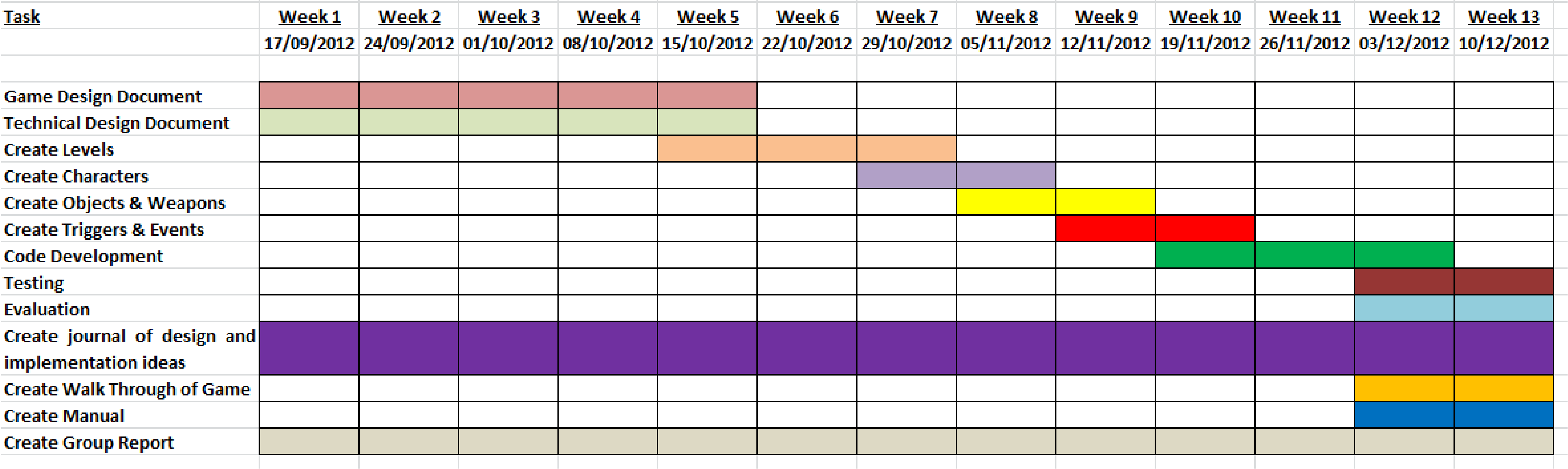
- Animation
- AI
- Audio system
- Editing of the game environment
- Kismet (visual scripting system)
- Physics support with physics assets

- Rendering
- Unreal scripting

The reasons that this game engine was chosen was because after trying three other game engines, including Cry Engine, Unity and Torque, UDK was found to be the most flexible. Furthermore, all three team members had previous knowledge of UDK and it is the most recognised by different companies. In addition, UDK is comprehensive allowing for different plugins, which is going to be useful when various objects are made using other art tools.

Section 3 – Schedule

The schedule for the development of the game is shown below:



Task	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13
	17/09/2012	24/09/2012	01/10/2012	08/10/2012	15/10/2012	22/10/2012	29/10/2012	05/11/2012	12/11/2012	19/11/2012	26/11/2012	03/12/2012	10/12/2012
Game Design Document	■	■	■	■	■								
Technical Design Document	■	■	■	■	■								
Create Levels					■	■	■						
Create Characters							■	■					
Create Objects & Weapons								■	■				
Create Triggers & Events									■	■			
Code Development										■	■	■	
Testing												■	■
Evaluation												■	■
Create journal of design and implementation ideas	■	■	■	■	■	■	■	■	■	■	■	■	■
Create Walk Through of Game												■	■
Create Manual												■	■
Create Group Report	■	■	■	■	■	■	■	■	■	■	■	■	■

- Every member of the group will contribute to every task
- Each task will have a lead group member
- This lead group member will be in charge of that particular task being done and will contribute to that task more than the other group members
- The lead group members will be based on team members strengths and previous knowledge

Section 4 – High-level Diagrams to Illustrate Software Design

4.1 Layout Diagrams:

- The layout diagrams illustrate the layout of the different floors in the game
- These different floors in the game are the different levels of the game
    - Top floor = level one
    - Second floor = level two
    - First floor = level three
    - Ground floor = level four
- The layout of the top floor, second floor, and first floor is the same, but what is contained in the different rooms may vary
- This is shown in Figure 1 below

