O'zapft is

Project Notebook

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You are Joseph Hintertupfer, but your friends normally call you "Sepp" or "Hintadupfa" as it is custom in Bavaria. You are a student (13th semester philosophy) enjoying your life doing nothing of value.

Especially now you celebrate your decision to move to Munich 6 years ago. It is the best time of the year again - Oktoberfest time. As every year, you had a bet with your friends: The last one that arrives at the Wiesn has to pay everything, that the others consumed by then. This should keep even the laziest student on its toes. Unfortunately, you are already thirty minutes late. You thought it was C.T. after all….

Your friends meanwhile enjoy their free drinks, who could reproach them? Your main goal now is to do damage control: Arrive at the Oktoberfest as fast as you can, before your friends have emptied your wallet.

1 Proposal
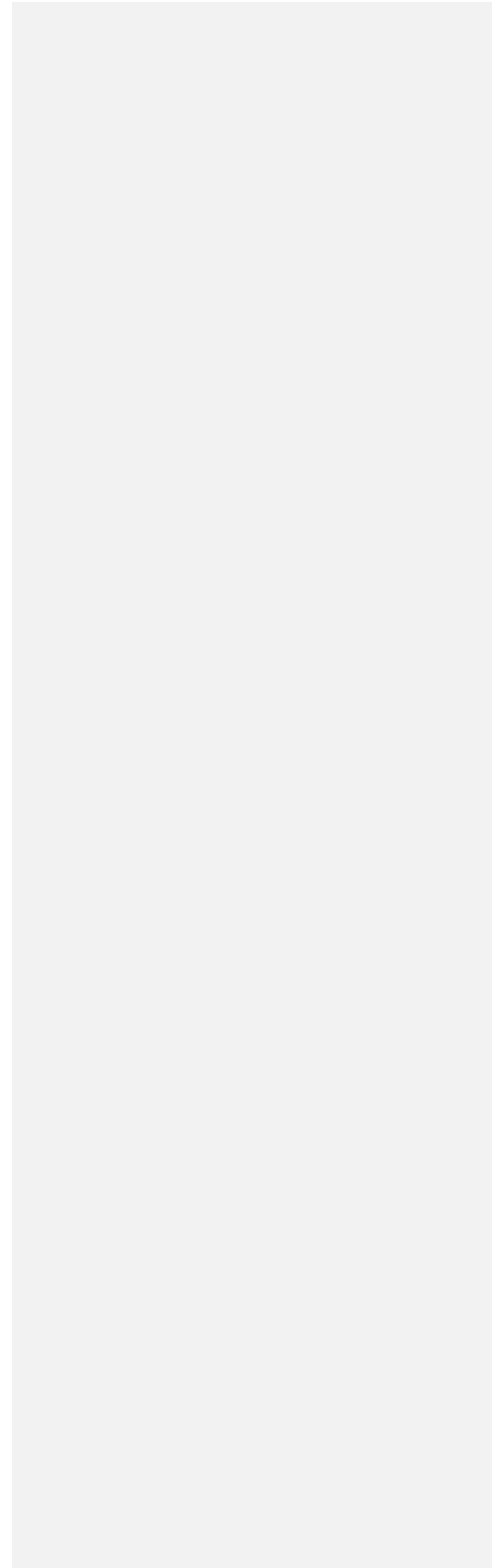
1.1 Game Description

1.1.1 Setting

"O'zapft is" is a 2D game from a top-down camera perspective. You navigate Sepp through Munich's underground network to get him as fast as possible to the Oktoberfest.

On your way you face two main challenges:

- You do not own the semester ticket and you have not bought another ticket yet. Therefore you have to avoid ticket inspectors at all cost. It may force you to exit trains and to reschedule your route from time to time.
- You have to micro manage Sepp's alcohol level on the way. He is not brave enough to dodge the fare, but he can encourage himself by drinking alcohol. You have the option to drink beer at every train station. However drinking does impair your vision. Additionally you run the risk of a blackout, and waking up at a random station.

1.1.2 Obstacles

I guess you already suspected it: Life isn't easy.

Naturally you do not own a car (You wouldn't use it anyway, let's be serious: You are a responsible person that won't drive home after a night of alcohol consumption.). So, your only choice is to rely on the wonderfully complex system of the MVG. If you didn't already have it hard enough finding the train station "Theresienwiese" on the network plan, the ticket automaton won't give you a ticket, or it will give you the wrong one, or there will be too many people waiting in front of it, or… Let's keep it real: you will have to dodge the fare.

At every train station, you arrive, you have to watch out for ticket inspectors, your wallet cannot handle another expense of 60€. Speaking of expenses: you better pregame, the "Mass" has gotten more expensive than last year (as every year). You better keep your alcohol level high to avoid paying 10,70€ for 1 litre of beverage, which is more like half a litre of beer and half a litre of foam. There will be shops at almost every train station to buy beer. However, it will get more expensive as you head towards the Oktoberfest. And as always: do not overdo it, it will become harder to spot the ticket inspectors once you are drunk and at some point, you run the risk of a blackout. I am sure you wouldn't want to start all over at a random train station.

If that wasn't hard enough, random events that happen on a day to day basis in the Munich train system hinder you at getting to your goal. Those suspicious "Signalstörungen" may appear and force you to change to another line. Maybe some passenger collapses exactly in your train: the train has to wait until a medic arrives. It might as well happen, that the doors of a train refuse to close. Unfortunately, everyone has to leave the train now. Sometimes you won't get into a train at all, given the chance that the FC Bayern plays in the Allianz Arena today. The MVG will use even the most ridiculously excuses to hinder you. You cannot tell me that it is snowing in the tunnels… again…

1.1.3 Helpers

As an avid smartphone user, you are able to receive push notifications from your friends via WhazzApp. You are also assigned to the service MunichOverwatch where each user can mark ticket inspectors, it will most certainly help you to avoid running into one of those masters of deception. You couldn't survive in Munich without the native MVG App either. I bet you saw it coming: The servers cannot be reached, but at least you can access the network plan. Lucky, you!

At a train station, you get the information which train leaves the station next. You will know which line this train is on (U1...U6, S1...S8) and what its end station is. Of course, you are also able to read the time.

All the time you can monitor your current wealth, as your friends happily tell you whenever they bought the next drink or whenever they ordered the next "Hendl". Growing up in Bavaria you have also been given the ability to always know how much alcohol you have consumed already. Your instinct tells you once you start to get sober as well.

1.1.4 Choices

At every train station, you have to decide whether you want to get out of the train or if you rather want to stay in it. There is however the risk, that ticket inspectors enter your train, once the train leaves the station you are trapped and have to pay the full prize for dodging the fare.

Leaving the train gives you another set of options, you can choose e.g. which train to take next, provided that the crowd lets you through. You can also enter a shop to buy beer to raise your alcohol level. It does so immediately, as it is forbidden to take your beer to the metro.

Actually, you can try to buy a ticket at a ticket automaton as well. This however is no real choice. Hint: It won't work.
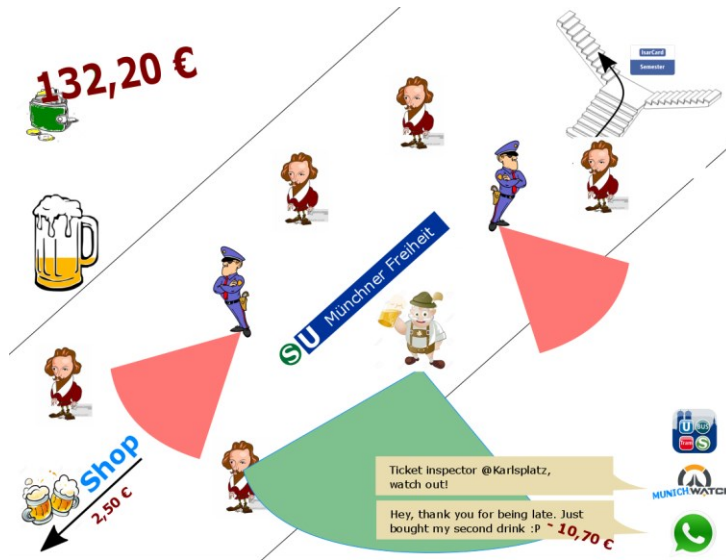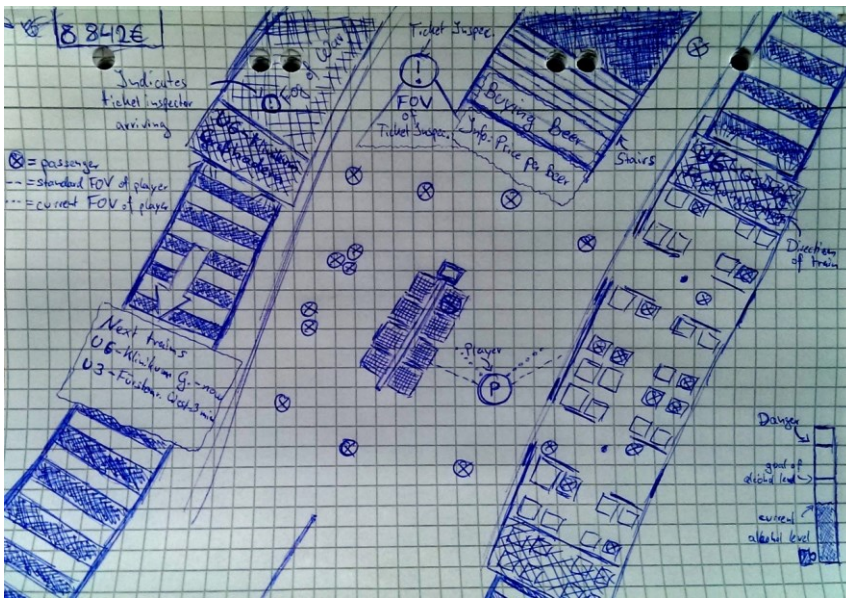
1.1.5 End

You succeed once you arrive at the Oktoberfest. There you may have to pay for every beer that is missing to raise your alcohol level to a "Wiesn" tolerable level.

