

Unreal Tournament: Roads & Pathways

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Research Question

How does the way different roads and pathways connect to each other influence how the player moves around the level?

Purpose

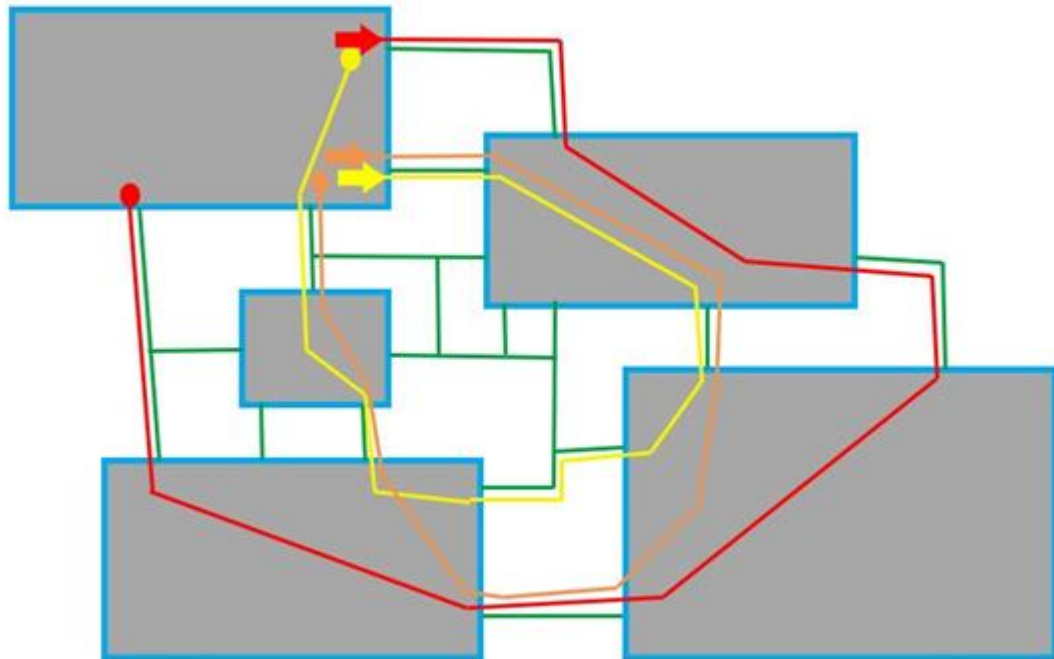
The goal of this research is to find out what a level needs for movement to flow well, and how we can make sure that our levels flow as well as default UT levels.

Observations

These observations were made first watching a video of a professional player playing the game, and then playing the game myself

- There is a lot more verticality than in most other shooters. Roads go up and down and cross over each other. Players are jumping down from ledges and use jump pads to get back up on them.
 - Because pathways cross over each other, the amount of potential pathways is significantly bigger than just following the roads you see. Roads afford for players creating their own pathways.
- There is almost non-stop movement.
 - This is probably caused not only by the game's default high movement speed and different movement abilities, but also by the level's affordance to flow through the level with ease, almost never needing to completely come to a stop because of the aforementioned ability to find new paths.
- The level provides opportunities for both chasing and escaping.
 - This is to due close-quarter hallways where you can easily lose a target if you don't manage to shoot them immediately.
 - I noticed that, probably because of this, most of the killing isn't happening in these hallways, but in larger open spaces.
- Movement flows a lot in the same, circular direction. The player seems to very often take the same general path throughout the level, circling around the centre, but does so using different paths.

A rough (exaggerated) sketch:



The red, yellow, and orange lines indicate the different paths a player could take throughout the level. This does not take into account the possibilities added by verticality. The way I see it, it flows into the same direction (in this case, clockwise around the level), but the player is able to take different pathways, and of course can choose to go in which direction.

- As seen in the sketch above, levels seem to be built using hallways and a few larger open spaces. In these open spaces, most pickups can be found, and is also where players will meet most often.
- Verticality seems to offer even more possible paths for the player to take. Using jump pads or jumping down onto another path seems to be like taking a vertical hallway to another path.
 - There seems to be a whole lot more to verticality that I still have to research, so I will not go in-depth in this research entry.

