

## Product Vision

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## **1 Introduction**

Tygron is a company that builds serious games for urban planning. Communities can generate and maintain realistic games to find solutions for city design and development projects. A game consists of a scenario in which several players play different roles, these players are real people. The goal of the virtual humans for serious gaming context project is to develop virtual humans that simulate the people in the tygron game. Virtual humans can ensure that a serious game can be played even when not all players in the scenario are present. In this document we will describe our product vision for this project. By defining our vision, it is clear for everyone what the purpose of this product is and why we are doing this project.

## **2 Target Customer**

As already stated in the introduction, Tygron builds serious games for urban planning. Those games are meant to be played by real people as described by the company Tygron (Tygron, 2016). Tygron is interested in simulating those people by virtual humans and is therefore our target customer.

Tygron wants to ensure that a game can be played, even when not all the players in a scenario are present. Virtual humans are the solution to that. Those virtual humans have to make decisions and actions in such a way, that it can be compared to a real human. While finding solution to city design and development projects, it is important that all the communities in a scenario are present. The absence of a community can have a major effect on the final solution to a scenario. A not good functioning virtual human, can therefore have an effect on the final solution to a scenario as well.

### 3 Addressing the customer needs

When a session of the game is played it is possible that not all the stakeholders are currently present to take part in the game. Especially when the group of stakeholders is large it is hard to get them all together to play the game. To ensure that a serious session of the game can be played even when not all the stakeholders are present to take part, we need an agent or multiple agents to replace the roles of those stakeholders.

The main goal that the product aims to satisfy, is the possibility to replace one of the roles that are meant to be played by a human. This includes more than one thing. First of all, the agent that represents one of the roles present in a session of the game has to understand the needs of the represented stakeholder. The goal of the agent is to come to an understanding with the other stakeholders in a way that is optimal or close to optimal for the stakeholder that the agent replaces. To be able to do this, the agent is able to proficiently negotiate with the other players of the game. To be able to reach the best possible outcome for the represented stakeholders is not easy. There are multiple strategies for accomplishing results that are optimal for every user, but when negotiating with humans the results of these strategies vary.

*“In essence, assumptions in most research are made that do not necessarily apply in genuine negotiations with humans, such as assuming complete information or the rationality of the opponent negotiator. In this sense, both parties are assumed to be rational in their behavior (for example, the decisions made by the agents are described as rational and the agents are considered to be expected utility maximizing agents that cannot deviate from their prescribed behavior). Yet, when dealing with human counterparts, one must take into consideration the fact that humans do not necessarily maximize expected utility or behave rationally. In particular, results from social sciences suggest that people do not follow equilibrium strategies.”*(Lin & Kraus, 2010)

Our agents aim to be able to handle these kind of problems and come to an understanding with the other players of the game while optimizing the specified outcome for the stakeholder the agent is representing.

## 4 Product Attributes

Like stated before, the goal of this product is to replace people in the Tygron engine using agents. These agents should be able behave like a human being. There are several attributes in our agent that will help to make this agent perform like a normal human being. Our agent needs to pursue a goal, by performing actions on the map and negotiating with other agents.

### 4.1 Goal

The goal of each entity in the game is set beforehand. Our agent will represent the TU Delft in the TU-wijk. Here the TU Delft has several goals and interests. For example there are a few faculties that need to be rebuilt or renovated and this needs to be done within the budget available. A couple of these faculties are EWI(Bonger, 2016) and CiTG(*Renovatie faculteitsgebouw CiTG*, n.d.). Also, the TU Delft wants to build a new faculty and keep the place as green is possible. All these goals are normally tried to accomplish by humans, but this time our agent will try to accomplish them. He needs to do this by working like a human would. So the goals are the first attributes that are needed to satisfy the customer.

### 4.2 Actions

There are four main actions in the game. These actions represent human actions to get things done in the world of Tygron. The actions are **build**, **destroy**, **buy** and **give money**. All the actions are needed to accomplish specific goals, so the implementation of the agents will mainly consist of reacting to the environment by doing one of the previous actions. This means the actions are really important for the game and normal humans would also use these options all the time. This means optimizing when to use them is very beneficial and that makes it an important attribute.

### 4.3 Communication

Not all actions can be done without permission from another entity in the game. This entity can be another person or an agent. So there needs to be some sort of communication to get permission from other agents. Without this, it's impossible to achieve your goals. For example, if the TU Delft want to build a new faculty on the ground of the town, it needs permission to do so. And the major might have certain demands on the building, for example a limit on the amount of stores. All these things need communication to happen, so it is important to have communication in the game as one of the elements. Actual humans playing the game communicate a lot by directly talking to eachother to make deals. An agent obviously can't talk, but can

also send messages in game. So the last attribute to simulate humans using agents is to let the agents communicate with each other. A special language could be written to do so: so there needs to be an ontology (Obitko, 2007).

## 5 Competitors

There are only a couple of products our product can compare against, and those products are the agents the other teams will write. But, because we just started on the project, the other teams haven't written their agents yet, so we cannot yet compete with them. This will obviously change when the project continues and at that point we will try to compare our agents against theirs to eventually optimize both of them. There is no documentation of the agents that were created during last years context project therefore we can't compare our agent to the agents that we're created before. Our agent will only work with the tygron engine and up to now the engine doesn't have the ability to be used without each of the parties being controlled by a human.

Our product will make it possible to use the tygron engine without all the parties present. So that a single party can plan its features without the need for all other parties to be present. Of course this will only be an indicator as the agent might make different decisions than the person it replaces, but replacing the person representing the party with a different person would likely have the same effect.

Our agent will specifically represent The Delft University of Technology, this means it will act as an instance that want's to keep its buildings up to date, while making sure that most of the students and all studies can be accommodated at all times. The agent will also want to make sure that all buildings can be easily reached by public transit.

## **6 Timeframe and Budget**

The product is going to be developed during a student project therefore the timeframe is quite limited. The project has a duration of ten weeks and is worth ten ECTS (European Credit Transfer System) for each of the five students. Which means every student will have about 25 to 30 hours available per week to work on the project. After these ten weeks the product should be finished. Therefore a strict planning is needed.

The students will not receive any payment for their work. Only the TU delft and Tygron will make some costs for this project. Both will have to assign some of their employees to help the students with the development of the product. Tygron needs to maintain a server for the students to work on and also needs to provide a workspace every tuesday morning.



## References

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