Your performance will be graded by your friends based on the remaining cash in your wallet. They jokingly award you a "Mass" for every 100€ left over.

1.1.6 Concept Art

1.2 Technical Achievement

"O'zapft is" is built with the Unity game engine. The core technical challenge is building a realistic game world including the underground network system of Munich and the ticket inspectors with a challenging artificial intelligence.

1.2.1 Game World and Navigation

The game world consists of all subway stations in Munich from a top down 2D perspective. Most stations in the game share the same layout. Unique assets are created for key stations like "Theresienwiese" or "Hauptbahnhof". Every station has shops, NPCs and ticket inspectors. The game's underground network should be a realistic representation of Munich's underground network. Trains follow a strict timetable. There is no spatial game world planned beside the stations. Once the player is in a train which starts moving, the scene will fade out and the next station will be loaded.

The game can be played using a keyboard or a game controller. The player can be moved with the W,A,S,D buttons or the joystick of a controller. In addition there is an action button to let the player interact with the shops and ticket machines.

1.2.2 Ticket Inspectors

Ticket inspectors are found throughout the whole game world. They can be distinguished between active inspectors on the same station with the player and inspector occurrences on all other stations.

When the player enters a station there will be a number of active ticket inspectors patrolling. Some might be in the same train with the player or entering the station from other trains. They can leave the station through outgoing trains. Ticket inspectors have a limited field of view. Once the player enters his field of view the ticket inspector will start chasing the player. If he catches the player, a penalty has to be paid. The player can however escape the ticket inspector by entering a leaving train or hiding in the crown far enough away from the inspector.
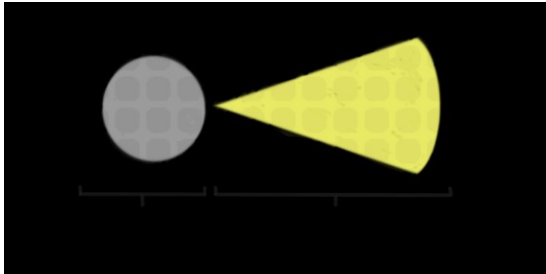
The player can only guess probabilities of ticket inspectors on other stations. The MunichOverwatch app is a build in UI which will notify the player about higher ticket inspector occurrences on other underground stations which helps the player to plan his route.

1.3 Schedule

1.3.1 Layered Development Description

Functional Minimum
- Player controller
- Data base for train network
- Fill database with one subway route
- One generic underground station
- Shop for buying beer
- Rating system when player arrives at destination

Low Target
- Ticket inspectors
- Graphic assets without animations
- Database with full subway network
- Simple UI for currency management

Desired Target
- Timelapse button
- Add animations to graphical assets
- Much alcohol leads to decreasing FOV
- Standing still increases FOV
- Difficulty scaling
- Messages about ticket checker locations nearby via push notification
- Technical achievement: realistic game environment
- Random events (fire service, sick passenger, defect train, ...)
- Database with full subway and suburban network

High Target
- Individual graphics at station ("Müncher Freiheit" looks different to "Marienplatz")
- Delay for usual departing times
- Bus and Taxi support to connect subway routes
- Option to buy a ticket. Never successful but costs time (and money)
- Random ticket checks while in FOV of ticket checkers

Extras
- Mobile support
- Monetizing
- Skins
- German railway system
- Gamescom 2019
- Italien weekend DLC

1.3.2 Timeline and Task Distribution

Legend: All (purple) · Dominik (red) · Jing Yi (yellow) · Marten (green) · Christoph (dark blue)

Phase	Week	Ongoing					Functional Minimum			
		Design Doc	Concept Art	Physical Pr.	Introduce Bugs	Fix Bugs	Character Mechanics	Database System	One Subway Route	One Subway Station
Physical Pr.	Week 43	All		All						
	Week 44	All		All						
	Week 45	All		All				All		
Interim	Week 46	All			Dominik		Marten	Christoph		Dominik
	Week 47	All			Marten		Marten	Christoph	Jing Yi	Dominik
	Week 48	All			Jing Yi	Jing Yi			Jing Yi	
Alpha	Week 49	All			Christoph					
	Week 50	All			Jing Yi					
	Week 51	All				Christoph				
Test	Week 52	All			Dominik					
	Week 1	All			Jing Yi					
	Week 2	All				Marten				
	Week 3	All				All				
Final	Week 4	All								
	Week 5	All								

Phase	Week	Low Target				Desired Target						
		AI / Ticket Inspectors	Basic UI	All Subway Routes	Graphics (w/o Anim.)	Fast Forward	Animations	Difficulty Scaling	Field of View	Random Events	Advanced UI	All Train Routes (U+S)
Physical Pr.	Week 43											
	Week 44											
	Week 45											
Interim	Week 46		Marten		Jing Yi							
	Week 47	Dominik	Marten		Jing Yi							
	Week 48	Dominik			Jing Yi							
Alpha	Week 49	Dominik		All	Jing Yi	Christoph						
	Week 50			All		Christoph					Marten	
	Week 51			All							Marten	
Test	Week 52						Jing Yi	Christoph	Dominik			
	Week 1						Jing Yi	Christoph	Dominik			All
	Week 2						Jing Yi			Christoph		All
	Week 3											
Final	Week 4											
	Week 5											

1.4 Assessment

1.4.1 Mission and goals

Everybody knows what Oktoberfest looks like. But no one ever thought in advance how to get there. Most of the people didn't even know where they should go or which public transportation to take, to get there. "O'zapft is" is a simulation which teaches the subway infrastructure by using the principle of gamification. The main goal of this game is to reach the Oktoberfest as fast as possible, using the subway infrastructure. Additionally our game should obviously be fun to play while showing all clichés which are stereotypic for Munich and especially the MVG.

1.4.2 Outcomes

Every time the game is started it's different, due to varying start subway stations. According to the proverb "all roads lead to Rome", there are also multiple ways to get to the Oktoberfest, so even if started at the same train station there's not only one way to take. Additionally, it gets more difficult as ticket inspectors are spawning randomly in this subway infrastructure, which try to hunt you down until you run out of money.

As you should know the subway infrastructure better every time you play this game, the game should get easier after a while, if the initial boundary conditions stay the same. So, after mastering the different levels and knowing more about the subway infrastructure, the game's difficulty can still increase due to a growing number of ticket inspectors and faster drinking "friends". Another parameter for balancing the game are the various prices, whether the price for one beer at the individual train station, the price on the Oktoberfest or the prices for the tickets sold by MVG, which increase every single year as we all know.

1.4.3 Discussion

Possible reasons for not reaching this goal are manifold. The biggest issue will be the big workload that we're going to face through the development of the game due to the extent of the real world data (MVG train stations and departures). We do also have concerns about other issues that may lead to unbeneficial gaming experience in the long run:

Balancing   Balancing is really important in games to maintain the joy of the game. Usually this step happens quite late in the process of developing a game, but as this project tries to be as realistic as possible the balancing has to be checked very early. Implementing the real prices for beer and tickets may lead to high realism, but maybe destroy the game as there's no real option for the player. For instance, if the player could just simply buy a ticket, the game would be boring and unidimensional as this option is obviously the most reasonable one.

Options   Another problem which can occur, is the starting location of the player. The player should always have the real option to choose from several stations. This objective could cause trouble as there are some train stations where you have to take the train in a specific direction, because it doesn't make sense to take it contrariwise.

Diversity The intent to set the Oktoberfest as the one and only destination to be reached in this game is another issue, which could decrease the gaming experience. As the Oktoberfest can just be reached by getting to the subway station "Theresienwiese" in this game, the player does always have the same target, which could quite fast lead to repetitive patterns to some extent. It is however possible to change the objective randomly as soon as the player gets close to the station "Theresienwiese".

View The last concern to be talked about is the view that will be used for playing the game. It was decided that the game will be a top-down, orthographic and real 2D game. The reason for using this approach was the following. The models can be created easier as the artistic effort is less than creating content for 2,5D or 3D games. Additionally the time that was saved by using 2D instead of 2,5D can be used to improve the game mechanics. The only drawback that's been generated using this approach, is the low depth awareness.

1.4.4 Methodology

This game will be successful if both player groups, experienced ones and beginners, are able to play this game with fun. So the different scalable criteria for the difficulty scale with the experience of the player. An early version may be used to confirm this statement. Additionally it has to be tested whether the topics addressed in "4.3 Discussion" could be eradicated to some extent and if the gameplay at the end of this projects matches the visions which were presented at the beginning.

