Teamname: THE Settlers of Catan

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Executive Summary:

We will be developing an interactive web-based version of the popular board game *The Settlers of Catan*. Our game will provide the user with a unique experience with the use of 3D models, animations, and an interactive interface. Our game will be implemented using the Unity game engine and will be accessible to users across the internet, allowing users who love playing this game with their friends to play at a distance without a physical copy of the board game.

Description of the *The Settlers of Catan*:

Our project will be an online, multiplayer *The Settlers of Catan* interface. *The Settlers of Catan* is a popular board game in which players assume the roles of settlers, each attempting to build and develop settlements while trading and acquiring resources. Players are awarded points as their settlements grow, and the game ends when a player has reach a set number of points, typically ten. This interface will allow people to play with each other remotely or with an AI. The most important feature is that it will allow players to follow the rules of the board game in a virtual environment. Users will obviously need to be able to play a game from start to finish, following the rules of *The Settlers of Catan*. However, to make our system stand out, we will have several other features, including:

- **A beautiful graphical interface:** The interface will use 3D graphics in order to create an immersive experience for the user. The board tiles, resources, robbers, and all game pieces will have 3D graphics that keep the user engaged.

- **Intuitive and convenient user controls**: Our interface will have user controls that make the game easy to play. Whenever it is the user's turn, the interface will clearly notify him or her. It will provide a clean way to manipulate resources, build properties, and interact with other players. The interface will allow for seamless gameplay without frustration, something that the physical board game can sometimes lack. Another goal is to enable notifications, such as through email or text, for significant events, e.g. when a spot opens up in a game, or when it becomes the user's turn.

- **Customizable games**: We have several different options to choose from when considering the way time is handled by the system. Almost all in-person games are played in real-time, however, since *The Settlers of Catan* can take hours, we recognize not everyone has sufficient time to play an entire game through. Therefore, we will accommodate by allowing people to make moves in asynchronous fashion. One option used will be the ability for whoever creates a game to specify a maximum time gap between moves. Real-time games might use a few minutes, whereas long-term games could use hours or even days.

- **A user profile system**: Each user will have a profile the includes information such as their number of wins and losses, achievements, and information about his or her previous games.

Need for the Product:

The Settlers of Catan is a wonderful, well-balanced, and critically acclaimed board game guaranteed to entertain the user and up to three of their friends, as long as someone owns the game and everyone is in the same room as each other. However, the game is not easily accessible to groups of friends who are separated by large distances geographically. By creating an faithful online reproduction of the game, we will allow people to play this game when they are on vacation from University or on a business trip and unable to play in person. A computerized version of *The Settlers of Catan* will also allows players to quickly setup and organize the pieces and board to play on, a usually lengthy process.

Discussion of Competing Products:

The main competition is the *The Settlers of Catan* board game which our product is based on. The obvious advantage of our product over the original board game is that it is on the computer and it is networked. This allows people to easily play with friends or

with strangers anywhere in the world at any time. The clean interface will also automate many of the mundane tasks in the game, to help provide a faster flow of the game than would be possible playing with the board version of the game.

Altough there are already electronic versions of the game available, including playcatan.com and catananytime.com, our product aims to provide a different user experience from existing implementations of the game. Catan Anytime implements a simple 3D version of the board game, but does not allow for the user to interactively view the board by means of moving the camera. In addition, Catan Anytime does not have any animations. Play Catan is provided through the company who made the board game and there is a small community of about 1500 people that play on playcatan.com. Furthermore, our version of the game will have options for both real-time gameplay and asynchronous gameplay to accommodate users who do not have blocks of time to devote to playing, but can play over days or weeks.

Ultimately, gameplay and the rules behind the game will remain largely unchanged, so the main draws to our version of the game will be aesthetics and convenience.

Potential Users:

The target users are people who enjoy playing the *The Settlers of Catan* board game and want to play with either strangers on the internet or friends who are unable to play in person. The target audience has the potential to be quite large.There is a vast community of people who enjoy playing the board game, in particular students at universities. The level of technical sophistication of the target audience varies, but is quite irrelevant to the design of our product; it will cater to people of all technical backgrounds. With both real-time and asynchronous gameplay, our product caters to players with varying schedules and opportunities to play a game. A great example of a potential audience is a group of friends from school who are on break and wish to stay in communication and play their favorite game together.

Major Technologies Used:

Our implementation of *The Settlers of Catan* will involve various technologies, enabling our game to be aesthetically pleasing, interactive, and accessible on the web:

- **SQLite on Mono Server:** We will be using a Mono backend to support a database as well as allow for communication between Unity and the backend. Since Unity employs Mono, using Mono as the framework for the webserver will

simplify the calls to the database. Mono supports many database platforms, including SQLite3, which we will use.