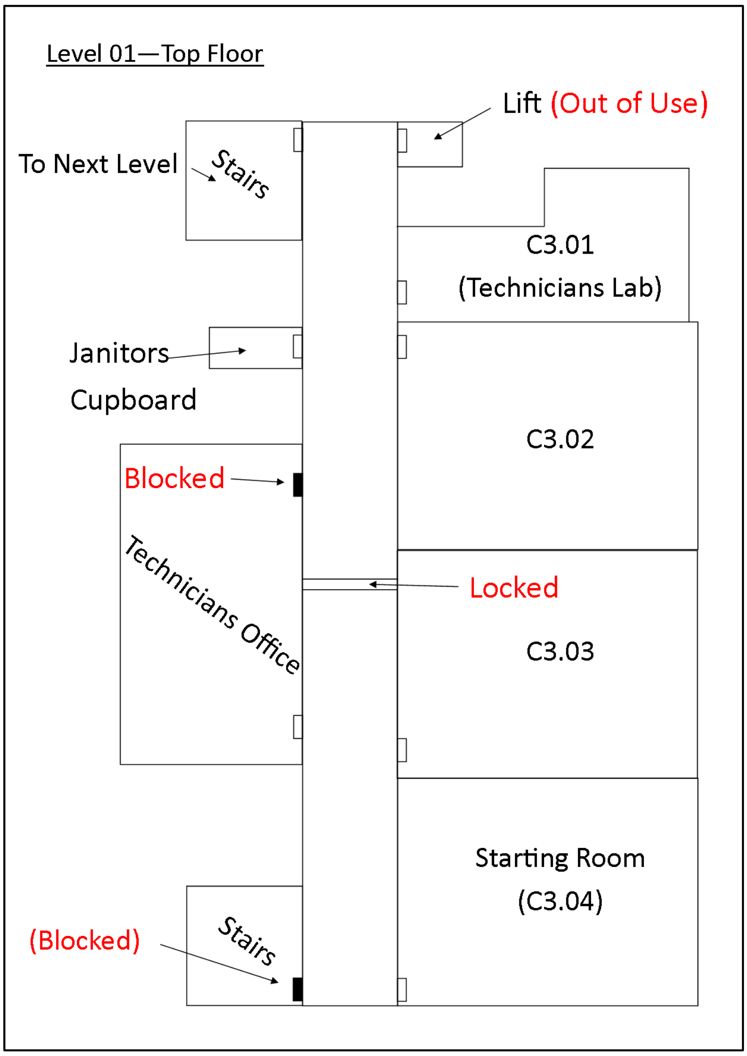


Figure 1 Layout of Top, Second and First Floors

- The layout of the ground floor is different, and this is shown is Figure 2 below

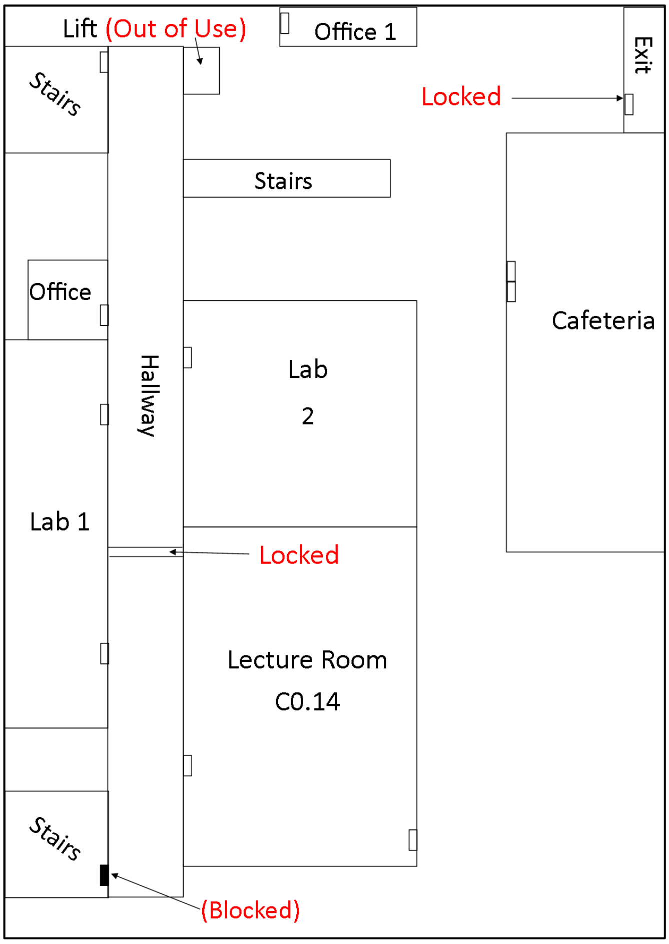


Figure 2 Layout of Ground Floor

4.2 Technology Diagram:

- The technology diagram indicates the technology that is going to be used for different aspects of the game and is displayed in Figure 3