2 Prototype
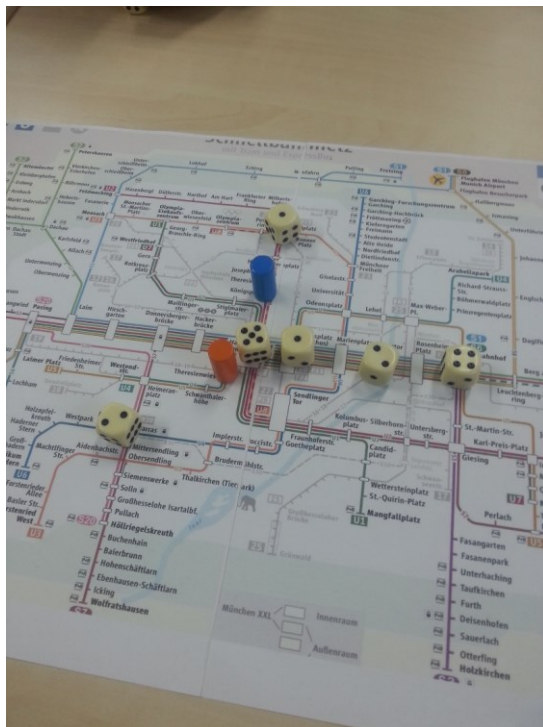
2.1 Rules

Our goal is to simulate how well the train stations are suited to travel to the Wiesn. We want to evaluate, if we have to add additional connections between metro stations, using e.g. Busses, Taxis or the Tram. Therefore, we have to find a good balancing between Sepp's currency and the alcohol prices. Furthermore, we have to balance his alcohol level, because we want the player to ponder how far he has to fill up his level prior to the Wiesn. For this prototype, we skip the action game, that takes part in each train station. To allow us to find the correct balancing, we decided to simulate this part using probabilities.

Sepp starts with a wealth of 200€ to his name. One of us is the game master and is responsible for mimicking the artificial intelligence / the random factor. The game master has to place Sepp at a random train station in the beginning and "randomly" lets Sepp's friends order another Mass or one more Hendl, each costing 10€.

Idea for placing Sepp:

- Roll W20, if x == 20 ==> Zone 4; if 17 < x < 20 ==> Zone 3; if 13 < x < 18 ==> Zone 2; else Zone 1
- Roll D6 ==> Divide map into 6 parts
- Roll another D6 dice ==> Divide previously divided map again into 6 parts
- Place Sepp randomly

Additionally, the game master has to place D6 (Dice with 6 sides) to random train stations, preferably at stations, that lie on Sepp's way to the Theresienwiese.
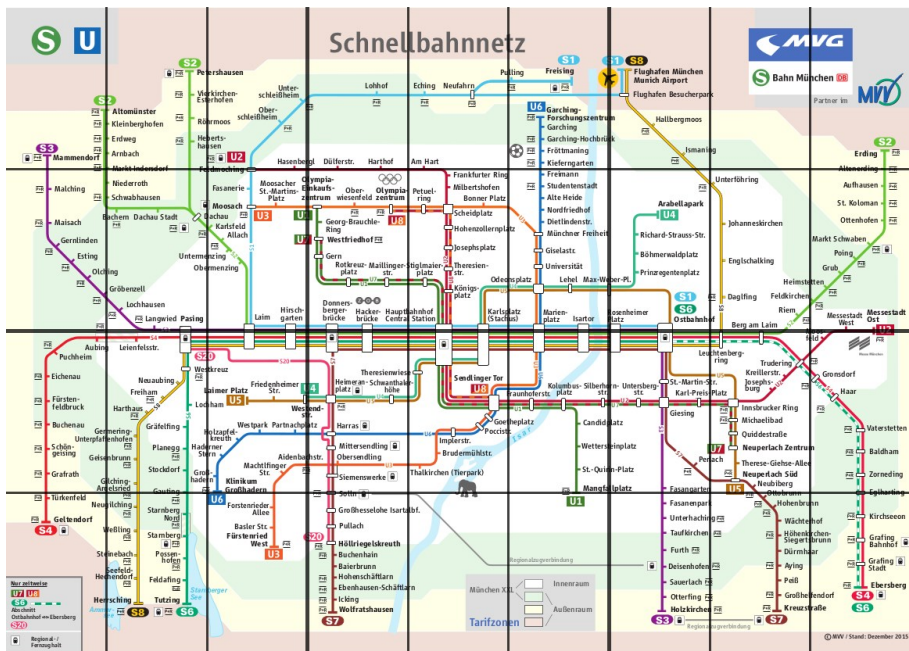
The dices simulate the ticket inspectors in our action game and the "Munich Overwatch"-App: We can imagine the number on the dice + 1 to be the number of the inspectors at that train station. Each time Sepp crosses the path of the ticket inspectors; he has to roll a D6. The number on his dice states the number of ticket inspectors, that he was able to dodge. Logically, if he could not dodge every inspector, he has to pay the price for dodging the fare, which is currently 60€.

For example, if a dice that shows the number 4 blocks the train station Münchner Freiheit, this means that there are 5 ticket inspectors at the station. Once Sepp enters Münchner Freiheit, he has to roll a D6. With a 5 or 6 he can safely continue his journey. However, with a 1,2,3 or 4 he dodges too few inspectors and has to pay 60€.

Remember that Sepp cannot ride the train, without at least a tiny bit of alcohol. We decided to keep track of his alcohol level with a D20 (Dice with 20 sides). A 1 on the D20 signals, that Sepp can not enter a train. So, he has to buy a beer, which raises his alcohol level by 3. Each round, the level declines by one point. The MVG Netzplan is divided into 4 zones. At the most outer zone a beer costs 1€. Coming closer to the center of Munich the prices for a single beer rise by 1€ per zone. Once Sepp arrives at the Wiesn he has to rise his alcohol level up to 15, to get on par with his friends. On the Wiesn you can only buy a Mass, which unfortunately costs 10€ and rises your alcohol by merely 3 points (Half of the Mass is foam, anyway...).

Consuming so much alcohol impairs Sepp's abilities to dodge the ticket inspectors. At an alcohol level of 6 to 10, his rolls are reduced by 1. This gets harder, as he gets more drunk: Each 5 levels, his rolls are reduced by 1 additionally. With an alcohol level of more than 15 he runs the risk of a blacking out. Each round, the player has to roll a D6, if the alcohol level plus the number on the dice exceed 20, then he wakes up at a random train station an alcohol level of 10 and 50€ less in his pocket.

Back to our example from above: The dice shows a "4". Let us assume that Sepp's alcohol level is at 10, so his rolls count 1 number less. That means he only dodges the ticket inspectors with a 6. With the numbers 1 to 5 he has to pay the fine.

Each round Sepp can decide, whether to stay on the train station, to stay on the same train or to switch to another train in either direction. Keep in mind, that the ticket inspectors may move, too. Each round is evaluated by Sepp's wealth after reaching an alcohol level of 15 at the Wiesn. We allow him to borrow money, i.e. negative wealth.

We found, that with those rules the game is already challenging enough. Traveling through Munich does not feel boring. And although there may be no cross connections between the suburban (S-Bahn) railways, the possibilities open up, once Sepp reaches the inner zone of Munich. We felt that adding more connections via Bus, Taxi and Tram are not necessary for a great gaming experience. However, this greatly factors in how the ticket inspectors are placed by the AI. For now, we will leave out those interconnections. But we will keep them in mind for later extensions.

2.2 Cheat – Sheet

Initial wealth:

- 200€

Costs of a beer:

- Zone 4: 1€
- Zone 3: 2€
- Zone 2: 3€
- Zone 1: 4€
- Wiesn: 10€

Alcohol Level:

- Use D20 to display
- Initial level: 1
- Beer -> +3
- Per Round: -1
- Reach 15 at the Wiesn

Chances to get caught:

- D6 <= ticket inspector number? -> -60€
- Alcohol level 0 – 5 -> D6 - 0
- Alcohol level 6 – 10 -> D6 - 1
- Alcohol level 11 – 15 -> D6 - 2
- Alcohol level 16 – 20 -> D6 - 3
- Alcohol level + D6 > 20 ? -> Blackout -> Random train station and – 50€

Game Master (At the beginning):

- Munich Overwatch: Spawn random ticket inspector dices (D6)
- Randomly place Sepp on MVG map

Game Master(Every round):

- Friends: Consume Hendl/Mass -> -10€ (Roll W20, if x > 15 ==> -10€)
- Move ticket inspectors: (Roll W20, if x > 12 ==> Move ticket inspectors)
  - Roll D6 for number of ticket inspector dices to move
 - Roll D6, if x == 1, move ticket inspectors one station to the player

Player (every round):

- Decrease alcohol level

2.3 Addressing the critiques

Q Sounds like a fun game.
   A Thanks!

Q But after paying 60€ you can safely travel without paying for another ticket!
   A That's true. However, Sepp is a very unlucky guy and the ticket inspectors are only human. They might forget to give you the temporal ticket or Sepp simply loses it. That's life...