- **Unity:** We will be creating the game using Unity as our engine. While Unity does not render as well as other available engines (for example, Unreal), it is easy to use and has good built-in browser plugin for easy networking. Some of our members already have familiarity with Unity and it has a lower learning curve than other engines.

- **Online Asset Stores / 3DSMax:** We will ideally find free 3D models online. When this fails we will either purchase models or create our own using Autodesk 3ds max.

- **AWS:** We will use AWS to host our game.

- **Unity Networking:** Unity has built in networking tools. Although other networks such as Node.js can be used with Unity, we foresee the built-in tools being sufficient for our needs.

- **C#:** Unity has 3 options for programming language: 1) C#, 2) Javascript, 3) A combination of the two. We will be using C# because the group overall has the most experience with systems languages, and we don't want to use a combination for the game itself because it would introduce unnecessary complexity.

- **HTML/CSS/Javascript:** We will use these for developing a front-end to the website that will be hosting the game. This is where players can register, find games, and check statistics.

- **Github:** We will use Github for our version control, per the course requirements.

Resource Requirements:

Although we can host on Heroku if need be, we would appreciate AWS credits for a more powerful server. This would allow for our product to support more games and more players at a given time than possible with Heroku.

We might need to purchase 3D models if we cannot find free models as we will not have time to create the more complex 3D models.

Potential Approaches:

We will use a combination of web technologies to build the infrastructure in the form of a web app.

Before we start, we will acquaint ourselves with Unity through means of online tutorials and documentation. After we are comfortable setting up our game framework using Unity, we will start building the infrastructure of the game and use github for version control.

First, we are going to focus on the game mechanics. *The Settlers of Catan* involve a set of nuanced game rules that involve multiple elements of the game. ie, how to draw a card? how to build a road? how to set up or upgrade a building? This will involve building basic graphics, the backend database structure for storage and the turn-based mechanics.

After the turn by turn game mode is finished, we will focus on the networking aspect of the game such that two players from two computers can play together over the web.

Then we will develop or acquire professional graphics to be combined into the web app to build a better visual experience. At the same time, we will be adding AI elements for a computer mode, where users can try to beat the computer implemented by our algorithms.

Towards the last 3 weeks of the development, we will start test runs with real Catan users and iterate based on user feedbacks. These will also involve guidance features where new users can follow the instructions to learn how to play the game easier.

In terms of our approach to development, we will use an agile structure. By utilizing an agile development approach, we can evolve our product over time and will allow us to solve logistical issues that arise mid-development as they appear. We focus on face to face communication and every week we will meet in person and code together. During that weekly meeting we will review our progress and also reassign the tasks to do every so often and ensure working software at every milestone.

Assessment of Risks:

There are many other ways we could have gone about implementing *The Settlers of Catan* game; we could have developed a mobile app for iOS or Android, we could have developed a desktop platform, we could have designed our own models from scratch, or we could have developed a very complicated AI for human players to play against.

- The risk with developing a mobile app for iOS or Android, as well as a desktop platform, is falling far behind. None of our group members have any experience with developing a mobile application for either OS, and a desktop version requires a lot more logistics than a web based game, as each player would have to have their own copy of the current state of the game and we would have to implement a system which would synchronize them all.

- Designing and creating 3D models from scratch requires a lot of time. With our group lacking any 3D model design experience, taking on the task of creating new models and giving them animations has the potential to become a huge risk to finishing our product.

- If we develop an AI, there are two risks: one is that we could develop a very simple AI which does not lend itself to a competitive opponent, while the other is we could develop an AI which is very complex and advanced lending itself to a very difficult, possibly even frustrating opponent. We want the user to enjoy playing against a computer opponent if we develop one, so the complexity of the AI will have to be very fine tuned and have only a certain level of intelligence.

Next Steps:

We have compiled a document that will be continually evolving with our product that will outline the tasks for each week. We will add to this document as new issues arise and as new features wished to be added. We will use this document to guide our efforts each week.

The first step that we will take is to introduce the group to all the technologies, languages, and platforms we will be using. This will require some of our group members to become comfortable using tools such as Unity and new languages, namely C#.

Next we will try to define a basic outline for the entire project by fleshing out all the necessary components and the interfaces between the components that we'll require. After creating this framework we will use it to divide the work between the five of us.

We will set weekly milestones as we go, but for the mid-quarter demo we would like to have a basic implementation of the game ready. The implementation would not involve web development and will be a hot-seat version of the game where users switch off. Once we have a working game with all of the rules integrated, we will split off into subgroups which will focus on different areas of future development, including web integration, more advanced 3D models and graphics, improving the user interface, and developing an AI for users to play against.