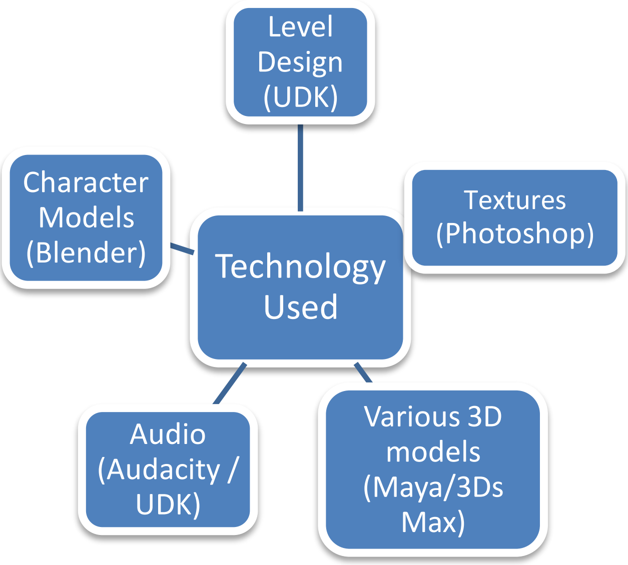


Figure 3 Technology Diagram

4.3 Design Diagram:

- The design diagram displays the design team involved in the game, and is shown in Figure 4

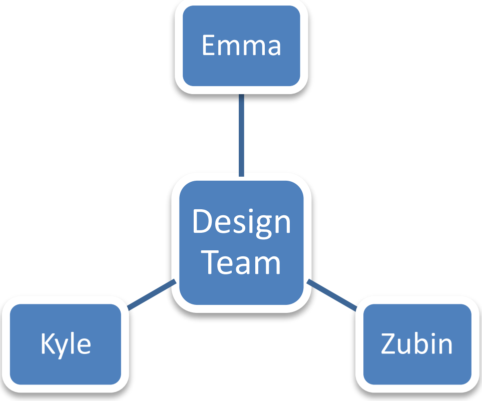


Figure 4 Design Team Diagram

4.4 Implementation Diagram:

- The implementation diagram illustrates the flow of the different stages of the creation of the game
- It also includes what weeks each stage will take place at
- This diagram is displayed in Figure 5

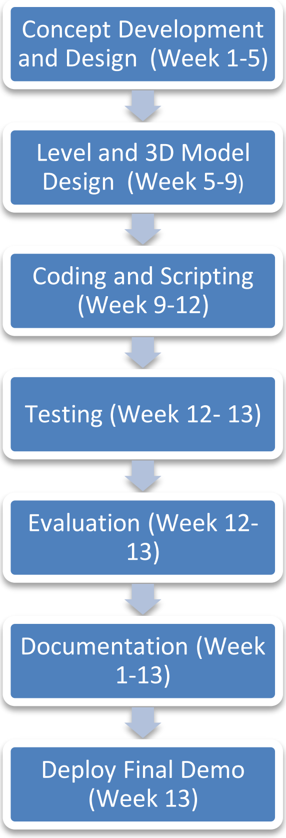

Concept Development and Design (Week 1-5)
Level and 3D Model Design (Week 5-9)
Coding and Scripting (Week 9-12)
Testing (Week 12- 13)
Evaluation (Week 12-13)
Documentation (Week 1-13)
Deploy Final Demo (Week 13)

Figure 5 Implementation Diagram

4.5 Gameplay Diagram:

- This gameplay diagram is a simple flow chart of how to play the game, which is shown in Figure 6