Q Repetitive gameplay because of only one subway system.
   A We evaluated this with our prototype. We found, that there can happen enough random events to make each playthrough an experience on its own. Luckily this game is not meant to have a high replay value and currently we do not plan to monetize it either. We want to hand out some jokes and stereotypes at the cost of the MVG. Once we are done with that, the game will definitely lose its sensation.

Q Why do the ticket inspectors only follow the player?
   A Their paths are planned to be randomly. However, Sepp is more suspicious than the rest. So, if they happen to see him, then they will control his tickets, if he's on the train.

Q But ticket inspectors only check for tickets in the train!
   A Ever heard of the "Bahnsteigticket"? As long as you're in the subway system the ticket inspectors have the right to check your ticket.

Q Add a star system like it exists in GTA.
   A Neat idea, we added that to our high target.

Q Spawning Sepp at random stations changes the games difficulty.
   A That is right. We found with our prototype, that a good way to counteract this, is to make the beer cheaper in the outer zones. Buying beer in the inner zone (zone 1) will be four times the price than in the outermost zone (zone 4). Beer on the Wiesn will be the most expensive obviously. Anyways our game should have different stages of difficulty so we can use this property in our favor.

Q The game should have some nice appearance to convey the humor of the game.
   A We hope that limiting the game to 2D helps us to keep the artistic cost at a minimum. We currently plan to enhance the graphics with proper shader use, as this is what we are best at.

Q I like the idea of WhazzApp, maybe add Mini-Games?
   A Thanks! Once the system is in place, adding new dialogs should not be the problem. Finding snarky comments for the friend's message shouldn't be either. However we think that the current game idea does not serve for more than a mini game itself, so we want to avoid mini-game-ception.

Q Proper balancing of the alcohol level may be too tedious for the player.
   A That is our fear as well. We have to see how it works out in the alpha release.

Q Make it competitive!
   A If we feel that the game is a success at the demo day, we will think of ways of doing so. However in our opinion the current version has too many random factors to justify a leaderboard.

Q What really got my attention was the plan to allow the player to interact with other NPCs while waiting for the train to pass.
  A We did not plan to do so, because we did not think about it at all! Now we definitely need this in our game! We already planned to implement small speech bubbles for Sepp, so adding them to random strangers could work easily.
Q Implement a race versus the AI to avoid paying anything to the friends.
  A Really great idea! However, we will definitely implement this only after everything else works well.
Q Scrap correct train departure times for more fun experience!
  A As if travelling with the MVG was that much fun...
Q Prost!
  A Prost!
Q How do you plan to implement vision impairment?
  A With a blurred cone of view in front of the player, that can scale depending on the alcohol level.
Q Better use 2.5D instead of top-down view.
  A Although we would like to use that as well, we may not be able to provide a satisfying quality as none of us is an artist. With 2D we are sure, that we can manage the art part.
Q Add more objectives, other than just reaching the Theresienwiese.
  A We actually planned to let the friends notify Sepp, that they already left the Wiesn, once Sepp comes close to the Theresienwiese. E.g. they are going to an "After Wiesn Party", to a house party etc.
Q Why add ticket machines when they are not useable? This frustrates the user.
  A That is exactly what we plan to do. Maybe we will scrap the idea of letting Sepp pay actual money for it, that may keep the frustration at a minimum. However, we will definitely keep the ticket machines, as they allow us to address a whole bunch of stereotypes.
Q Some outer metro lines are boring, e.g. travelling from Garching-Forschungszentrum to the city.
  A Well, that's the point... Maybe we have to include busses, cabs or tram lines to overcome this issue.
Q You could always have somebody standing there [at the ticket machine], who will fiddle with the machine until the dawn of time, or have it be under maintenance.

3 Interim Report
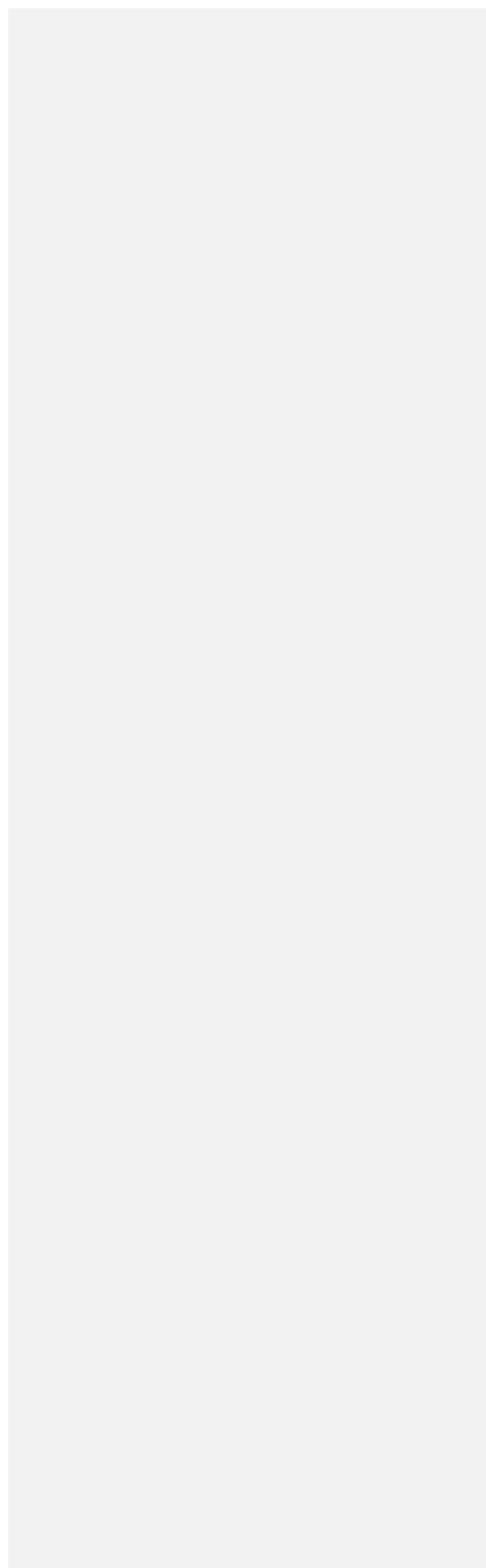
3.1 Goal

Our goal for the interims report was to implement the functional minimum of the game, which consists of the backend database system, game art, player behavior and one station with subways. The goal has been achieved. Furthermore, we implemented the UI and simple pathfinding from our low target. The minimal target was achieved faster than expected. One of the reasons is that we spend a lot of time during the design phase to work out technical details.

3.2 Database

We have decided to use a local SQLite file as our train network database. It contains information about stations, underground lines and arrival times. We've created a tool to generate the tables for our database. Below is an excerpt of the input file to generate data for the underground line U6. "Stations" contain all stations of a single subway line. The seconds between each train station are listed by "Distances". The time slots only correspond to the first station of the line which is "Laimer Platz" in this case. "TimeSlot,06,00,12,00,300" is interpreted like the following. The train operates from 6am to 12am every 300 seconds (5 minutes). With this data, we were able to generate over 6 000 entries for our database. The majority of generated entries are the arrival data for every station in both directions. The image below is a sketch of our database.

```
Stations,Laimer Platz, Friedenheimer Straße, Westendstraße, …
Distances,120,120,120,120, …
TimeSlot,06,00,12,00,300
TimeSlot,12,00,17,00,600
TimeSlot,17,00,20,00,300
```
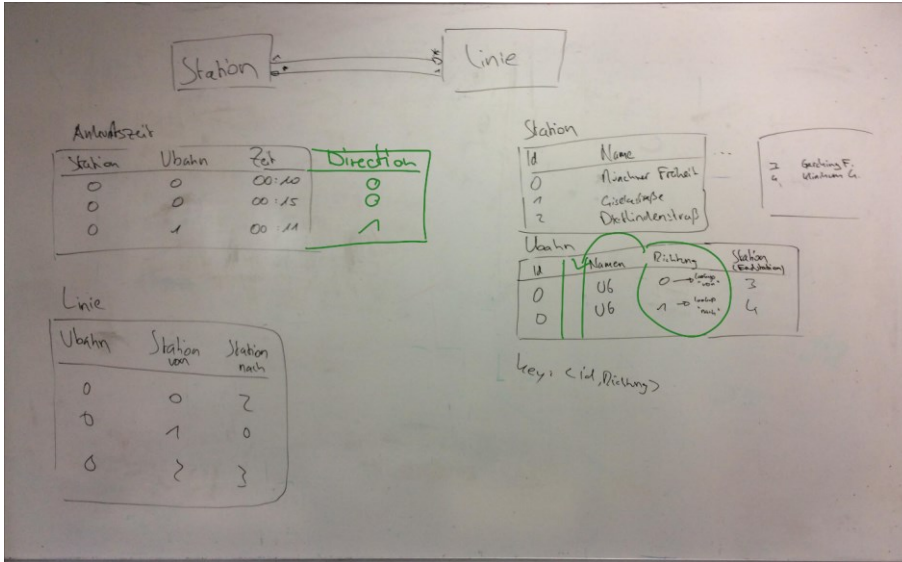
3.3 Game Art and Station