Conclusion

- The amount of different paths and how they connect afford for a lot of smooth flowing movement around the level, never requiring the player to stop. They tend to circle around the same general direction – sometimes turning around to go in the opposite direction or to chase an enemy – but always taking different routes provided by the abundance of different roads. Having many different roads that also lead into different roads seems integral to a good Unreal Tournament map and will probably be a requirement for a level that has good movement flow.

- UT levels all seem to have a few larger open spaces that are connected by hallways, roads, or other pathways; these larger spaces tend to be the points where players meet most often. No matter what path they take, they will always end up in one of these spaces and encounter one or more players.
- In conclusion, if you were to look at a UT level more abstractly, you would find that they are built up out of larger, open spaces, connected by a multitude of roads that afford for a smooth flowing movement that never requires the player to stop moving. These roads, combined with verticality that affords for players creating their own paths, allows players to easily navigate around the level without having to wonder where they are and where the action is. It is critical that a UT level has this smooth flow in it, as this is what encourages the player to move faster and explore all movement features – features that are vital to the core experience of Unreal Tournament.

Unreal Tournament: Movement Signifiers

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Research Question

What are the signifiers in a level for using certain special movement features (wallriding, elevators, sliding, dodging, wall jumping)?

Purpose

Knowing the signifiers to all the special movement features in a level will greatly improve the quality of the level, in particular navigation.

Observations

1. Wallriding

- Surfaces meant for wallriding are noticeably smoother than other walls. Normal walls tend to have more clutter, like pillars and decoration, and have rougher textures. Walls meant for wallriding tend to be larger, square surfaces with a different, smoother texture and little to no decoration.
- The textures usually also have orientation; walls meant for wallriding are usually horizontally aligned, for example horizontal wooden boards. This guides the player in the right direction; forward instead of up.
- There aren't many walls specifically meant for wallriding long distances to for example cross large gaps. Wallriding isn't often used to get to a specific place but more as an evasive manoeuvre, or, when followed up with a wall jump, to reach a place higher or further away, but rarely alone to cross a gap.

2. Elevators and Elevator Jumps

- Elevators are always in a gap in a wall, never in front of it. This geometric layout indicates that a hallway isn't just a dead end, and when looked at from above, a path does not lead to just a ledge.
- If this structure is not used, the wall behind the elevator is clearly marked with a sign, arrow or something similar, to set it apart from normal walls.
- The elevator is usually surrounded by different textures. The wall the elevator is against is usually a different texture entirely, while its corners are accented by either that same texture or decorations.
- The elevator itself is raised slightly, just enough to notice it's not at the same level as the ground is.
- The floor right before the elevator is usually marked with for example arrows or footprints.
- Elevator jumps are signified by more markings on the wall, even at the top of the elevator. Textures run through to above the elevator, encouraging the player to go even higher. Players will usually always jump off of elevators, however.

3. Sliding

- Sliding is barely used for navigating through spaces specifically meant for sliding or crouching. This could be because crouching impacts speed too much, or because it affects line of sight too much.
- Slide is the least used movement feature. It is mainly used as an evasive manoeuvre.

4. Dodge

- Dodge is by far the most used feature.
- Dodge is often used for a small speed boost that'll propel the player in any direction.
- It is sometimes used to cross gaps. Ledges aren't marked distinctively however, most likely because players will use dodge instinctively. If every ledge had a signifier for dodging, the level would be incredibly cluttered.
- Dodge jumps further than normal jump. If a gap can't be crossed without using dodge, it might be useful to put a signifier there.
- Very often when a player dodges from a ledge, they land in exactly the right spot; a weapon pickup, a certain marked spot, etc. The level guides the player to these ledges (lighting, decoration, navigation, flow), and the player instinctively dodges off them.
- Dodge can be used against a slope, which launches the player up and forward. This is used multiple times in some levels, and is usually marked the same way wallrides are marked; different texture, smooth surface, textures oriented in the right way (in this case up). It's usually also marked with some signifiers on the floor.

5. Wall Jump

- Wall jumping is usually used either after wall riding or individually. There is no real signifier for wall jumping after wall riding; the player is usually guided into a jump that will make them wall jump automatically.
- There is no real difference in textures for places where the player can use wall jump. Surfaces do appear more smooth and less cluttered, however. Players often use wall jump to traverse a gap or get to a higher place, so they often don't need a signifier to wall jump to somewhere.
- There are some very specific places where the player is guided to jump straight up to a wall and wall jump right back off it again. These spots are marked with different textures and walls are angled towards the player. However, more often than not, walls are not explicitly marked. Players are usually left to figure out routes for themselves, even if the level is specifically designed to afford for these routes.