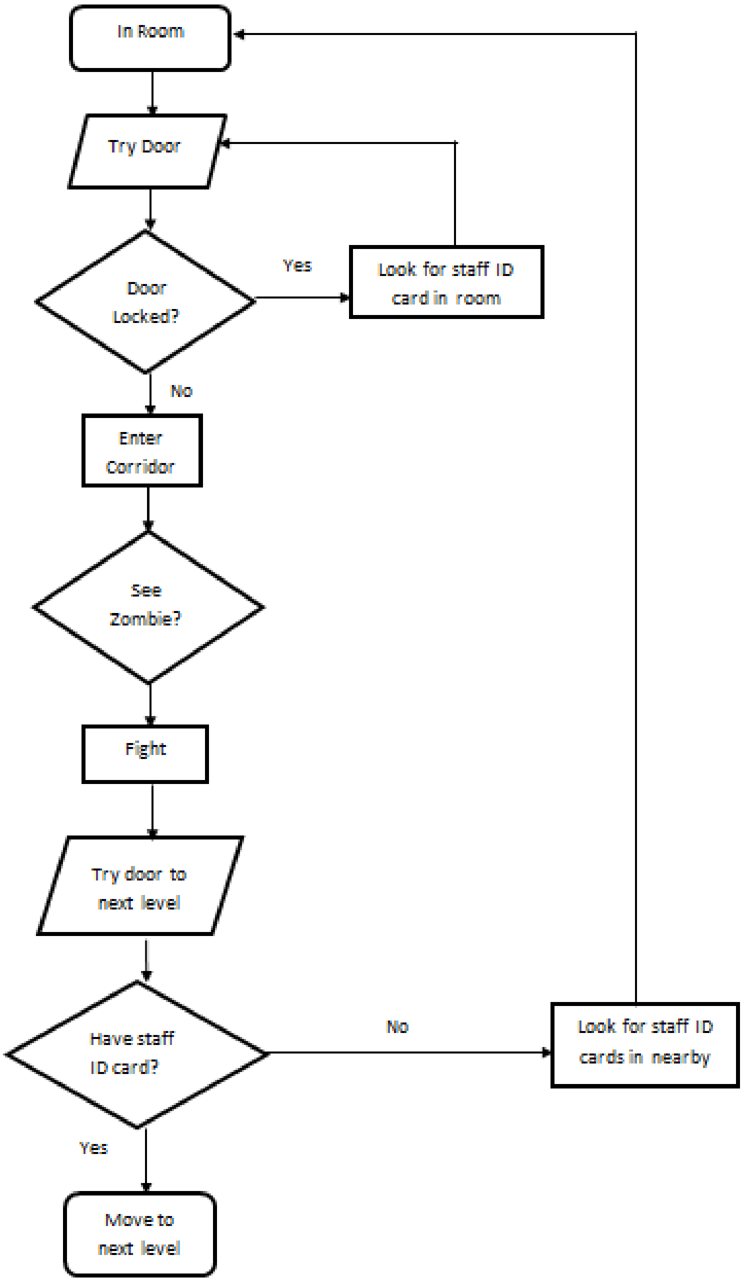


Figure 6 Gameplay Diagram

Section 5 – Art Tools

5.1 Photoshop:

5.1.1 Version:

- CS5 or CS6

5.1.2 About Photoshop:

- Graphics editing program
- Allows user to manipulate images using a variety of tools, e.g.:
  - Brush
  - Fill
  - Clone stamping
  - 3D object rotations
- Supports transparent images:
  - This is beneficial as we will be implementing objects such as windows and glasses within our computer game (texture mapping)

5.1.3 What it will be Used For:

- Textures e.g. walls
- General appearance of buildings and objects

5.2 3DS Max:

5.2.1 Version:

- 2012

5.2.2 About 3DS Max:

- Design software providing integrated 3D modelling, animation and rendering tools
- Features for this game include:
  - Shaders
  - Rendering global illumination
  - General keyframing - keyframing will be used to animate our characters and enemies within the game

5.2.3 What it will be Used For:

- Animate and model objects i.e. keyframing

5.3 Blender:

5.3.1 Version:

- 2.64a

5.3.2 About Blender:

- Open source 3D content creation suite
- Features include:
  - Character modelling
  - Solid modelling
  - Animation
  - Rendering

5.3.3 What it will be Used For:

- Modelling characters

5.4 Audacity:

5.4.1 Version:

- 2.0.2

5.4.2 About Audacity:

- Audio editor for recording, slicing and mixing audio

- Allows live audio to be recorded and tapes and records to be converted into digital recordings

5.4.3 What it will be Used For:

- Editing, mixing and recording sound effects and speech

Section 6 – 3D Objects, Terrain, & Scene Management

6.1 3D Objects:

- Labs:
  - Computers
  - Desks
  - Chairs
  - TVs
  - Computer keyboards
  - Computer mouse
  - Fire extinguishers
  - Overhead projectors
  - Printers
  - Bins
  - Bags
  - Staff ID cards
- Technicians office/ any office:
  - Chairs
  - Desks
  - Computers
  - Computer keyboards
  - Computer mouse
  - Books
  - Mugs
  - Fire extinguishers
  - Printers
  - Bins
  - Bags
  - Staff ID cards
- Cafeteria:
  - Chairs
  - Tables
  - Fire extinguishers
  - Vending machines
  - Bins
  - Plates
  - Cups
  - Cutlery
  - Tills
  - Trays

  - Bags
  - Guitar
  - Tennis racket
  - Tennis ball
  - Staff ID cards
- Hallway:
  - Vending machine
- Lecture room:
  - Chairs
  - Desks
  - Front desk
  - Big screen
  - Projector
  - Fire extinguisher
  - Bins
  - Bags
  - Staff ID cards
- Stairs:
  - Individual stairs
  - Banisters

6.2 Terrain:

- Indoors:
  - John Dalton building interior
- Outdoors (view through windows):
  - Motorway
  - Roads
  - Buildings
  - Trees
  - Sky
  - Fog

6.3 Scene Management:

- The responsibility of the scene management system is the efficient rendering and loading of complex scenes
- It includes components:
  - Culling & occlusion – not loading objects in memory unless they are seen by the player
  - Level Of Detail (LOD) – creating lower detailed models to use when distance is far and higher level models at nearer distances
  - Clipping – cutting parts of objects which are not within the field of view (FOV) of the player

Section 7 – Collision Detection, Physics & Interaction

7.1 Collision Detection:

- This is where there will need to be detection of the intersection of two or more objects within the game
- Characters cannot walk through objects – objects must remain solid
- Characters will need to jump over items or walk round items as characters cannot walk through the items
- Collision detection will be needed for when:
    - Characters hit the zombies with weapons or their fists
    - Zombies and characters collide
    - Zombies hitting into walls, doors or other objects
    - Items falling
    - Objects and weapons hitting into each other
- To enforce collision detection in the game:
    - Bounding boxes can be used
    - UDK can be used

7.2 Physics:

- This is the component that makes the game real
- Objects and players must react to player input and player decision (e.g. opening doors)
- Must be realistic (how it would be in real life)
    - Items/objects fall over realistically
    - Items/objects smash realistically
- Friction and gravity
- Physics will be needed for:
    - Picking up items
    - Dropping items (gravity & speed)
    - Items that break shatter
- To enforce physics in the game:
    - UDK can be used with physics assets implemented onto objects

7.3 Interaction:

- This is how characters interact with the game world
- Interaction with objects/items:
    - Opening doors
    - Picking up weapons
    - Interacting with the vending machines
    - Interacting with zombies
    - Collecting the staff ID cards – picking them up and using them to unlock doors
- Zombies interaction:
    - Zombies remain following a path unless triggered by characters presence
    - Once triggered, zombies path changes to follow character until it cannot see the character anymore

- To enforce interaction in the game:
    - UDK can be used with triggers

Section 8 – Game logic & Artificial Intelligence

Section 8.1 Game Logic:

- Use Kismet & Matinee within UDK

Section 8.2 Artificial Intelligence:

- The zombies path will use AI
    - They will loop around until they see the playable character
    - When they have seen the playable character then they will continue to go after them

Section 9 – Networking

9. 1 Multiplayer hosting service:

- Every person has a playable character
- Cooperative gameplay
- Maximum three people

Section 10 – Audio & Visual Effects

Section 10.1 Audio Effects:

- Record effects using Audacity
- Free sounds from the internet
- Text-to-speech (free)
- Audio in UDK Content Browser

Section 10.2 Visual Effects:

- Free visual effects from the internet
- Visual effects in UDK Content Browser

Section 11 – Delivery Platform & Hardware/Software Requirements

Section 11.1 Delivery Platform:

- PC Windows platform

Section 11.2 Hardware Requirements:

- Dual core processor
- 1 GB RAM
- Keyboard
- Mouse
- Monitor

- Speakers
- Hard drive
- Graphics
- CD Drive/USB

Section 11.3 Software Requirements:

- Windows XP, Windows Vista or Windows 7
- Direct X version 9, 10 or 11