We decided on a 2D top down view to simplify artwork creation. The game's art has a cartoonish style e.g. our characters have very big heads. This further simplifies our artwork since only the character's head can be seen from above thus we do not have to draw should or legs for our characters. To increase performance most textures are created with a resolution of the power of two. The shop texture has a resolution of 512x512, the characters have textures of size 128x128. For simplicity reasons, we also decided to set 128 pixels as one game unit in Unity. In our first art iteration, we use placeholder assets to build the train station. After we decided on the texture size of all objects we then moved on to create a second iteration of our station. Below you can see the first iteration containing only colored rectangles as game art. The next image is a screenshot of our second iteration.
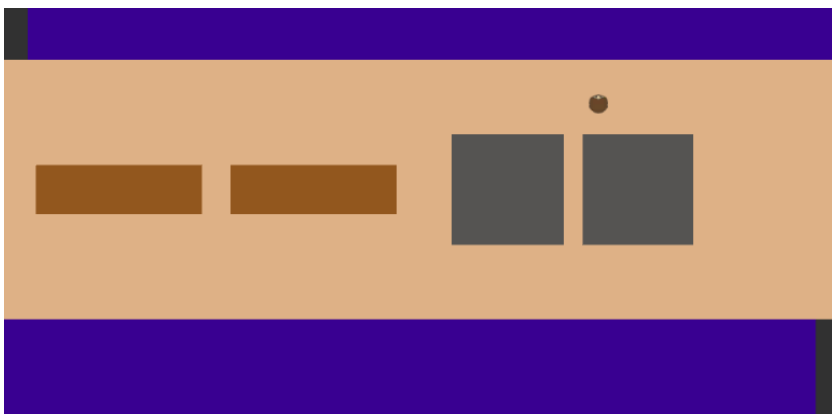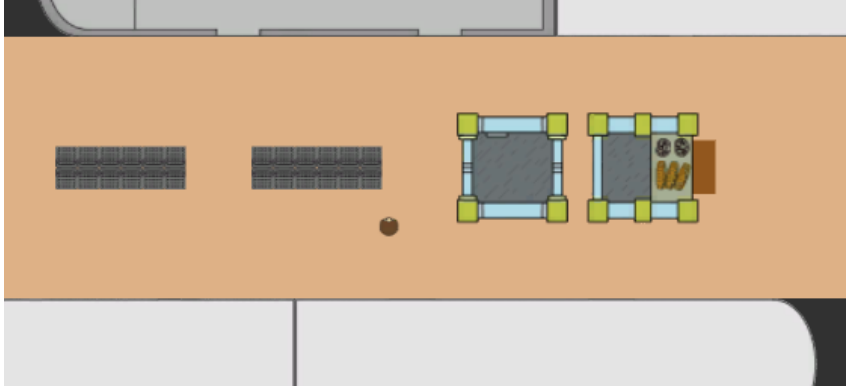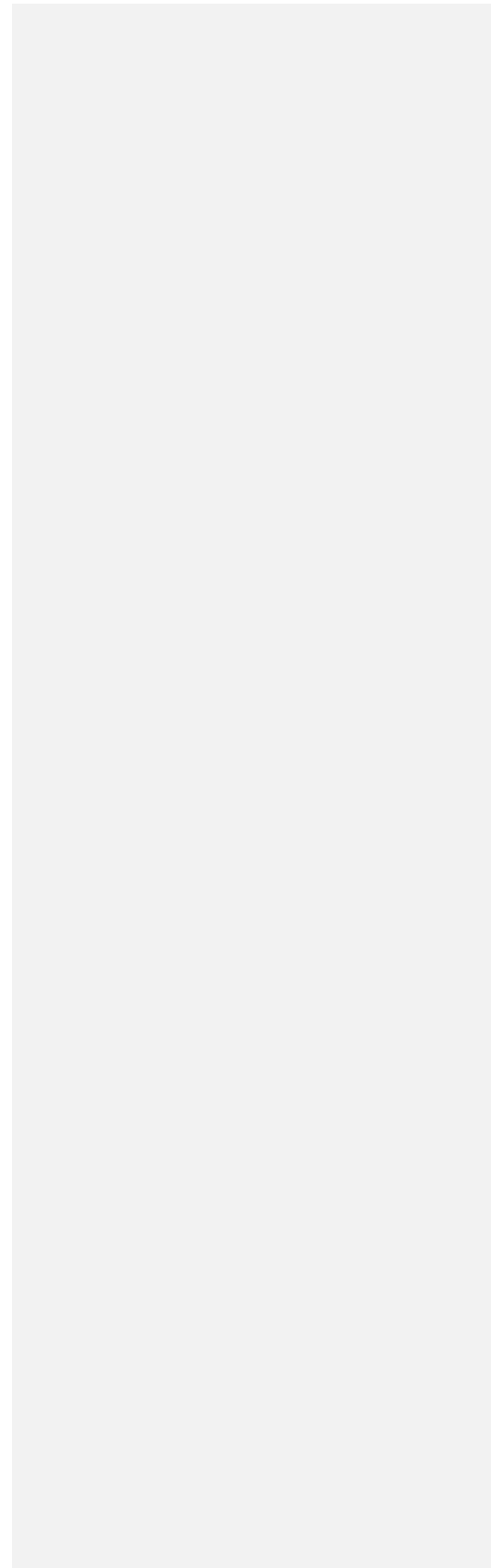
All textures created during the second iteration are listed here

Shop	
Lift	
Outer subway train	
Inner subway train	

Characters	
Single seat	

3.4 Player Behavior

Our player can move through the scene, collide with objects, level borders as well as with NPCs. Additionally, the player has the option to buy beer in front of the shop. Obviously as moving around empty space would be boring and nonsensical, a train station was created. These tasks were done, so the player can move in the train station.
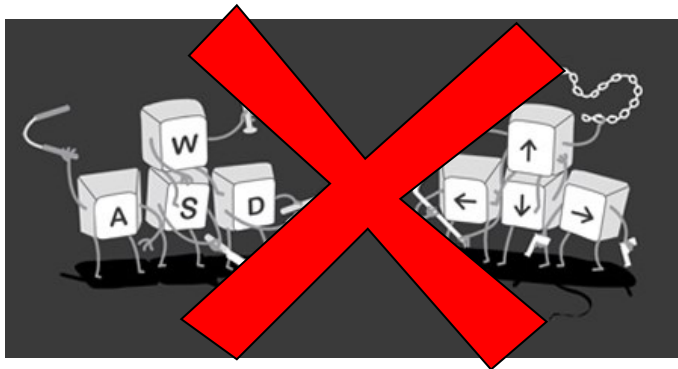
Sepp can be moved by either using **WASD** or the **arrow keys.** As mentioned above, being close enough to the shop, Sepp can buy beer by pressing **SPACE** which increases his alcohol level. Changing the game speed can be done, by pressing **L** to increase the game speed or **K** to decrease the game speed respectively.

3.5 Non-player-characters (NPCs) and UI

NPCs and UIs are two low target feature we've already implemented in the game. We use an A* package from the Unity asset store to realize pathfinding for our game. The current iteration contains a simple pathfinding for NPCs which move from one side of the train station to the other one, dodging obstacles. NPCs do not avoid the player. If the player stands in its way, the NPC will try to push the player aside. This is an intended feature. In crowded stations, the player must fight its way through other people to quickly enter the train.

To check Sepp's status, we implemented a basic UI. This UI consists of five elements. The time as well as the current balance are shown in the top left corner, whereas the alcohol level and the "WhazzApp" button can be seen at the bottom right corner. The last element is a pop-up which shows up at the top of the screen. This pop-up can be used to display expenses by Sepp's friends as well as showing Sepp some hints about barriers or ticket inspectors. Currently the pop-up just appears when arriving at the next station, like random expenses and events will be implemented in the desired target. As pop-ups can be pretty annoying, the player has the option to click at it, to make it disappear. Currently we don't have to pay for the beer, so the balance will stay at 0€, but the alcohol level on the bottom right will still increase. The "WhazzApp" button has no function yet.

Additionally, we implemented a simple fast forward feature to change the game speed, which can be used to shorten the time Sepp waits for the next train. This was initially planned for the desired target, but was implemented as it's very useful for testing.

3.6 Possible future changes

Friends are the greatest gift. Everybody knows that, but if they're allowed to use your money to drink at the Oktoberfest, they can turn into trolls. As this is the case in our game, the money Sepp's friends are using, won't be applied to Sepp's balance not until he reaches his goal. If we wouldn't do this, Sepp's balance could easily fall below zero, which is not possible.