6. Other

- Levels often have two main colours or textures, for example white and orange, stone and wood, etc. The secondary colour or texture is used to mark and accent certain spots.
- Arrows and markings are often used as signifiers in case the geometry, texture or layout itself is not enough.
- Textures are usually oriented horizontally or vertically to guide the player more.
- Decoration around the map is also used to guide the player (horizontal pipes, gates, etc).

Conclusion

This is a summary of signifiers in default Unreal Tournament levels.

Generally:

- The most used signifier is a change in textures between a primary and secondary texture (stone and wood, for example). Players notice this change and will instinctively know to use a special movement feature at those spots. Because of the navigation and flow of the rest of the level, combined with decoration that subtly guides the player, the player will know what movement feature to use.
- Textures are oriented in the direction of the player's movement; textures on surfaces meant for wallriding will have textures horizontally oriented, while for elevators, they're vertically oriented.
- Arrows and markings are used whenever other signifiers do not suffice.

Wallriding:

- Smooth surfaces;
- Horizontally oriented textures;
- Large, square, open surface.

Elevators:

- Always placed in a gap in a wall, never directly against it. This is to make sure the player does not mistake it for a dead end or a normal ledge. If this structure is not clear enough, the wall behind the elevator is marked.
- Elevators are slightly raised off of the floor, and the ground before it is also marked.
- Elevator jumps are marked with even more signs, arrows and vertically oriented textures to encourage the player to go even higher.

Sliding:

- Barely used. Could not find signifiers.

Dodge:

- Should only be marked in case a gap can only be crossed using dodge and not with jump. Too cluttered otherwise, since dodge is used a lot.
- Not explicitly marked, but subtly hinted at using navigation, flow, lighting, etc. The spot where the player lands is marked on the floor, however.
- Slopes to dodge against are marked with vertical textures and often also additional decoration around it. Also ground before it.

Wall Jump:

- No additional signifiers when used after wallriding.
- Only marked with mainly geometry layout and markings on wall when wall jumping is used individually, not in combination with wallriding.

Unreal Tournament: Level Sizes

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Research Question

What is the average size of an Unreal Tournament level, and how long does it take on average to traverse one?

Purpose

It will be useful to know the standard of Unreal Tournament levels when it comes to size, and what elements impact the traversal time.

Observations

Level Name	Level Size (uu)	Lap #1	Lap #2	Lap #3	Average
Outpost 23	8000x9000	13.05"	14.56"	12.89"	13.5"
Chill	11000x11000	10.84"	9.02"	9.66"	9.84"
Underland	9000x8500	10.69"	10.11"	10.39"	10.39666667"

- Travel time was measured by crossing the level from one side to the other. The 2nd lap was in the opposite direction, which affected time slightly but not much, as the road used didn't have much one-way verticality.
- While Outpost 23 and Underland are roughly the same size, there's a significant difference in travel time. This is probably due to the openness of Underland, and the amount of hallways and verticality levels in Outpost 23. It was harder to find straight roads in Outpost 23.
 - To my surprise, Outpost 23 and Underland are roughly the same size, but it doesn't feel this way. Outpost 23 seems bigger than Underland. Travel time seems to be the more important factor than sheer size.
- Surprisingly, while Chill is the biggest level, it has the shortest travel time. This is caused by the large, mostly flat exterior of Chill.
- All three levels are somewhat square. None of them are clearly rectangular.
- Both the travel time and physical sizes of the levels are very close to each other. There is no level that is clearly bigger or smaller than the rest.

Conclusion

- Travel time seems to be more important than physical size of the level. A huge level with a small travel time will feel smaller than a smaller level with higher travel time. The interconnectivity and compactness of a level is more important than total size.
- Verticality and openness affects travel time a lot. It's obvious that an open area with little verticality allows for a straighter line through the level, but it's important to remember when creating a compact level that appears bigger than it actually is.
- Levels seem to be square and between 8000x8000 and 11000x11000 in size, and have an average between 9 and 13 seconds in travel time (13 seconds is already quite long).