Another design revision considers the changing of the game speed. It's more a design decision, as we didn't really agree on a solution. The first decision is about the changing rate of the game speed. We thought of letting the player increase and decrease the game speed without transition. But as the player usually don't care if the game speed is 1,3 or 1,35, we decided to implement only a few game speed modes, like "normal", "faster" and "incredibly fast". The game speed will be set to "normal" if a train arrives at the train station. Next to this decision, we also decided, that Sepp can only move in the "normal" game speed mode.
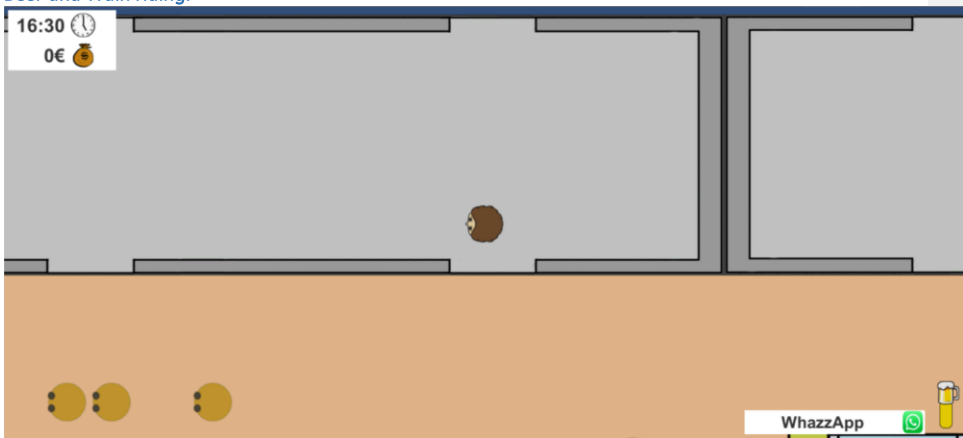
3.7 Screenshots

Game Start:
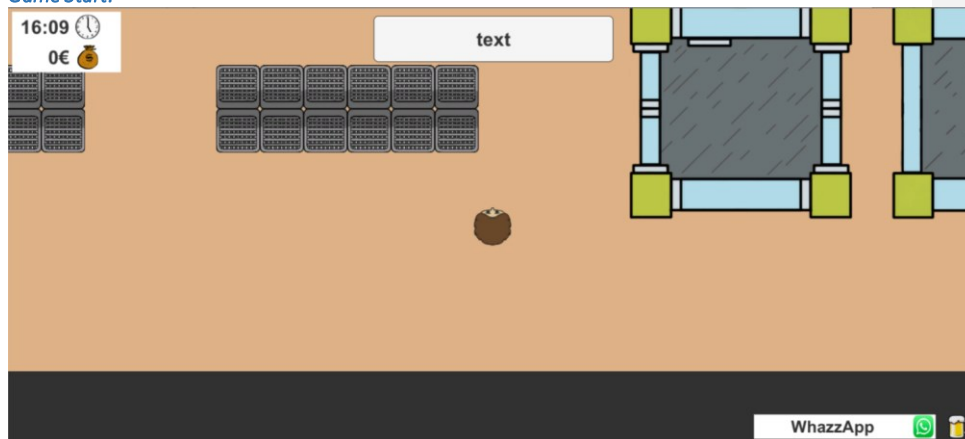
Arrived Train and NPC:
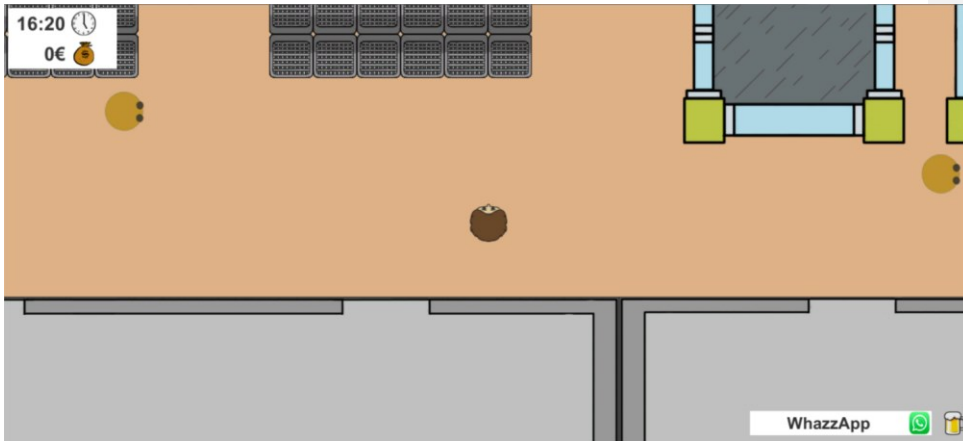

Beer and Train riding:

4 Alpha Report

4.1 Current Status

We have finished our low target and are halfway through the third layer. Since the interims report we have included more graphics, ticket inspectors, limited field of view for the player and ticket inspectors, start/end scenes and the full underground train network database into the game. Sepp experiences drawbacks from high alcohol levels. Furthermore, the "Munich Overwatch" system has been started, which is part of the updated UI. Random game events are tasks from the desired target hence are not completed yet.

4.1.1 Game Art

We have created all artworks needed for our generic station. The most recent assets are stairways, animated escalators and ticket inspectors. It should be hard to distinguish ticket inspectors from other characters. We visualized our ticket inspectors, by created darker versions of our already existing characters. These versions have red glowing eyes and darker hairs than the usual NPCs.
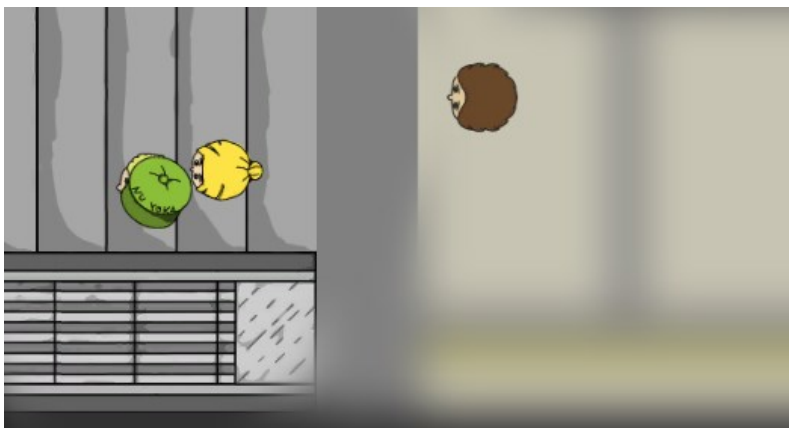
4.1.2 Character behaviours

To include more plausible non-player character behaviour, we extended our AI system. Newly
spawned NPCs can either leave the station or go to a platform and wait for the next train to come.
Ticket inspectors follow the same behaviour pattern as normal NPCs, but once the player gets too
close to a ticket inspector he will try to catch Sepp.

Clean code architecture is very important for us since the beginning of the project. To keep coupling
between classes as low as possible we have decided to implement a strategy pattern for character
behaviours. All ticket inspectors have a ticket inspector component in addition to the normal NPC
classes. When the player enters the ticket inspectors vision trigger collider, the inspector component
switches its active behaviour to a chasing behaviour. The character controller continues without
knowing its behaviour has been changed. The following images is a UML sketch of our character and
AI system. Notice the low coupling between classes.
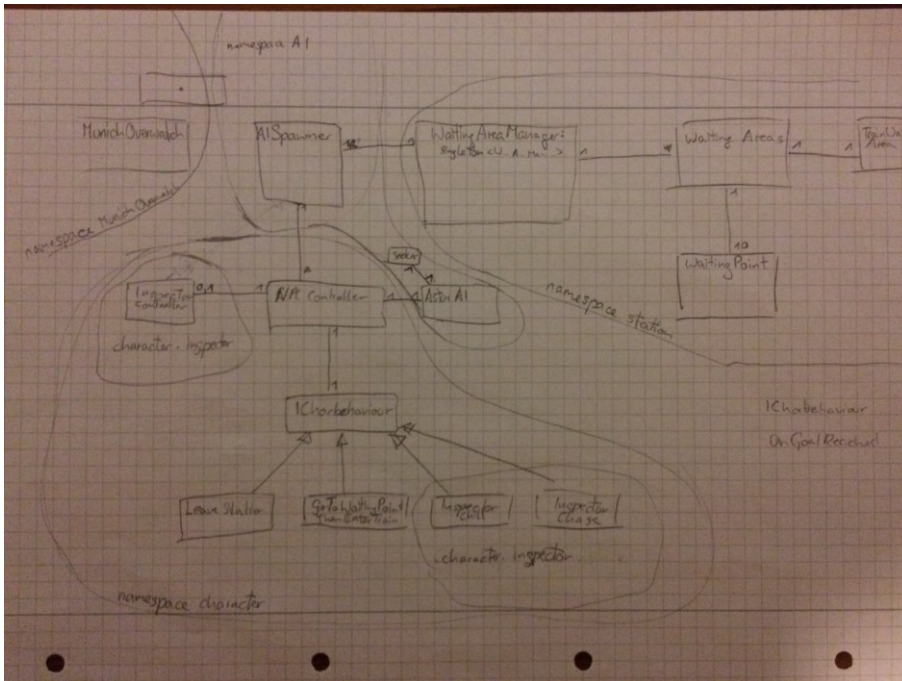
4.1.3 Limited field of vision

Ticket inspectors and players have a limited field of vision. Static objects in the game world also block the field of vision. The field of vision in form of a cone is realised through a constantly changing 2D bounding box which adjusts its shape when objects are in the field of vision. Screen regions invisible to the player are marked by a blurring shader.
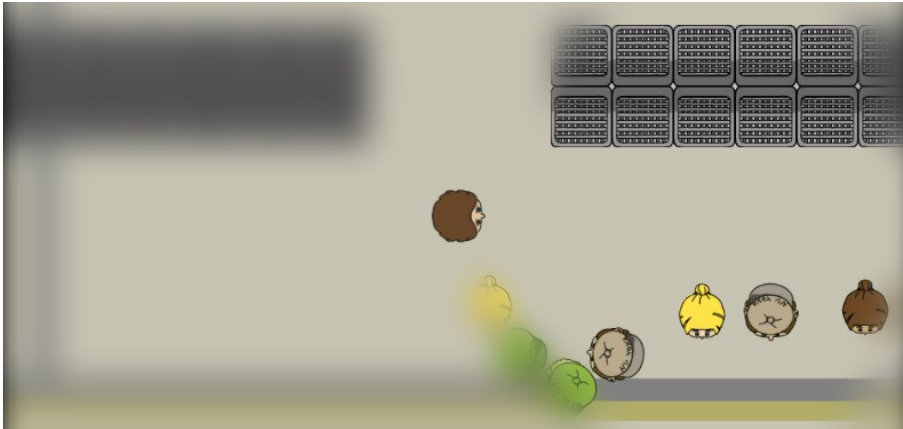
The limited field of vision is realized by rendering multiple layers with different layer masks enabled. In Unity we can emulate multiple render passes by creating multiple cameras and assigning increasing depths to them. The camera with the lowest depth is our main camera, it handles all variable changes, screen resizes and clears the render target. Additionally , it provides the other cameras with the necessary render textures and renders all objects on the station layer.

In each frame we create the mesh for Sepp's cone of vision by casting rays in regular angle intervals in front of him. Using a layer mask, we can determine, if a ray hits an obstacle early on. To create sharp edges in certain cases, we have to recognize, if two following rays hit different obstacles. In these cases we shoot additional rays to perform a binary search for the actual edge between the two original rays. With those points we can create the triangles for the cone of vision mesh. This mesh is rendered into a separate render texture, which serves as stencil later on. Additionally we create a polygon trigger object from it, which allows us to easily trigger collisions with other NPCs.

In a separate pass, we render the NPCs. They have to be fully opaque while Sepp looks at them, but they fade out, once they leave Sepp's cone of vision trigger. In the same pass, we render the roofs of the trains. The cone of vision render texture is used to cut out parts of the roof, so the player can see through them.

To visualize the drunken state, we want to blur the scene. To avoid thousands of blur passes, we begin by downsampling the original render target, as well as the cone of vision stencil. Then we apply the actual blur passes. In the end we blit the blurred scene over the actual render target, using the blurred stencil as linear interpolation coefficient.

Additionally we apply an image distortion effect to increase the feeling of being drunk. We do so by displacing the uv lookup coordinates towards and away from the center, depending on the current time modulate by a cosine.

4.1.4 Database

We have extended our database. It now contains all UBahn and SBahn lines of munich including plausible distances between stations and timetables. The current snapshot of our database has about 100 000 arrival time entries.

4.1.5 Menu

We have included a main menu from which the game starts and an end game scene which loads when the player arrives at the Theresienwiese station.
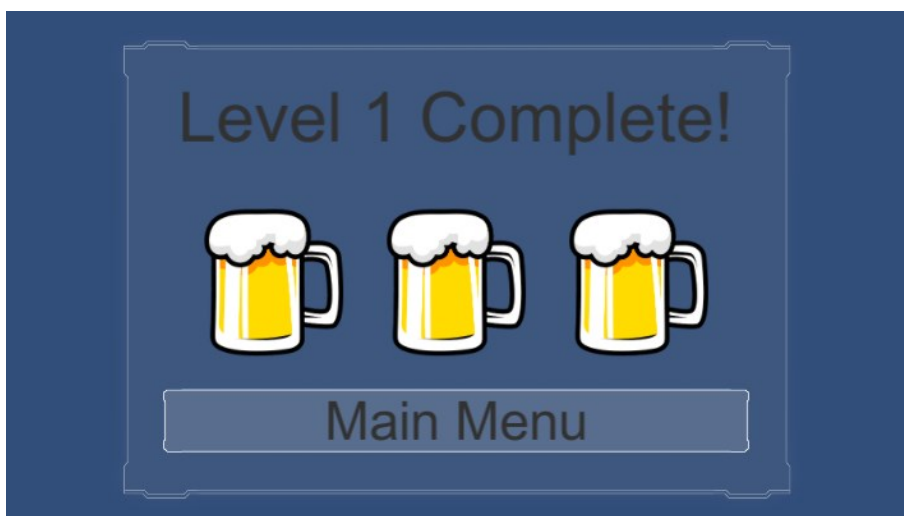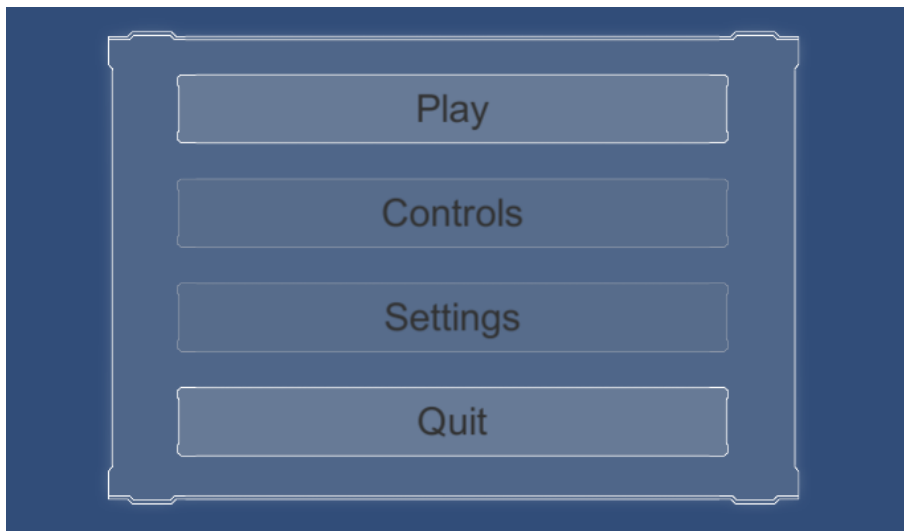
4.2 Where to go from here

As mentioned we have not finished implementing our desired target. We still lack essential features like random game events and more AI behaviours. Our plan is to keep in implementing till the end of the Christmas holidays and then doing the tests.

5 Playtesting

5.1 Project's current status

We are about to reach commit #400. Since the alpha report we have introduced a number of features which enhance the gameplay experience.

5.1.1 Drunkenness

From the alpha release feedback, we learned that the vision impairment was too strong in our game. We have extended the initial cone of vision angle to 360° and changed the strong vision blur to a shaky effect. We have also changed the moving vector of the player depending on his alcohol level making it harder to control. At the maximum alcohol level, it is very hard to control Sepp. Since we didn't want the player to stay in that state for too long, the alcohol level decreases faster on higher alcohol levels and slower on lower alcohol levels.

We added a new indicator to display the current alcohol level. The games timescale is now linked to Sepps alcohol level. Meaning the time passes faster when being drunk.

5.1.2 User Interface changes

We have noticed that our UI was too small and most testers didn't even notice it, so we scaled our UI by 200%. We have added a messenger which shows the well-known "Massenkontrollen" at some stations. These also moved when the player takes a train. We added displays which shows which train goes on which platform so player don't need to guess where the train goes. We have implemented speech bubbles. If a ticket inspector catches a player, he kindly prints out a message on his speech bubble.

5.1.3 Characters

All characters now have hands which wobble when they move. We have extended the NPC behaviours. They wait for trains and enter them on arrival. When arriving at a new station exit the train and leave the station. NPCs which couldn't catch the train on time are well behaved and wait for the next train. Ticket inspectors who catch the player also leave the station.

5.1.4 Music & Sounds

MVG kindly provided us their original sounds. Our trains play the "bitte zurückbleiben", "nächster Halt" plus the corresponding station sound files. We have also added a Bavarian background music, "Zillertaler Hochzeitsmarsch" to enhance the Oktoberfest atmosphere.

5.1.5 Stations

We have added support for stations with more than two platforms e.g. Sendlinger Tor. Trains correctly enter on the right platform. We have started building unique stations. We currently have Sendlinger Tor, Marienplatz and Hauptbahnhof as unique stations. Some of them have multiple layers. Players can take stairs to access them.

5.2 Playtesting

5.2.1 Preparation

Since we introduced a lot of features since the alpha version of our game, we also had a lot of bugs to fix. We have scheduled a testing day but still had a few bugs which impacted the gameplay. Therefore, we had to change our test plan spontaneously. Initially, a big part of our test included finding bugs. We discarded this part and focused on the overall idea, design and experience of the game, since it was very unlikely to play our game without getting stuck due to a bug. We also adjusted the questions of our survey.

We created an online survey with help of Google Forms which contained the following questions and statements. Testers can answer on a scale from 1 to 5 if they agree or disagree. 1 = Strong disagreement. 5 = Strong agreement.
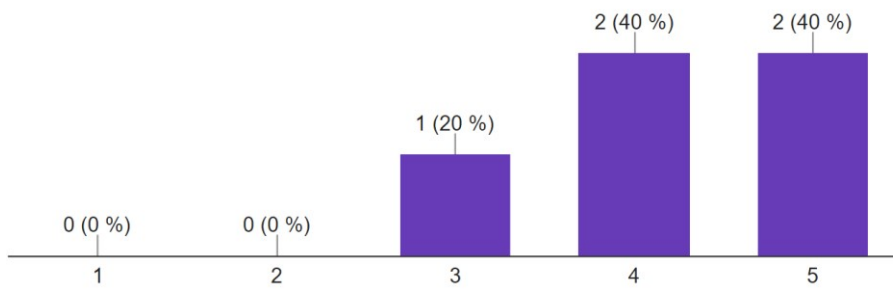
1. Was the game fun?
2. Were the controls intuitive?
3. The game needs more polishing.
4. I like the idea of the game.
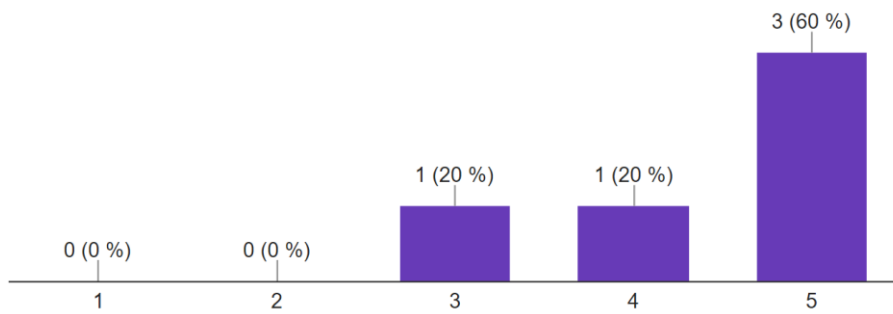5. The art style fits the game.

5.2.2 Execution

We invited 5 testers. All testers were TUM students. Two of these testers were females. A testing session took 5 – 10 minutes. Testers were encouraged to think loud while testing. We started the test by introducing the game laboratory course and this terms game theme. We also talked a bit about the background of the game. No controls were explained to the testers. Since it was unlikely that a tester could finish the game due to bugs, we stopped the testing when testers had seen most of our game features. The testers filled out the online survey at the end.

5.2.3 Survey Results
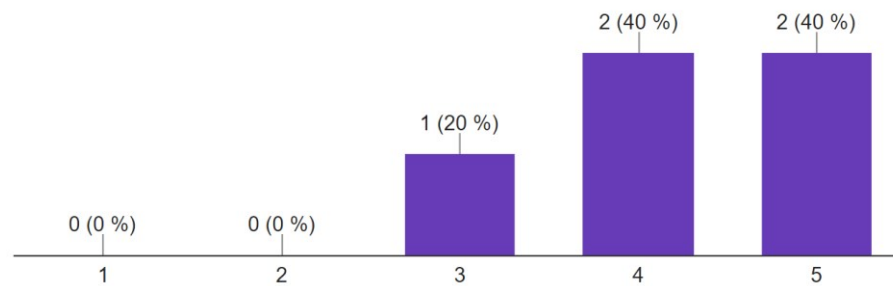
1. Was the game fun?

2. Were the controls intuitive?

3. The game needs more polishing.

4. I like the idea of the game.

			1 (20 %)	4 (80 %)
0 (0 %)	0 (0 %)	0 (0 %)		
1	2	3	4	5

5. The art style fits the game.

			2 (40 %)	3 (60 %)
0 (0 %)	0 (0 %)	0 (0 %)		
1	2	3	4	5
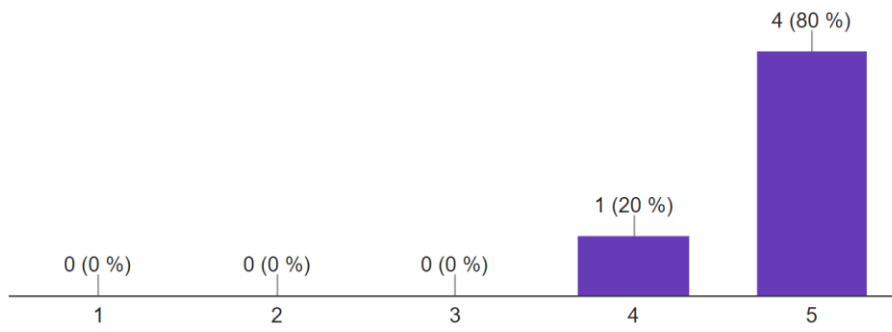
5.3 Evaluation

Overall most liked the idea of the game and thought the game was fun to play. Also the controls were very intuitive and they liked our art style. On the other side they had the opinion that our game needs more polishing and feels unfinished mostly due to the current bugs.

We noticed that players had problems orienting themselves on the station. The displays which showed the incoming stations were not enough. We plan to change that until the next iteration. Players were a bit overwhelmed by the complexity of the underground network, mostly players who don't use the network daily. We have removed all SBahn lines from out network except S1. We have now fixed all major bugs we had during testing which hindered the player from finishing the game.

Another issue is that testers didn't actively tried to dodge ticket inspectors. They noticed them and just said "oh no I was caught again". We have increased punishment when being caught by a ticket inspector. Sepp doesn't have a credit card anymore which allowed a negative balance. The game over screen is triggered if a balance smaller than zero is reached.
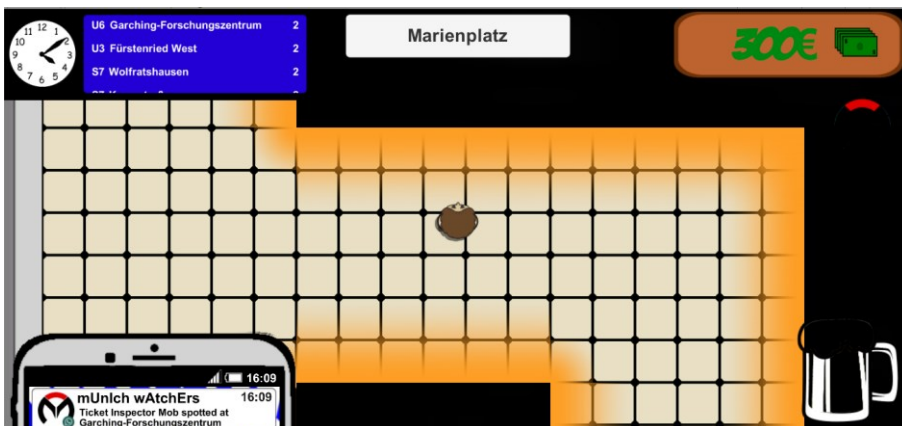
6 Final Release

6.1 Current status

We have added and improved features since the playtesting phase based on the feedback we have received. Most of the recent changes target bugs and UI polishing. Sepp can only enter a train without a ticket if he is drunk. All platforms are now rotated in such way that the top of the screen is always oriented towards the north. Furthermore, we added shadows so that the game looks more appealing. The station "Odeonsplatz" is now be presented by its own custom station. A fully-functional ticket machine ("MVG-style" ticket machine, a.k.a. "not working") was added.

6.1.1 UI Revision

The UI has been totally revised. The graphical theme of all menus is now more fitting to the game and the elements in the in-game UI were repositioned to give the player a better experience while playing the game. The coloured dots on the map were changed to sprites, so that it is more intuitive where Sepp and inspectors are located. The train arrival panel was changed to look like the original MVG display.

6.2 Summary

		Ongoing					Functional Minimum				Low Target				Desired Target						
Working on →		Design Doc	Concept Art	Physical Pr.	Introduce Bugs	Fix Bugs	Character Mechanics	Database System	One Subway Route	One Subway Station	All Ticket Inspectors	Basic UI	All Subway Routes	Graphics (w/o Anim.)	Fast Forward	Animations	Difficulty Scaling	Field of View	Random Events	Advanced UI	All Train Routes (U+S)
Physical	Week 43																				
	Week 44																				
	Week 45																				
Interim	Week 46																				
	Week 47																				
	Week 48																				
Alpha	Week 49																				
	Week 50																				
	Week 51																				
	Week 52																				
	Week 1																				
	Week 2																				
Final Test	Week 3																				
	Week 4																				
	Week 5																				

Most of the goals set in our desired target have been achieved. There were only a few slight adjustments. We removed all suburban trains except the S7 for the sake of simplicity. Since all suburban trains are riding on the "Stammstrecke", the stations where we used the default station scene were completely overloaded, because all suburban trains and the subway were arriving on only one platform, in contrast to the real world where they are split on 3 or more platforms. We have also ditched the random events due to lack of time.

6.3 Conclusion

The biggest technical difficulty was getting the trains to arrive on the correct time and leaving into the correct direction. Although this task was completed quite early, it only worked for one platform with a total of two trains at the same time. In the real world, a lot of stations have multiple platforms and more than two trains can arrive at the same time. Due to the initial architecture not considering this, we had problems later when adding stations which had more than one platform.

For us, the theme was very interesting, because we used two of the most well-known things in Munich: The Oktoberfest and the MVG. Without this theme, the idea of the game would have never been found.

In the future, we plan start using an issue tracking earlier. Also, we should test the whole game more frequently, instead of just testing the recent features. In our eyes, the greatest success in the game was the drunkenness effect. It looks and feels perfect.

To summarize this project, we are happy with the final result of the game and would consider it a success. But of course, there are always things you could improve or things you would really like to do but didn't have the time for.